

**EXAMINING SPATIAL DYNAMICS OF AN URBAN FRINGE**  
*A Case Study of Nairobi-Kiambu Corridor*

**By**

**NJOROGE CASTY GATAKAA MBAE**  
**DEPARTMENT OF URBAN AND REGIONAL PLANNING**  
**UNIVERSITY OF NAIROBI**

**A THESIS SUBMITTED IN PART FULFILMENT OF THE REQUIREMENT FOR  
THE DEGREE OF MASTER OF ARTS IN URBAN AND REGIONAL PLANNING,  
UNIVERSITY OF NAIROBI**

**AUGUST 2005**

## DECLARATION

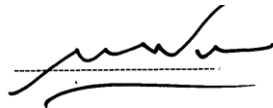
I hereby declare that this thesis is my own original work and has not been presented in any other University.



Signed:

**Njoroge Casty Gatakaa Mbae  
(Candidate)**

This thesis has been submitted for examination with our approval as University supervisors



Signed:

**Prof. E. Ndegwa  
Senior Lecturer  
Department of Urban and Regional Planning**



**Mr. M. Mbathi  
Lecturer  
Department of Urban and Regional Planning**



**DEDICATION**

**To  
My children**

**Davis Wambugu  
Brian Muthomi  
&  
Faith Wanjiru-Baby Chiru**

## **ACKNOWLEDGEMENTS**

I am greatly indebted to the Director of Personnel Management of the Kenya Government for allowing me to proceed on a two-year study leave, the period within which I undertook my study. My indebtedness also goes to the Ministry of Lands and Housing, Department of Physical Planning for meeting the cost of my study.

My gratitude and profound thanks go to my supervisors, Prof. Ndegwa and Mr. Mbathi for the invaluable advice and support they rendered to make this thesis a success. I cannot forget to thank, other lecturers from the Department of Urban and Regional Planning, for the constructive advice they rendered in shaping my research proposal. I wish also to thank my classmates for the moral support and teamwork in our endeavour to accomplish the studies. My thanks also go to my colleague Mr. Oguya, for the assistance he rendered in GIS applications.

My special thanks go to my husband for the patience, assistance, and support he provided during those hectic moments. I cannot forget to thank my sons, Mbugu and Thomi for bearing with my absence as well as taking care of their little sister. As for Baby Chiru, she was the source of my inspiration to go on.

I wish to acknowledge all those who assisted me in one way or another, it may not be possible to put all the names here but, I acknowledge your help and wish you God's blessing. Above all, I thank the almighty God for making it possible for me to accomplish my studies.

## **ABSTRACT**

Planning at the urban fringe has posed long standing challenges, including: the loss of agricultural land, inadequate public facilities, development pressures, lack of up to date data on land use changes, and institutional weaknesses. Planners and policy makers have responded to these challenges with a variety of policies, regulatory approaches, and institutional frameworks.

In Kenya, and particularly within Nairobi fringe, lack of a clear institutional and legal framework to manage urban fringe has led to widespread urban sprawl. This is evidenced by occurrence of unplanned settlements, loss of open space/green areas and farmland in the urban fringe, inadequate provision of infrastructure facilities such as sewage and solid waste disposal systems, congestion on transportation networks, environmental degradation, and others.

It has been noted that there are about 50 legislations dealing with land use and tenure in Kenya. Evidence however shows that these policies have not been adhered to because to this day, prime agricultural land is being subdivided and converted to urban land uses, forests are being cleared for human settlement, and physical planning standards are not being adhered to around the Nairobi periphery.

To address planning problems and dynamic nature of the urban fringe, the government recently passed a declaration on the minimum subdivisions of agricultural land to 2.5 acres or one hectare. Though the declaration has received various criticisms, it was an eye opener to various loopholes in the planning legislations. It is also a challenge to those who are aggrieved to give an appropriate minimum size that would be agriculturally economical.

The study has showed that urban fringe is fluid and its dynamics cannot be easily managed. Thus a strong authority, equipped with new technologies such as Remote Sensing and Geographical Information Systems is necessary to monitor the land use changes and guide the same to avoid future land use conflicts. The study also found out that, existing land laws have ignored the importance of special planning of urban fringes as had been provided by Town Planning Act Cap 134 and this has made the fringe areas a no mans zone in development control. There is therefore need to entrench the planning of fringe areas into an act to legitimize the planning. Lastly, public/private partnership in management of urban fringes was found to be more effective in achieving sustainable development.

## TABLE OF CONTENTS

|   |      |
|---|------|
| SPATIAL DYNAMICS OF AN URBAN FRINGE.....  | i    |
| DECLARATION .....   | ii   |
| DEDICATION.....   | iv   |
| ACKNOWLEDGEMENTS .....  | v    |
| ABSTRACT .....  | vi   |
| TABLE OF CONTENTS.....  | vii  |
| LIST OF TABLES.....   | x    |
| LIST OF CHARTS .....  | xi   |
| LIST OF MAPS.....   | xii  |
| LIST OF PLATES .....  | xiii |
| CHAPTER ONE: INTRODUCTION.....  | 1    |
| 1.1 Introduction.....   | 1    |
| 1.2 Problem statement.....  | 3    |
| 1.3 Objectives .....  | 5    |
| 1.4 Assumptions.....  | 5    |
| 1.5 Justification of the study .....  | 6    |
| 1.6 Scope of the study.....   | 7    |
| 1.7 Research Methodology .....  | 7    |
| <b>1.7.1 Data collection</b> .....  | 9    |
| <b>1.7.2 Sampling Technique</b> .....   | 10   |
| <b>1.7.3 Data Analysis</b> .....  | 10   |
| <b>1.7.4 Data interpretation and report writing</b> .....   | 11   |
| <b>1.7.5 Summary of research design</b> .....   | 11   |
| 1.8 Study Limitations.....  | 12   |
| 1.9 Organization of the study.....  | 12   |
| CHAPTER 2: LITERATURE REVIEW .....  | 14   |
| 2.1 Introduction.....   | 14   |
| 2.2 Urban sprawl.....   | 14   |
| <b>2.2.1 Introduction</b> .....   | 14   |
| <b>2.2.2 Causes of urban sprawl</b> .....   | 15   |
| <b>2.2.3 Impacts of urban sprawl</b> .....  | 16   |
| 2.3 Concept of fringe .....   | 18   |
| <b>2.3.1 Introduction</b> .....   | 18   |
| <b>2.3.2 Urban fringe policies</b> .....  | 19   |
| <b>2.3.3 Agriculture on urban fringe</b> .....  | 20   |
| <b>2.3.4 Vegetation on urban fringe</b> .....   | 21   |
| 2.4 Determinants of land use in urban areas .....   | 22   |
| <b>2.4.1 Introduction</b> .....   | 22   |
| <b>2.4.2 Alonzo’s classical theory of land use</b> .....  | 23   |
| <b>2.4.3 Transportation –oriented Theory of Land use by Wingo</b> .....   | 24   |
| <b>2.4.4 Social-oriented theory of land use by Firey</b> .....  | 26   |
| <b>2.4.5 Land use determinants by Harver, (1996)</b> .....  | 26   |
| 2.5 Application of Remote Sensing and Geographical Information System in the<br>management of land use changes in urban areas ..... | 28   |
| <b>2.5.1 Introduction</b> .....   | 28   |
| <b>2.5.2 The importance of using GIS and RS</b> .....   | 30   |
| <b>2.5.3 Limitations of GIS and RS</b> .....  | 30   |
| 2.6 Spatial planning and Politics.....  | 30   |
| <b>2.6.1 Introduction</b> .....   | 30   |
| <b>2.6.2 Improving spatial planning:</b> .....  | 32   |

|   |    |
|---|----|
| 2.7 Towards a new approach to management of urban fringe .....                                      | 34 |
| <b>2.7.1 Strategic objectives and policies</b> .....  | 34 |
| <b>2.7.2 Local management</b> .....   | 35 |
| <b>2.7.3 Implications for implementations</b> .....   | 35 |
| <b>2.7.4 Implications of local government</b> .....   | 36 |
| <b>2.7.5 New management laws of the urban fringe</b> .....  | 37 |
| 2.8 Summary .....   | 39 |
| CHAPTER THREE: THE STUDY AREA .....   | 42 |
| 3.1 Nairobi City .....  | 42 |
| <b>3.1.1 Planning experience</b> .....  | 43 |
| 3.2 Kiambu District .....   | 44 |
| 3.3 Municipal Council of Kiambu .....   | 46 |
| <b>3.3.1 Historical development</b> .....   | 46 |
| <b>3.3.2 Physical characteristics</b> .....   | 47 |
| <b>3.3.3 Population, demography, and housing</b> .....  | 49 |
| <b>3.3.4 Infrastructure services and community facilities</b> .....                                 | 51 |
| 3.4 Summary .....   | 57 |
| CHAPTER FOUR: POLICY INSTITUTIONS FOR MANAGEMENT OF<br>URBAN FRINGE .....                           | 59 |
| 4.1 Introduction .....  | 59 |
| <b>4.1.1. Land tenure and land use legislations</b> .....   | 59 |
| <b>4.1.2 Environmental Legislations</b> .....   | 60 |
| <b>4.1.3 Forestry legislation</b> .....   | 60 |
| <b>4.1.4 Water Laws</b> .....   | 61 |
| <b>4.1.5 Public Health Act</b> .....  | 62 |
| <b>4.1.6 Constitution of Kenya</b> .....  | 63 |
| 4.2 Historical background of land use planning laws in Kenya .....                                  | 63 |
| 4.3 Physical Planning statutes .....  | 64 |
| <b>4.3.1 The Town Planning Ordinance, 1931 (CAP 134)</b> .....                                      | 64 |
| <b>4.3.2 The Land Planning Act 1968 (CAP 303)</b> .....   | 65 |
| <b>4.3.3 Physical planning Act (Cap 286)</b> .....  | 66 |
| <b>4.3.4 Local Government Act (Cap 265)</b> .....   | 68 |
| 4.4 Institutional Analysis .....  | 70 |
| <b>4.4.1 Introduction</b> .....   | 70 |
| <b>4.4.2 Central Government</b> .....   | 71 |
| <b>4.4.3 The Local Authorities</b> .....  | 73 |
| <b>4.4.4 Local Communities along Nairobi Kiambu Corridor</b> .....                                  | 73 |
| 4.5 Summary .....   | 74 |
| CHAPTER 5: RESEARCH FINDINGS .....  | 76 |
| 5.1 Introduction .....  | 76 |
| <b>5.1.1 Demographic characteristics</b> .....  | 76 |
| <b>5.1.2 Land tenure</b> .....  | 77 |
| 5.2 Land use changes .....  | 78 |
| <b>5.2.1 Change in Vegetation Cover</b> .....   | 79 |
| <b>5.2.2 Land Subdivisions</b> .....  | 81 |
| <b>5.2.3 Land use change in Built up area</b> .....   | 84 |
| 5.3 Causes of the subdivisions and increase in built up area .....                                  | 86 |
| 5.4 Consequences of Land subdivisions, land cover clearance and increase in built up areas<br>..... | 93 |
| <b>5.4.1 Reduction of farm sizes</b> .....  | 93 |
| <b>5.4.2 Unplanned settlements</b> .....  | 93 |
| <b>5.4.3 Environmental degradation</b> .....  | 95 |



|  |     |
|--|-----|
| <b>5.4.4 Lack of up to date data</b> .....   | 95  |
| <b>5.4.5 Legal/institutional conflicts</b> .....                                     | 96  |
| <b>5.4.6. Inadequate infrastructure</b> .....  | 96  |
| 5.7 Summary .....  | 98  |
| <b>CHAPTER SIX: A FRAMEWORK FOR MANAGEMENT OF URBAN<br/>FRINGE DEVELOPMENT</b> ..... | 99  |
| 6.1 Introduction.....  | 99  |
| 6.2 Preparation and implementation of Physical development Plan.....                 | 100 |
| 6.3 Strengthen planning institutions .....   | 100 |
| 6.4 Harmonize land use legislations .....  | 102 |
| 6.5 Adopt new technologies in data acquisition .....                                 | 104 |
| 6.6 Public/ private partnership in management of urban fringe.....                   | 105 |
| 6.7 Summary and Recommendations .....  | 105 |
| 6.8 Conclusions.....   | 106 |
| List of References .....   | 108 |
| <b>Appendices</b> .....  | 113 |

## LIST OF TABLES

|  |    |
|--|----|
| Table 1: Ecological Zones .....  | 48 |
| Table 2: sewage waste disposal .....   | 53 |
| Table 3: Pre-primary enrolment and The Number of teachers by Operators ..... | 56 |
| Table 4: primary and Secondary school enrolment by Sex .....                 | 56 |
| Table 5: Respondents Level of Education attained.....                        | 76 |
| Table 6: Types of Forest cover by areas they occupy.....                     | 79 |
| Table 7: Land Acquisition .....  | 87 |
| Table 8: Place of work .....   | 87 |
| Table 9: Land Tenure types in Kiambu Municipality.....                       | 88 |
| Table 10: Private land ownership .....                                       | 88 |
| Table 11: Mode of Transport .....  | 97 |

## LIST OF CHARTS

|                                      |    |
|--------------------------------------|----|
| Chart 1: Methodology Flow Chart..... | 8  |
| Chart 2: Sources of Water.....       | 52 |
| Chart 3: Solid Waste Disposal.....   | 54 |
| Chart 4: Sources of water.....       | 90 |
| Chart 5: Adequacy of water.....      | 98 |

## LIST OF MAPS

|  |    |
|--|----|
| Map 1: Regional Setting of the Study area .....                              | 45 |
| Map 2: Road Network in Kiambu District.....                                  | 55 |
| Map 3: Karura forest by 1954.....  | 80 |
| Map 4: Karura Forest by 2003 .....   | 80 |
| Map 5: Karura Forest 1954/2003.....  | 80 |
| Map 6: Land sizes in 1954. A case of L.R Number 7022.....                    | 81 |
| Map 7: Part of L.R. No. 7022 in 2000 .....                                   | 83 |
| Map 8: Land subdivisions along the Nairobi-Kiambu Municipality boundary..... | 83 |
| Map 9: Built up area by 1954 .....   | 84 |
| Map 10: Built up area by 1978 .....  | 85 |
| Map 11: Built up area by 2003 .....  | 85 |

## LIST OF PLATES

|   |    |
|---|----|
| Plate 1: Controlled developments at muthithi Estate.....                                    | 78 |
| Plate 2: Thindigwa Estate      Plate 3: Blocks of flats at Kasarini Estate.....             | 79 |
| Plate 4: Sasamua water line .....   | 91 |
| Plate 5: Urban developments on the former coffee farms and the clearing of coffee crops.... | 92 |
| Plate 6: Muthithi estate .....  | 94 |

# CHAPTER ONE: INTRODUCTION

## 1.1 Introduction

Urban areas in Kenya are growing at unprecedented rates, creating management concerns. Many of farmlands, wetlands, and forests that formed Kenya in 1950s have been transformed during the past 50 years as a result of human settlements development. Almost everyone has seen these changes in their local environment but without a clear understanding of their impacts. It is not until a study on these land use changes has been carried out from a spatial perspective and the time scale of decades that one begins to measure the changes that have occurred and predict the impact of changes to come. This will then assist decision makers in deciding the steps to be taken towards sustainable development. Land and natural environment are limited resources that are often strained by growing population and poor land use planning. Their proper management is therefore important for their sustainability. Population growth and development at the interface between urban areas and rural agricultural regions of urban areas are creating challenges for planners, local governments, residents, and farmers. Urban development in relatively rural areas with limited local services and infrastructure can lead to conflicts concerning the level and quality of services provided in the community. Non-farm development also impacts on agriculture, with the loss of farmland and the difficulties of farming amidst large non-farm population. This interface between the urban and rural areas is what constitutes the urban fringe.

An urban fringe is the space into which a town or city extends as a result of process of dispersion or urbanization (Cater, 1973). It is transitional in nature and has been referred to as peri-urban, suburban, septic fringe area, shadow area, and many other descriptions (Simiyu, 2002). The descriptions differ from country to country. In developing countries for instance, fringe areas are associated with disorder and service deficiencies, while in developed countries, suburban regions are associated with high-income residents. Urban fringe is commonly lumped together with urban sprawl. Urban sprawl is defined as land development that takes place at the periphery of expanding urban areas. (Louis, 1971). In the geography literature however, the term refers to the area in which suburban growth takes place and where rural and urban land uses are mixed together to form a transition

zone between rural and urban areas. A complex mix of factors causes urban sprawl, including;

- Lack of specific national and local policies needed to address urban sprawl
- Population growth
- Poverty and
- Flight from central places by the elite in search of greener areas.

Urban sprawl has major impacts on the urban fringe due to the fact that the developments are unplanned leading to land use conflicts such as loss of open space/green areas and farmland in the suburbs that spring up, inadequate provision of public facilities such as sewage and solid waste disposal systems, transportation networks, inadequate education facilities, healthy facilities, electricity and water, as well as environmental degradation.

Hall (1973) recognized the need for management of urban fringe to conserve open spaces and agricultural land in Britain. He emphasized on a policy of “urban containment”, which would forbid settlement development on productive land where less productive land was available. By so doing, Urban Containment would stop towns spreading to preserve agricultural land and give adequate access to the countryside for the recreation to town’s people. This idea has been envisioned by various countries, through policy plans which, direct human settlement development towards less productive land. In Kenya for example, the impact of urban sprawl on agricultural land was recognized in the early 1960s in Nairobi fringe. King’oriah (1980) noted that the government had started acquiring agricultural land with large coffee farms that were not subdivided in the Nairobi’s periphery in an effort to create a land bank and protect agricultural land. In the preparation of the Nairobi Metropolitan Growth Strategy (1973), Nairobi’s growth direction was recommended towards which the future city boundary extensions were expected to take place; the direction was aimed at protecting agricultural land. It recommended that urban development of Nairobi should not be permitted to take place to the North and west of the Kikuyu plateau but was to be channelled across the lower plains towards Thika. This deliberate move to change the direction of city growth was aimed at preserving the rich agricultural land higher up on the plateau from urban encroachment.

Evidence however shows that these policies were never adhered to because to this day, agricultural land is being subdivided and converted to urban land uses within the Nairobi periphery. Various studies have revealed that land subdivision of agricultural land on urban periphery is prevalent. This has raised concern because in a country where agriculture is the backbone of economy with only 20% of arable land, there is need to protect such land. The Minister of Lands and Housing on recognizing the impacts of urban sprawl on agricultural land, has limited the size of subdivision of agricultural land to one hectare or two and half acres. This is aimed at protecting agricultural land from urban land uses, (Daily Nation, 6<sup>th</sup> April, 2005).

A study on management of land use changes in an urban fringe can therefore provide the much needed information about the land use changes that are taking place in urban fringe of Nairobi and thereby can play an important role in planning and managing of the city.

## **1.2 Problem statement**

Influx of population in urban territories due to migration from rural areas coupled with rapid natural urban population growth has over spilled the urban boundaries and disturbed the urban ecological balance. Most major Metropolitan areas in developing countries face the growing problem of urban sprawl, leading to haphazard developments, loss of natural vegetation and open areas, wetlands and wildlife habitat, farmland and forests. The problem has always been the unplanned settlements and the conversion of the high potential agricultural/green land into urban land uses. In Kenya this raises serious questions on the country's development with only 20% of arable land. Sprawl is not a static phenomenon but rather a continuous process as every year agricultural land is converted to urban land uses. Though the percentage converted may not be very big, unplanned development scattered all over the urban fringe destroys agricultural land, making farming on the urban fringe uneconomic. A major issue associated with urban sprawl is inadequate provision of public facilities such as sewage and solid waste disposal systems, transportation networks, education facilities, healthy facilities, electricity and water. Urban developments are usually not matched with infrastructure



development. Infrastructures services are therefore strained; resulting into traffic jams, water rationing, irregular electricity supplies, and environmental degradation.

In the past, Town Planning Act Cap 134 had a provision where the Central Government through a Central Government Authority had control over land within three mile from the urban boundary and 400 feet from major highways. This is lacking in the Physical Planning Act Cap 286 and Land Control Act Cap 302. Urban fringe therefore lacks legal planning backing, hence becomes a no man's management zone and urban sprawl occurs within these areas without any control or monitoring of the developments. This has had major negative impact on social and cultural, economic and environmental sustainability. Nairobi-Kiambu Corridor is a good example where urban sprawl has occurred, and former coffee estates have been subdivided into uneconomical agricultural land.

It is important to note that urban growth rates in Nairobi show no signs of slowing, especially when viewed at the rate of built up area trends and patterns even after the Minister's directives. Though the Minister of lands and Housing prohibited (Daily Nation 6<sup>th</sup>, April, 2005) the subdivisions of agricultural land below an hectare or two and half acres, where such land had already been subdivided and issued with titles, he recommended change of user from agricultural to 'others'. Though this may be a good move, little considerations have been put on provision of other services that goes hand in hand with land use change, such as roads, water, electricity, schools, hospitals, and others. It is also important to note that, management and planning of urban space requires spatially accurate and timely information on land use and changing pattern. Monitoring provides the planners and decision makers with required information about the current state of development and the nature of changes that have occurred. Spatial and temporal distribution of land use/land cover information and its changes is desirable for any planning, management and monitoring programmes. This information not only provides a better understanding of land utilization aspects but also plays a vital role in the formulation of policies and program required for developmental planning. Planning means the assessment of future and making provisions for it. Thus for ensuring sustainable development, it is necessary to monitor the ongoing changes in land use pattern over a period of time.(Srivastava & Gupta, 2004). This requires the present and .

past land use /land cover information of the area and pattern of changes with respect to urban settlement and other local resources.

The purpose of the study is therefore to examine spatial dynamics on the urban fringe and propose planning approaches that can be adopted for sustainable development of the area.

### **Research Questions**

The study seeks to answer the following questions:

- What land use changes are taking place on Nairobi-Kiambu Corridor?
- What are the causes of the land use changes along Nairobi- Kiambu Corridor?
- What are the consequences of land use changes along Nairobi-Kiambu Corridor?
- How can urban fringe development be managed to accommodate land use changes and minimize land use conflict?
- Where has urban fringe development been sustainably managed in Kenya or other countries? Are the approaches adopted in the management of urban fringe developments in such areas applicable to the study area?

### **1.3 Objectives**

- To identify the main land use changes taking place along Nairobi-Kiambu corridor
- To establish the causes of land use changes on Nairobi-Kiambu corridor
- To find out the consequences of land use changes along the corridor
- To recommend planning policies, guidelines, and institutional framework to manage Nairobi-Kiambu corridor for sustainable development

### **1.4 Assumptions**

The study was based on the following assumptions

- a) The proximity of Kiambu municipality to Nairobi city and the provision of infrastructure (accessibility) make it a dormitory area for Nairobi's residents.
- b) Land use changes at the fringe area has led to subdivisions of agricultural land to uneconomical sizes
- c) Unplanned settlement on the urban fringe is as a result of legal and institutional weaknesses of the planning unit

### **1. 5 Justification of the study**

Globally, sustainable development is the focus of development programmes .The recognition of interdependence of regions in environmental co-existence promotes studies towards sustainable development. Karura forest falls within the study area, and it would be important to find out the amount of forest that has been lost to urban land uses and the associated consequences.

The main problem of land use changes on urban fringe in Kenya as indicated above is lack of clear policies on how best to manage the use of land at the urban fringe. Existing planning policies are geared towards management of well-defined areas and the county council manages land outside the urban area. Land use changes in the urban fringe of Nairobi city can provide important information that can be used in formulation of policies to manage other urban fringe in the country.

The result of the study also showed the patterns and trend of urban developments along Nairobi-Kiambu Corridor. The insights gained from the study are useful in modelling future growth pattern of Nairobi-Kiambu Corridor and other corridors that would therefore provide general principles of corridor development management. The research output is also expected to assist in developing infrastructure and other public utilities.

Sustainability of the social economic standards of the landowners within the peri-urban agricultural land is also at stake. Reconnaissance field survey revealed cases where the sale of such land has left them worse off. Money gotten from such sales is either embezzled by the cooperative officials or spent on lavish lifestyle and only a few utilize it

on viable projects. The study hopes to suggest ways of ensuring that stakeholders at the urban fringe benefits from the development taking place along the corridor.

### **1.6 Scope of the study**

Urban fringe from an operational point of view can be defined as an area of transition between the well recognized urban land uses and the area devoted to agriculture. In other words, it is the area of mixed urban and rural land uses between the points where the entire range of the city services ceases to be available and the point where agricultural land uses begun to predominate. There is absence of a clear break between rural and urban condition measured both in terms of land uses and of the social organization, making it important to define clearly the area under study. This study is focused along the Nairobi-Kiambu Corridor, defined by Nairobi- Kiambu Road. This is based on the assumptions that urban land uses are influenced by accessibility as discussed by Alonso and Wingo (Alonso, 1964). The area under study will be about 2 kms stretch of land on the eastern side of the Nairobi-Kiambu road starting at Karura forest, to Kiambu Roundabout in Kiambu town. The reason for studying one side of the road was the limited time, and after finding out that very little changes were taking place on the western side of the road.

The area represented part of the most potential agricultural land in Nairobi and Kiambu that has been encroached by the urban sprawl. This is also a high potential agricultural land which the government had aimed at protecting from urban encroachment as noted in the 1973, Nairobi Metropolitan Strategy.

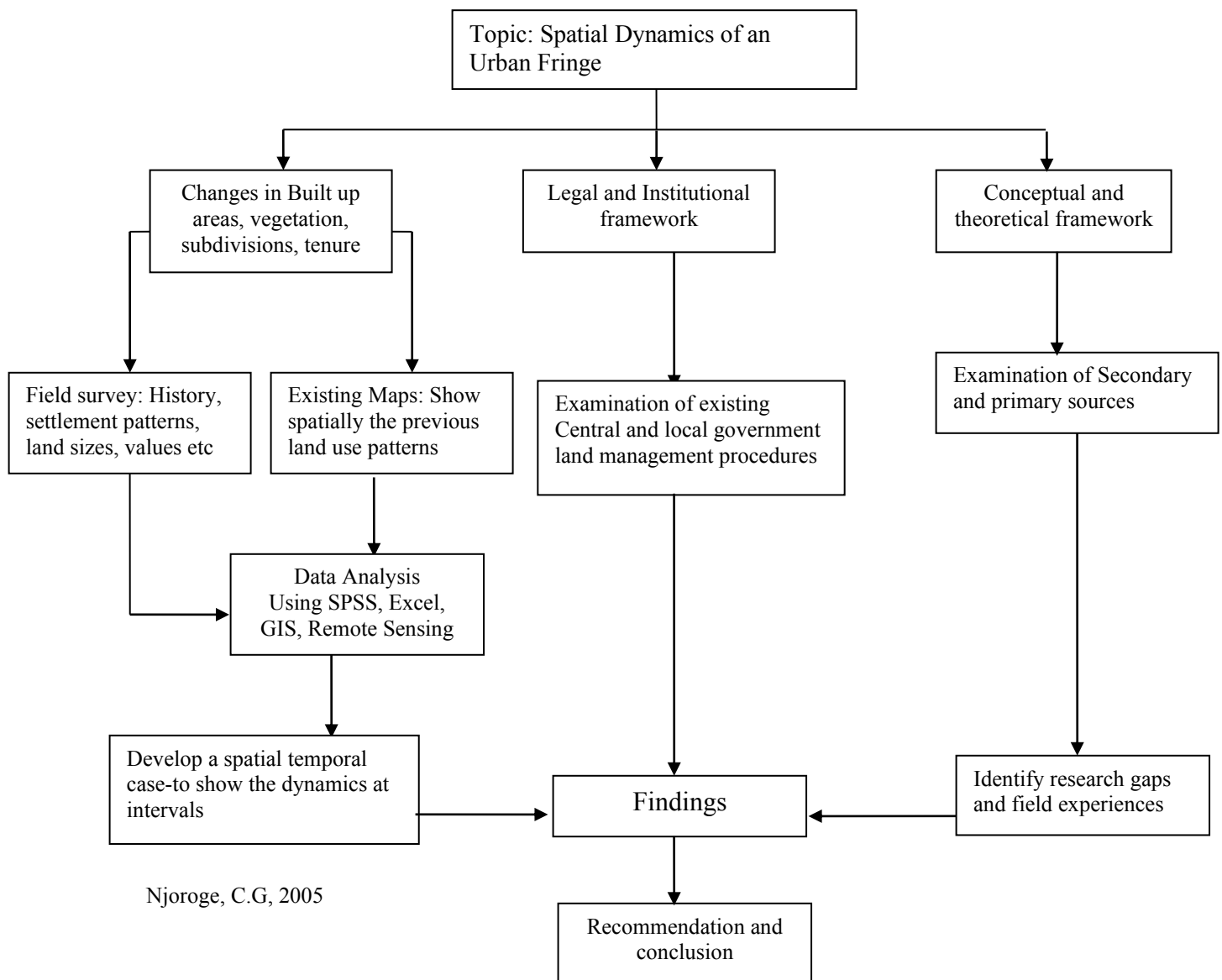
### **1.7 Research Methodology**

In order to obtain the required information, various methods were utilized. The methodology entailed collection of data from both secondary and primary sources. The study basically dealt with the land use changes from agricultural to urban land uses. Three major variables to identify the land use changes were used, namely, built up area, subdivisions and vegetation cover.

Due to the multiplicity of land laws that sums to over 50 statutes in Kenya, emphasis was laid on the specified legislations that are relevant to this study. They include, Land Control Act, Physical Planning Act, Town Planning Act, Local Government Act and Agricultural Act.

The overall methodology process adopted is outlined in the chart below;

**Chart 1: Methodology Flow Chart**



### **1.7.1 Data collection**

The major sources of data collection were as follows,

#### a) Documentary Research:

This entailed secondary information generation. It involved collecting information from legislative documents and other relevant documents among them, Agricultural Act, Physical planning Act, Physical Planning Handbook, Land Control Act, etc. They were used to determine the existing laws that had impact on the urban fringe. Others included books, journals and publications on Urban sprawl management. The study was carried out to understand the existing legislative policies, how urban sprawls have been dealt with in Kenya and other countries, and discover the gaps that need to be explored. They included land and planning policies, Agriculture production and policies, among others. The information gathered forms the basis of broad topic to be studied.

Kiambu and Nairobi Lands office was visited to get maps and other information related to land along the corridor. Kiambu municipal council and Nairobi city council offices were also visited to get information on land uses and development control.

#### b) Direct observations

It started with reconnaissance survey that familiarized the researcher on the existing situation along the corridor. Reconnaissance surveys were carried out before the formulation of problem statement and before the actual field surveys were carried out to help the researcher obtain an institutional grasp of the subject and suitable sampling design for the study area. Direct observations were however, a continuous process during the field study. During the reconnaissance survey, stakeholders were identified and their relationships established which further enriched the research tools and instruments for carrying out the field survey.

#### c) Field survey

Once the stakeholders were identified, formal and informal discussions were carried out. The discussions generated the information on historical land use changes in the study area, advantages and disadvantages of the land changes and the general preferences. The methods used to generate the information were;

- Household and institutional questionnaires, Household questionnaires were prepared to gather information on the patterns of human settlement, land tenure, preference of persons towards the land use changes along the corridor. Institutional questionnaires aimed at shedding light on institutional framework, existing land use policies, and management techniques for urban fringe.
- Interviews were also carried on selected individuals such administrative officers, forester, water department, and others who were able to shed light on impacts of urban sprawl on resource management
- Focused Group Discussions were carried out to gather information on community views on urban sprawl and their impacts.

### **1.7.2 Sampling Technique**

Key informants were interviewed such as the administrative office, the forester, Physical Planning Officer, Land Officer, Agricultural Office, and others.

On household questionnaire however, systematic sampling was employed. This being a descriptive study in which a maximum of 30 samples are representative, a total of 98 questionnaires were administered. The first step was to establish the number of households within the study area. Systematic random sampling was carried out starting at a random point and taking every k<sup>th</sup> household to be included in the sample. These ensured that all households within the corridor were included and represented sufficiently.

### **1.7.3 Data Analysis**

Data obtained from the field cleaned, coded and keypunched into a computer for analysis. Computer Software used for analysis included Statistical Package for Social Sciences (SPSS), Excel and Ms Access. The data analyzed included, population characteristics, subdivisions carried out, major problems within the area, and others.

Spatial analysis on the other hand was done using Arc View, Ilwis, and INDRIS software's while Remote Sensed images and field data used. GIS and Remote Sensing was used to analyze land uses, and show the spatial temporal changes within the study

areas since 1950s. They showed, spatial temporal data on the vegetation cover, built up areas and land subdivisions within the corridor.

Quantitative analysis was presented in form of graphs, tables and pie charts while maps shows the qualitative analysis.

#### **1.7.4 Data interpretation and report writing**

Final report was presented in terms of written text, maps, tables and charts depending on type of data under consideration and the intended messages.

#### **1.7.5 Summary of research design**

The research adopted the following study design towards achieving its objectives.

The initial stage was carrying out of literature review; discussions and consultations aimed at formulation of the research proposal and stating the problem statement on the spatial land use changes on an urban fringe.

A reconnaissance survey to the study area was then carried out, aimed at enriching the problem statement and understanding the constraints and strengths in the carrying out the research. Reconnaissance survey also revealed some of the research design suitable in the study area.

Further Literature review was carried out to help the researcher understand the urban fringe dynamics, conceptual framework, and institutional organisations. Literature review also highlighted research methodology which was applied in studying or management of urban fringe and which can be applicable in the study.

Next step was the preparation of data collection instruments such as questionnaires, base maps, and others. These were pre-tested and refined to get the best results.

Once the research instruments were ready, the next step was carrying out field survey. The field survey entailed carrying out of the household questionnaires, which was done in 7 days by the researcher and four field assistants. This was based on the sampled



households. Interviews were also carried out on key informers such as Government officers, local government officers, and community leaders. In the process of carrying out the interviews, any relevant materials were collected for further reading.

After the field survey, the data obtained from the field was cleaned, coded and key punched into a computer for analysis. The data was analysed geared into describing the objectives. At the same time, literature review was being compiled.

Finally, the report was compiled and presented.

### **1.8 Study Limitations**

First, lack of cadastral maps with small scale to provide detailed information for planning and up to date information was difficult to get. This involved going through several offices to get bits of such information and combining it, which was difficult. For example subdivision information was only on RIM maps which are drawn at 1:2500 scales, while aerial photos were in various scales and cadastral maps were in 1:50,000. This made the work tedious as direct merging could not be carried out using Geographical Information Systems and Remote sensing tools.

Secondly, Carrying out the household Questionnaires was difficult. Some people were not available at home, but even those who were at home hesitated answering the questions. Where questionnaires were left for overnight filling, they were rarely filled and therefore one had to visit the same home more than once

Thirdly, security in Kiambu is a major issue. Due to high insecurity, landowners were not willing to allow one into their premises. Walking in the area was also unsafe and especially for strangers. Sometimes, police escort was needed.

Lastly, time and funds were a limiting factor. The corridor was therefore used as a case study, though the whole of Nairobi-Kiambu urban fringe would have been better.

### **1.9 Organization of the study**

The study is outlined on the following chapters,

**Chapter one:** covers the introduction, which entails introduction to the research problem, problem statement, study objectives, justification of the study, the scope, the scope, limitation, and methodology of the study.

**Chapter two:** examines the literature review. This chapter carries out a comprehensive study on urban sprawl on the urban fringe. It examines the causes of urban sprawl, the consequences. The chapter also includes the managed strategies that have been adopted by various countries and or in Kenya in management of urban fringe.

**Chapter three:** deals with the background information of the study area. It highlights the major physical, economic and social conditions that promotes urban sprawl or hinder human developments in the study area. It also deals with the existing infrastructure, which is an important element in supporting human settlement.

**Chapter four** deals with Legal, Institutional and policy framework governing land use planning in which the study area falls. The chapter examines the land laws applicable to management of land use changes and its effectiveness. It also examines the institutions mandated to implement the acts and their linkages in management of urban fringe.

**Chapter five:** Presents the research findings. The analysis of the data collected is done to highlight the findings on the research objectives.

**Chapter six:** proposes planning techniques for sustainable management of urban fringe. Based on the research findings, Literature review, policy framework, and the background information, the research puts forward recommendations for proper management of urban fringe to minimize land use conflicts. Lastly, concluding remarks are included.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1 Introduction**

Urbanization is now a common feature of all third world countries. Primate Cities and mega cities are emerging in developing countries. The growth in the population of cities in developing countries has been attributed to various factors that could be summarized in two: natural population increase and rural urban migration.

Throughout the 1970s, the largest cities in developing countries grew very rapidly because of migration from the rural areas and high rate of natural increase of the urban dwellers. Under this situation, many governments tolerated unplanned settlement such as squatting on illegal land, and relying on community based self-help groups to develop water, roads, and educational facilities when none of these appeared in the official Master Plan. By then, there was no immediate concern that the cities were growing too fast or would become too large; as it was believed that, deterioration in the urban quality of life would produce a decline (Perhaps even a reversal) of rural urban migration. (White, 1989). It was also believed that rapid urbanization would stimulate the demand of goods from the domestic rural economy, eventually rural wages would rise, and tendency towards equilibrium would appear, thus encouraging an orderly transition.

### **2.2 Urban sprawl**

#### **2.2.1 Introduction**

Urban sprawl has been associated with rapid geographic expansion of urban areas in “leapfrog,” low density pattern, segregation of distinct land uses, heavy dependence on automobile travel with extensive construction from the center to the periphery, and relatively weak regional planning (Howard, 2001)

Archer (1973) on the other hand indicated that, there is no universally accepted definition of urban sprawl that exist and indeed the phenomenon it seeks to describe i.e. the land – consumptive pattern of urban development, can be interpreted both positively and negatively. The authors commonly refer to the phenomenon as urban growth rather than

sprawl to quantify the amount of land converted to urban land uses, leaving it open to subjective interpretation whether or not it constitutes “sprawl”. They suggest “ the challenge is to quantify and categorise urban growth in a way that is useful and meaningful to land use decision makers at the municipal, regional and state levels”. Gregory (2002) on the other hand noted that urban sprawl can also be explained in form of dormitory settlements which depend on the larger urban area for job opportunities, retail and service facilities and have an excessively high proportion of land in residential use.

It is important to note that urban sprawl developments follows expansion lines of least resistance; essentially major radial roads out of the urban areas. Ribbon development occurs when land on either side of such a main road for considerable distance, into the countryside is converted to urban use,(Harvey,1996). The occurrence of urban sprawl has been noticed through,

- Very low-density development over a large area, where single-family homes are built on lots of 1/2-5 acres or more. This low-density sprawl consumes large amount of land that some argue should be developed at a higher ratio.
- Intense development extending out from built-up areas along major highway routes. Space between the strips development is undeveloped and public service costs usually are more expensive to provide in strip sprawl than in low density ratio
- Where relatively compacts urbanisation takes place, but surrounded by substantial undeveloped land. Such development usually require the greatest initial capital expenditures for urban service

### **2.2.2 Causes of urban sprawl**

Causes of sprawl defer from one community to another hence the solutions to sprawl depends on the forces at work in the area. The main causes however can be summarized as follows,

- Urban population growth is clearly a factor in urban sprawl. It has been noted that no matter how smart the growth or how good the planning, a rapid increase in population can overwhelm a planners best efforts. Though in most countries,

urbanisation has been measured in relationship to urban population, it is important to note that it is not equivalent to the spatial growth rate of urbanisation. The rate of spatial spread may be higher than the rate of population increase. For example in United States, from 1970 to 1990, Detroit's population shrank by 7% but its urbanised area increased by 28%. Pittsburgh's population shrank 9% in the same period while its area increased by 30%. Chicago's population did increase in the same period by 1% but its urbanised area increased by 24%. Increase in population however also play a role in urbanisation and urban sprawl. Examples in US showed that Nashville's population grew by 28% from 1970 to 1990 while its urbanised area grew by 41%. Charlotte's population grew by a significant 63% during this period while its urbanised area grew by a staggering 129%.

- Public investments in infrastructure such as roads, public buildings, water, sewer and other infrastructure in peripheral areas also encourages settlements on urban fringe. This is common in developed countries whereas development in developing countries occurs at the periphery without provision of infrastructure.
- Land regulations that promote spread out or land consumptive development also contribute to urban sprawl. As evidenced by Kaid, (2004) Sprawl in many parts of the Midwest and Northeast in US was largely a product of poor land-use planning. In these communities, poor planning and lack of regional cooperation play larger roles than net population growth
- Consumer desire for rural lifestyle with large homes and large yards, safe environment and less traffic congestion causes the spread of developments to urban fringe.
- Preference of business and industry for easy highway access, plenty of free parking and corporate identity has led to development of satellite centres away from urban areas. Such developments are accompanied by residential developments.

### **2.2.3 Impacts of urban sprawl**

Early utopian visionaries expressed a positive opinion of urban sprawl: Wright (1931) presented his Broad acre City as an exemplary model while Gutkind (1962) promoted a scattered urban development in his book 'The Twilight of Cities'. Urban sprawl has

however been regarded as negative phenomenon by most scholars who associate it to the interruption of farm activities by urban type developments, the destruction of ecosystems; noise and air pollution; the depletion of energy resources; and social disintegration .The major impacts can be summarised as follows,

- **Reduction in land sizes:** resulting from subdivisions of agricultural land, which makes it agriculturally uneconomical and result to change in use.
- **Human-animal conflict:** Human settlement has been cited as cause of destruction of water catchments areas that leads to reduction in water resources or drying up of streams. This leads to competition of the limited resources by both animals and human. (Simiyu, 2002)
- **Loss of vegetation:** The presence and abundance of vegetation in urban areas has long been recognised as strong influence on energy demand and development of the urban heat island. Urban vegetation abundance also influences air quality and human health because trees provide abundant surface area for sequestration of particulate matter and ozone.
- **Insufficient public services:** Sound planning can help communities grow efficiently by encouraging development where infrastructure such as roads, schools, and water already exist. This type of planning helps keep city centres alive and established communities vital. The best planning efforts also steer development away from wildlife habitat, forests, wetlands, and other crucial resources.
- **Environmental degradation:** Urban sprawl is normally unplanned development that leads to clearance of green areas as well as agricultural land. In such cases, the natural biodiversity is disturbed. Increase in built up area on the other hand increases the run off rainwater, which causes soil erosion and surface water pollution. Air pollution is caused by burning of solid wastes as well as motor vehicle smokes.

Due to the negative impacts of urban sprawl as mentioned above, the battle against urban sprawl and especially on urban fringe has been through;

- Method or strategy where some have adopted cluster zoning to preserve open spaces for community and cut costs for the homeowner and the builder.
- Planned community zoning technique to permit a mixture of residential, industrial, and commercial land uses.
- Reforming the real estate tax which proposes for tax reform to discourage speculation

It is clear from the above that urban sprawl is no longer a positive occurrence if not managed and planned. The question then is on how 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. White (1989) has argued that, the solution to curb urban sprawl and manage land use changes in urban sprawl lies on a systematic, comprehensive, and planned attack from every angle, may it be political, legal, financial, social and educational.

## **2.3 Concept of fringe**

### **2.3.1 Introduction**

Many terms synonymous to fringe such as urban fringe, rural urban fringe, sub-urban areas, suburbs, urban periphery and more recently extended metropolitan regions (EMRs) have been used in planning literature. Conceptually fringe is related to the growth area of cities that lies immediately outside the designated urbanizable limits, has strong interaction with present city, and bears an urban reflection on the physical, occupational, and demographic characteristics (Burns, (2005), [www.isprs.org](http://www.isprs.org)). By and large, the residents of the fringe enjoy the urban services and facilities but usually do not pay for them.

The fringe areas are generally within the jurisdiction of councils that have neither the financial resources nor the technical expertise to plan and manage the rapidly developing fringe. The urban authorities also ignore the problems of the fringe as it falls outside their jurisdiction. Thus the city and the fringe, although administratively fall in different areas, for the residents of the fringe there is hardly any difference between the two and their movement is unrestricted and they use the municipal services without paying for it.

The fringe is not an easily defined geographical area that begins and ends at a certain distance from a city centre, it is rather an area characterised by functional and visual uncertainty about its dominant use. It contains substantial discontinuous areas of urban development mixed with stretches of more extensive and traditionally rural uses like agriculture and forestry. Other characteristics of the urban fringe are an assortment of urban uses which are not wanted in, or cannot afford the city and are inappropriate for the open countryside, but which nevertheless require a location near the population that they serve such as hospitals, prisons, slaughterhouse, sewage works, sports ground etc. Urban fringe has also been defined as the inner edge, where rurality and urbanity are truly mixed. Many geographical changes at the urban fringe are associated with the transfer of land from rural to urban purposes. It is also accompanied by a much sharper increase in land value than is produced by any other urban land use changes. (James, 1974)

In social terms, fringe is an area of transition which is neither town nor country: a desirable living environment for many whose economic and social lives are firmly linked to the town: and a less desirable one for those dependant upon local employment. To note as important feature of the fringe for many towns is that it is a “transitory environment that would sooner or later get absorbed within a new urban area (Davidson and Wiberley, 1978). Rarely is the planning of urban fringe seen as the first stage in planning areas of new development or as an integral component of an expanding city region. Although it is transitory in space and time, many analysts argue that it is not simply an intermediate environment, which exhibits, with less intensity some urban problems and some rural problems at any one time. The predominant analysis is that the fringe is the main arena for a clash of urban and rural interests, in which the latter are more severely disadvantaged. The solutions therefore seeks to re-establish “rurality” in the form of greater protection from obvious urban incursion particularly of building development

### **2.3.2 Urban fringe policies**

Policy making for the urban fringe has failed not only to tackle a number of land management problems, but also to realise many of the opportunities of a unique location



(Davidson and Wiberley, 1978). Greenbelts policy adopted by Ebenezer Howard and various Protagonists such as Unwin and Abercrombie is of long standing (Herington, 1984). A reservation of land outside the urban area, protected from certain activities (notably building developments), is seen as vital to the containment of a town in danger of becoming “too big”, necessary also to retain its special character and to separate it from neighbouring towns. Urwin and Abercrombie also argued that such land would provide recreational opportunities and to be protected for agricultural use. Greenbelt has been partly successful in retaining the character of some towns, especially historical centres like Cambridge, York, and Chester without which much of the agricultural land would have disappeared. However, green belt has clearly not stopped urban growth. Development has “Leapfrogged” the protected girdle of most large towns so that their influence is felt further into the countryside than might otherwise have been the case without greenbelts. (Davidson and Wimberley, 1978)

### **2.3.3 Agriculture on urban fringe**

Urban fringe as described above is characterised by a mixture of rural and urban land uses. Rurality here refers to agricultural practice for commercial or leisure. There are four categories of fringe farmers as described by Davidson (Davidson and Wimberley, 1978)

- Truly commercial farmer who aims to sell and relocate a large enterprise on the proceeds of the sale
- The undercapitalised and uneconomical farmer who is the prey to all the problems of an urban fringe location and who may attempt many changes of enterprise to achieve some success
- The hobby farmer who is involved to enjoy a pleasant rural home or for some other non agricultural reason
- Land speculators for whom farming is a temporary incidental activity, often pursued in an inefficient way.

#### **2.3.3.1 Shortcoming of urban sprawl on fringe farming**

Unlike in the countryside where farming is the major source of livelihood, urban fringe is characterized with land speculations and subdivisions that have major impacts on the

productivity of the land. Studies have shown that acreage of land in commercial agriculture falls. Large farm unit declines and are severed by various developments and reduced to scattered holdings. ((Heimlich and Arderson, 2001)

**Land speculation:** Once land is acquired for speculative purposes, there is little incentive to farm it well, if at all for the prevailing view has been that derelict farmland is likely to be released more quickly for development than land which is better farmed. In many ways, agricultural changes on the edge of towns contribute to a decline quality of environment, visually, and otherwise. Due to the problems associated with urban sprawl on farming, attention has been paid in controlling land use developments in fringe zones, for example in Britain, it was a concern which eventually led to the enactment of the Green belt Act of 1938, a device to preserve relatively small areas of public open space and inbuilt land suitable for agriculture, woodland and recreation on the fringe of London.

#### **2.3.4 Vegetation on urban fringe**

Recent estimates indicate that over 45% of the world's human population lives in urban areas with over 60% projected by 2030 (United Nations, 1997). The global rate of urbanization is expected to accelerate in the future with the emergence of large urban agglomerations in developing countries (Berry, 1990) As the size and number of urban agglomerations increase, so does the relative importance of the urban environment to the global population.

The spatio-temporal distribution of vegetation is a fundamental component of the urban and fringe environment. Vegetation influence urban environmental conditions and energy fluxes by,

- Selective reflection and absorption of solar radiation
- Modulation of evapotranspiration

The presence and abundance of vegetation in urban areas has long been recognised as strong influence on energy demand and development of the urban heat island. Urban vegetation abundance may also influence air quality and human health because trees provide abundant surface area for sequestration of particulate matter and ozone, (Bery,

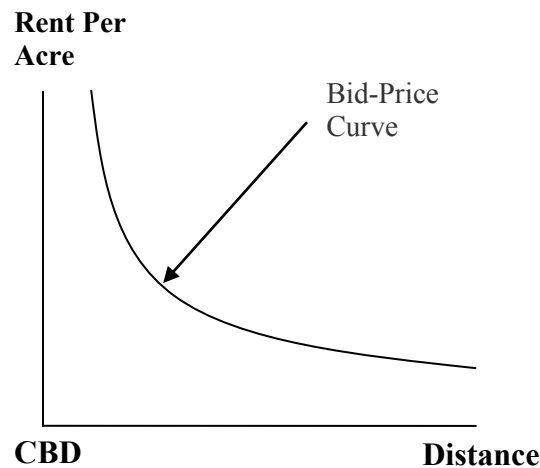
1990). This creates a strong case for preservation of vegetation on urban fringe. The study area for example acts as air cleanser for Nairobi city with Karura forest located in the area.

## **2.4 Determinants of land use in urban areas**

### **2.4.1 Introduction**

Land performs many simultaneous functions, some private, and some public. Through its role as an input in production, it provides a flow of income streams for landowners or tenants. It provides space and amenity values for owners, tenants, and visitors. Different habitats support wildlife intrinsically valued by society as a whole. Finally, for land owners land represents a capital asset that is held for investment purposes. Not only does land perform multiple functions but it also has several unique characteristics which influence its value: it is highly heterogeneous in nature with each parcel of land having a unique combination of soil quality, location, climatic conditions, etc. It is fixed in location resulting in trading tending to be confined to regionally localised contexts although the market for some types of land can be much wider. Finally, it is fixed in overall supply.

The demand by firms and households for a particular location depends upon the expected net revenue yield/ utility referred to as value. The rent is what has to be paid by particular to prevent the site going to another use. Since different locations have different use and capacities, a pattern of differential rents emerges. Thus land values and land uses are determined simultaneously by the location of the site. The greatest demand will be for those sites/locations having the greatest relative advantage. This is likely to make intensive development of the site profitable. Those users who can use the site most intensively will be able to pay the highest price or rent. Often however, this result in a site having a split use such as, shops outbidding other users for the ground floor of a building, with offices or residences occupying the upper storeys. This is what is commonly described by the bid-price curve as shown below,

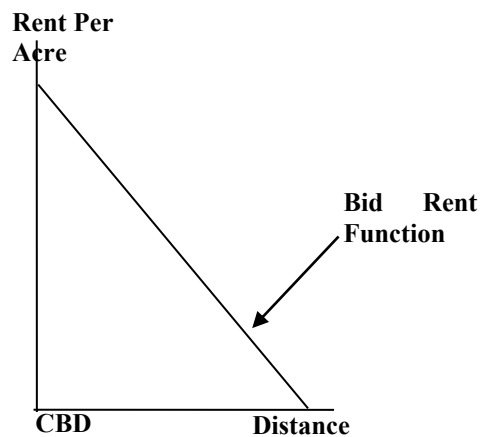


It is important to note that the bid will depend upon businessmen's profit maximisation decisions where utility maximises sales revenue or minimises production costs. Similarly, a household seeks to maximise the utility advantage of a locality over costs of travelling. Much of the theory of land use and values are based on the work of Von Thunen, Richardo, Alonso (1964) and Muth (1969) and draws on concepts from microeconomics. Within this theory, patterns of land use are determined by land values that are, in turn, related to transportation costs. Thus, each type of urban activity will have its own bid rent function and the combination of several bid rent functions will define the rent gradient as shown on the graph above. Other works, which have gained recognition, are by Wingo and Firey. To highlight the principles of these theories, Alonso's theory, Wingo and Firey will be discussed.

#### **2.4.2 Alonso's classical theory of land use**

Alonso looked at interaction of land values and land uses. (Alonso, 1964). The focus of attention is on residential land with the behaviour of urban business. It is assumed that the individual arrives in the market wishing to buy land for a home or basics. He faces the double decision on how large a parcel of land to rent and how close to the city he should locate. The city in this case is assumed to have a simplified geography and infrastructure, has a single employment and shopping centre. It is also assumed that it has equal transportation in all directions, no zoning or other restrictions and the household has perfect knowledge of the price of land and the cost of commuting in the city while the household has given income.

Individual/household equilibrium is achieved by selecting that combination of quantity of land and distance from the city centre which combination will maximise the households satisfaction but stay within its income constant. The selection is given based on land costs that are higher nearer the centre and becomes lower with increasing distance from the centre. Also commuting cost, which increase with distance from the centre and price per unit of the composite good that does not vary. This structure and household income constrains and defines the opportunity space of composition open to the household. The choice is a function of household preference.



The pattern of land uses and values becomes mutually determinant. The supply and demand quantities are equalized so that the city is larger to accommodate all users land needs without any vacant land existing. The supply and demand prices are equalized such that no user of land can increase his business profit or the household satisfaction by moving to another location or by buying more land or less land and no landlord can increase revenue by changing the price of the land. This explains how preferences on demand side mediate through the market mechanism to establish land use. The structural features of the resulting pattern of land use are because of the market forces.

### **2.4.3 Transportation –oriented Theory of Land use by Wingo**

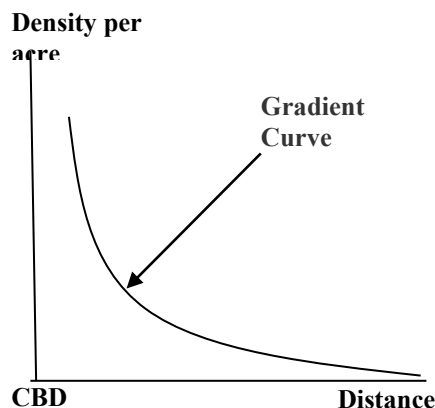
The theory was based on residential development (Kain, 1962). It was developed based on the concept of transportation demand considering the spatial relationship between home and work. The journey to work in this theory is viewed as the technological link between the labour force and the production process whereby demand for movements

relates to the total employment of an urban area multiplied by the frequency of work trips. In addition, work trips are taken as the number of trips required to support the production process. Drawing from the concept of accessibility, he used the cost of transportation as a unit of measurements based on the time spent in movements between points and out of pocket costs for these movements expressed in money equivalents for the distance and number of trips.

The central problem is to achieve an equilibrium distribution of households of particular rent paying abilities to sites with particular structure of rents. He achieves this location equilibrium by substituting transportation costs for space costs. On the supply side he uses transportation costs to establish the distribution of household sites at varying location rents. On the demand side, he assumes that if prices for other goods competing for the household income can be held constant, then the rents that households are willing to pay can be based on the classic utility concept which states that the greater the unit rent the fewer the units of space consumed. The smaller the quantity of space consumed in the more accessible location, the higher the density. The framework proposed by the theory functions under the assumptions that those who control residential space and households who seek space will each behave in a manner to maximise their returns given the following

- Location of employment centres
- A particular transportation technology
- A set of urban households
- The marginal value that households place on residential space

The model is used to determine the spatial distribution of densities and rents and the spatial distribution of the values and the extent of land requirement for residential use. This results into the gradient curve as follows with the highest densities at the centre and decreases with distance.



#### **2.4.4 Social-oriented theory of land use by Firey**

Firey came up with an argument that choices of locations are influenced by social values, tastes, symbols, and social choices that will frequently vary among various social and ethnical groups of a particular society. He carried out the test of two possibilities,

- Assumed that socially rooted values exert a causative influence on urban land use Pattern
- Secondly, rationally functioning interests such as the market governed forces similar to the one of Alonso and Wingo. When they exert causative influence, they stem directly from larger cultural system and thereby cannot be viewed as self-given ends in themselves.

He concluded that,

Space may not only be a productive agent but also a symbol and that people in groups choose locations not merely in relation to the market considerations but also in response to social values. In the case he observed in Boston North, social values were not a result of cultural value of space perse but a result of processes of social organisation whereby residents in the area by persons of Italian origin were a means of becoming identified with the Italian community and its distinctive values relating to occupation, family, choice of friends, group membership etc.( Owino, 1975)

Secondly, rational determinants of land use are contingent upon a particular culture bound value system and the cultural component is central to location processes. The failure to recognise the cultural component in spatial adaptation was a major omission in existing formal theories, which seek to explain land use.

#### **2.4.5 Land use determinants by Harver, (1996)**

Harvey explains that though writers have emphasized on location, transport and culture as determinants of land uses and values, the determination of urban land prices must incorporate the accounting for multiple factors associated with the parcel of land. They include,

**Transportation Mode:** the introduction of a new transportation mode will play an important role in shifting the centre of accessibility, relocating a market centre and be a

continuing influence on land use and values. Intermingling of uses of lots within an area or district is certainly an element in the formation of prices of parcels because of the coexistence of incompatible social, economic and environmental conditions that will devalue from its value.

**Compatible land uses** (Planned environment) the existence of compatible conditions in an area may portend future land use changes to attain higher returns. Such elements as proximity to different activities, a transportation system, which connects a location to different activities may raise the land values.

**Historical Development of a location:** while planning influences land values in some locations, historical conditions may determine the value associated with a parcel of land. For example, the status of a neighbourhood may raise or lower the value of land.

**Topographic features:** Physical aspects such as rivers, mountains, plains etc. often influence the location decisions of different activities. Topography may affect land values by the impact it may have on the supply of easily accessible land, but can also provide premium locations by including scenic vistas for residents.

**Government policy:** the government both central and local, influences location decisions through its policies on taxation, planning, parks, green belts and open spaces, conservation, transport and traffic congestion, housing, etc. For example, when planning regulations are relaxed on out of town development, inner city tends to deteriorate as people major on out of town developments. Such development changes the bid-price curve with higher values on some locations far of from the core.

**Globalisation,** an increase in demand for building space in a section of a large city by externally based multinational businesses raises the land values. Government monetary actions in response to international conditions by an economically dominant country will affect its land prices.

He concludes that changes in local land uses and prices in a city are influenced by the location of the land unit relative to other landscape elements and will be reflective of its uses such as commercial and residential land within the larger framework of a geographic



area. The intent of the “Isolated State” framework by Von Thunnen, Ricardo and Alonso and others was to analyse regional or local patterns of land uses and prices by excluding external factors.

Recent studies have also suggested that models should include variables representing both the productive and consumptive values of land. The effect of nature conservation designation on land values will vary not only in relation to the impact on property rights, investment and income flows, but also the type of purchaser and the relative weight they place on the consumptive components of land value.

## **2.5 Application of Remote Sensing and Geographical Information System in the management of land use changes in urban areas**

### **2.5.1 Introduction**

Remote Sensing has been defined as the instrument, techniques, or methods to observe the Earth’s surface at a distance and to interpret the images or numerical values obtained in order to acquire meaningful information of particular objects on earth, (Jassen, 2000)

GIS on the other hand refers a software package that facilitates the capture, analysis, manipulation, and presentation of georeferenced data, (Jassen,2000). GIS help us to

- Understand our environment (changes over time)
- Geographical space-position relative to earth surface
- Changes-natural or man-made or mix of both

Urban and Regional planning is concerned with resource generation, resource development and resource management exercise. The efficiency of resources use largely depends upon how well they are planned, how economically they are developed and how efficiently they are managed. Planning inputs largely govern the efficiency level in that it refers to a process that harnesses spatio-economic potential of an area for the benefit of the people

Important to note on the above definitions is the fact that remote sensing acquires data on earth’s surface using a device that is not in contact with the objects being measured. GIS

on the other hand, analysis, manipulates, and presents the data in a meaningful style. Remote Sensing and GIS are used in almost all fields of study but Prof. Saini has summarized the application to planners as follows,

**a) Land use classification:** This activity has been undertaken by many agencies, as this data provides a lot of information on the actual use of the land, the related land values, projected population densities, identification of specific problems such as slums and housing studies. This information correlated with other data could give the planner information for development of services such as water supply, sanitary facilities and the layout of streets and highways.

**b) Growth patterns:** The analysis of imagery over time commonly referred to as time series, using sequential photography of imagery could give the planner information on growth patterns. For general projections that do not require detailed information; the use of satellite imagery could be a great advantage because of the low cost and frequent over flights.

**c) Relationship to the Geology or environmental conditions.** These aspects often determine the growth of the city, but often owing to land pressure, the most suitable land is used because no real analysis is done to determine the various relationships. The location of better alternative sites is often ignored due to lack of access or other infrastructure services on the growth, which often have limited the expansion.

**d) Population studies:** These are usually related to land classification, which are later quantified using ground population densities sampling methods. Population for small areas may be collected using field methods and the imagery (Photos) used as a logistic guide for the field team.

**e) Transportation and Traffic studies:** For aircraft and helicopters, studies can be made using aerial photography to analyze the traffic flow patterns and bottlenecks. Sequential photographing of the traffic during the actual peak traffic times can do these, or analyzing oil dip patterns on the land use patterns developed by rubber tyre marks.

*f) Miscellaneous use:* Road quality inventories, utility service point inventories, flood measurements, and many other similar quick analyses are possible, depending on the scale and quality of the imagery or photographs.

### **2.5.2 The importance of using GIS and RS**

The importance of using GIS and RS is that they are faster in data acquisition. To monitor unplanned urban growth and especially in developing countries where the rate of change is very high, Remote Sensing offers the fastest method to keep at pace with the rate of growth. Ground surveys are limited because the capacity of planners does not meet the demand; hence, they are overtaken by events. That is why in Kenya, for example where remote sensing data is not readily used in urban planning, the trend has been “planning after developments have taken place”. Remote Sensing can be used to update such information. This is very important to planners who need up to date information in decision-making.

### **2.5.3 Limitations of GIS and RS**

It is important to note that, GIS and Remote sensing will not solve or manage urban or rural problems, but it provides necessary information which integrated with other data can provide a better insight into the problems to be solved, or a better ability to assign the priorities for implementation. Thus, Remote Sensing and GIS are important tools used by planners in data acquisition. For example, remote sensing requires ground data. Although remote sensing data can be interpreted and processed without other information, the best results are obtained by linking remote sensing measurements to ground measurements and observations. Skilled manpower is required in the interpretation of satellite images and working with GIS. Where wrong information is fed to a GIS system, the results would also be misleading, thus, “Garbage in, garbage out”.

## **2.6 Spatial planning and Politics**

### **2.6.1 Introduction**

Traditional approaches to land use planning in Kenya and many other developing countries have proved of limited value. These approaches have resulted in the production

of ‘paper plans’ while ‘illegal’ developments generally exceeds that of legal development. Where regulations have been enforced, they have resulted in higher land values. These have been squarely blamed on central and local government due to their ineffectiveness and inefficiency. The main issue has been on governance, politics, legitimacy, and process of decision-making without which spatial development plans are unlikely to be more useful than the past unless more attention is given to analysis, policy, and practice.

Traditionally, spatial planning has been dominated by Master plans as a tool. These are blueprints plans specifying a desired pattern of urban development for 15-30 years to planners. The weakness of Master plans however has been that they paid very little attention to resource requirements and implementation. These were attributed to,

- **Local authorities:** In developing countries, these are the land use plans implementers but have been traditionally organised along sectoral lines, with limited fiscal base, limited autonomy and no corporate policy making capacity (Rakodi, 2001). They experience, deficient resource allocation, lacks coordination with other agencies, lacks reliable system of recording spatially referenced data and adequate capacity for enforcement. This has rendered them ineffective in the management of the rapid urban growth.
- **Development regulation systems:** This is carried out through some combination of zoning, subdivision control, land use control, building control, and environmental regulation depending on the planning system. The design of regulatory mechanism raises questions of certainty, discretion, and flexibility. Moreover, regulatory system requires considerable administration capacity, which has typically been lacking in developing countries, which are short of trained professionals. This has led to evasion of taxes by land owners..
- Thirdly, **legitimacy** has been lacking in the implementation of the plans. Legitimacy is not derived automatically from the enactment of legislation. It may be defined as the belief that the authority is entitled to issue commands which citizens are obliged to obey, the response to non-compliance being coercion. Such a belief in the authority to restrict individual rights in some higher interest is

based on confidence, acceptance of the institutions, trust in those entrusted in decision making, power and support for the regime.

It has been found that the above characteristics have rendered the Master Plans systems unsuccessful in developing countries. The outcomes can as explained by Rakodi (2001) has been as follows,

- Extent of illegal developments far exceeds the volume of development that complies wholly with plan provisions and development regulations. Illegality refers not just to land use and construction but to tenure, title registration, compliance with environmental and public health regulations, and absence of utilities and services. Illegality is widespread in the informal settlements predominantly occupied by low-income households but also middle and upper income developments occur on illegal subdivisions.
- Where policies have been implemented and regulations on land use and construction enforced, they have led to escalation of land values. This was demonstrated by World Bank research in the 1990s in India (Rakodi, 2001). The higher house price to income ratios in Kuala Lumpur than Bangkok for example were attributed to exceptionally complex regulatory procedures, resulting in increased development costs and thus exclusion of lower income households from home ownership or rental in formal housing areas. In comparison, in Bangkok, lack of enforcement of land use controls, coupled with a diverse and competitive housing construction sector, ready availability of housing finance, rising real incomes and large numbers of farmers on the urban periphery ready and willing to sell their land resulted in the increasingly lower income households being able to access housing built of permanent materials.

### **2.6.2 Improving spatial planning:**

#### **i) Potential for Regional Analysis**

Traditional town planning's failure to cope with rapid urban growth has been attributed to its failure to relate land use planning and regulation process to the wider process of urban development; an exaggerated view of what 'planning' can achieve, with respect to changing migration flows, determining the speed and location of land subdivisions and

settlement, and ensuring that development complies with desirable standards; and unrealistic or mistaken projections, proposals and projects. All of these imply a need for improvements to the policy formulation and plan preparation process. This can be achieved through,

- Attempts to improve the understanding and analysis of interrelated components of the urban development process, in order to arrive at more appropriate priorities and sets of policies
- Attempts to improve the process of plan making, which include, legislative change, improved coordination between multiple agencies responsible for production and management of the built environment, a better conceptualisation of the purpose and nature of plans, A better involvement of the public in planning process, and better data management systems.

## **ii) Policy Improvement systems for regulating development**

Proposals for improvements to development regulations can be grouped into three groups as follows,

1. Simplification of development control requirements by, for example, Simplifying procedures, Exempting some development, and Introduction of more appropriate policies/zoning regulations.
2. Revisiting the principles on which development control is based: in zoning systems certainty for developers is achieved at the cost of inflexibility in the face of unforeseen demands and needs, while in discretionary systems flexibility to accommodate rapid and unforeseen changes comes at the cost of uncertainty and greater opportunities for corruption.
3. Increased enforcement capacity, implying both strengthening the legal basis for enforcement, and increased administrative capacity to monitor and take action on illegal development.

## **iii) Decision-making-practice**

The new public management implies a different approach to decision making, based on 'steering not rowing' (Kaul, 1997). This implies guiding rather than attempting to substitute for market forces, negotiation, and collaboration, in order to produce support for and compliance with decision-making. It is in this context that debates about

communicative or collaborative planning processes are relevant as noted by Healey, (1995),

“Recent planning praxis in the western world advocates processes of dialogic democracy, Incorporating difference and oppositional views and representatives into policy decision-making, trying to find some common ground as a basis for negotiation”

In Europe there is evidence of emergence of more collaborative approaches to planning at both the city/regional and local levels in a number of countries. At the local level, such approaches are often stimulated by the need to prepare Local Agenda 21s or to promote regeneration and combat social exclusion, rather than to develop new approaches to land use planning. In developing countries, the Urban Management Programme and the Sustainable Cities Programme have generally taken initiatives as part of UNCHS. Both involve securing wide stakeholder involvement in the process of developing a strategy for one or more sectors or aspects of the city.

## **2.7 Towards a new approach to management of urban fringe**

Having discussed the theoretical, and political influences on urban planning, it is important to assess the way forward to the management of urban growth. It is felt that the notion of green belt is too firmly fixed in the public and planning mind to remove, short of a total upheaval of the political and administrative system. To achieve this, it seems that policies need to be clarified in three ways namely, (White, 1989),

1. Strategic level- where the nature and purpose of the activities and environment of the fringe can be specified
2. Local management level- where strategic policies can be implemented
3. Means of implementation

### **2.7.1 Strategic objectives and policies**

In a number of ways, the activities of the fringe could be better arranged so that conflict of interests could be avoided and the possibilities of mutual benefits realized. For example in some areas, certain activities ought to be protected so that they may flourish.

An example is land of high quality value should be reserved for farming while the distribution of holdings may need to be regrouped to provide larger, more economic units or to allow co-operation between neighbouring farmers or extensions to farms. Conflicting land activities should be separated spatially or protected by buffer zones while others could be spatially linked when some mutual benefits may accrue from integration. In all strategic planning of this transitional zone, there are calls for policies that aim to link it in two directions, inwards to the urban area, and outwards to the deeper countryside. Recreation provides a good example of the ways in which urban and rural activities can be linked.

The successful implementation of these policies depends upon the development and operation of more detailed management policies concerned not simply with the broad nature and distribution of activities in a tract of fringe land but with their daily operation and interactions.

### **2.7.2 Local management**

The allocation of land to certain broad categories of desirable uses even with protection from most kinds of building development is no guarantee either of continued viability, or of retention of the wider environmental values of fringe land. Thus, strategic policies are not enough because not only reservations but also management is important. Management plans should be prepared and special means of implementation should be established to carry them out. Experiments have showed the involvement of landowners and farmers in management have been successful in some countries (Srivastava, (2004). [www.gisdevelopment.net](http://www.gisdevelopment.net)). A major requirement is for the reduction of uncertainty about the future, so that land managers can plan. It will be necessary for planners to help by producing phased long term policies e.g. farmers would be helped by at least 10 years advance warning of changes in land use proposed by local authorities.

### **2.7.3 Implications for implementations**

In all achievement of fringe, goals, through the mechanism of planning control, will be limited by the problems of enforcement and by the counter economic arguments of developers. Mechanism that are more persuasive might have greater effect in some areas



and over the long time. It may be possible, for example by providing detailed advice together with financial and other incentives such as voluntary labour to persuade more fringe farmers to modify their practices to accommodate certain kinds of recreational and educational activity or Management agreements between land owners and public agencies. However, for various reasons, persuasive efforts too will be limited. Some owners may continue to be pre-occupied with the future value of their land, at the expense of any real interest in its present use or appearance. So, public monies and management will be needed to develop schemes where the social benefits will outweigh commercial ones, especially in the early stages.

In theory, the proposals for public-private partnership ownership of fringe land for development provide unique opportunities for better planning. The basis for land speculation is removed together with the incentive to hold land that may have no positive use. Local authorities to have the time and powers to plan a better mix and phasing of fringe land uses and an improved local environment that can be created alongside new developments. Developers are placed in a position whereby they may be more easily influenced on environmental issues.

#### **2.7.4 Implications of local government**

In Britain, (Davidson and Wiberley, 1978) found out that there was need to introduce leisure and recreation department in Local Government administration to manage fringe areas. Nevertheless, there were problems in practice because the fringe is most extensive and problems are most acute at the margins where local government boundaries have been tightly drawn, so that no one authority can assume responsibility for fringe planning. Many planning policies were divided between both tiers of government within these metropolitan areas, while their margins would be influenced by the decisions of rural counties and county districts.

Faced with these inadequacies of a dissimilar administrative structure, a number of developments seem to be essential if urban fringe problems are to be tackled and the potential of this environment is to be realized. Such are,

- Close collaboration between structure plan authorities is clearly vital to ensure that the fringe suffers nor neglect nor imbalanced treatment
- Creation of strong executive regional planning authorities with environmental planning and management powers
- For the larger schemes of fringe management, regional parks, extensive planting of new landscapes, rehabilitation and after use of degraded land, the initiative and finance for implementation must come from metropolitan authority, working together with District Authorities, Agencies of Central Government and other organizations. Many of these suggestions imply a much stronger recognition at national level of the problems and opportunities of the urban fringe. Thus all the stakeholders should be involved in the management of the fringe areas.

The task is to be less rigidly protective and accommodate the changing demands of a city, but at the same time prevent the misuse and neglect of land in the face of the uncertainty that may follow such a policy.

### **2.7.5 New management laws of the urban fringe**

In most cases, growth management plans are only effective when they are coupled with a strong implementation program. In US, to test on the implementation of growth management laws, they used the following criteria,

- Fixing urban growth boundaries: A key question was whether states require communities to establish sprawl growth limits or an urban growth boundary. An urban growth boundary is a line that identifies which area will become urban and which areas will remain rural.
- Public participation requirement: State requires communities to actively involve citizens in the planning process. The worst performer locks the public out of the process, keeping decisions away from scrutiny.
- Impact fees: States should authorise use of impact fees. This tool allows local government to charge developers fees to help pay the cost of new roads, schools and utility lines. By requiring developers to pay their own way, rather than forcing existing taxpayers to bear the full cost of sprawl, states can better grow on their own.

- Regional coordination requirement: These should foster regional cooperation. The best planning efforts recognise the dirty air and polluted water don't stop at the country line. It is critical that local units of government communities and cooperate in their planning and growth management efforts, preferably through formal regional planning agencies. Even the sprawl opponents agree that for all the strides being made against sprawl, real progress will be made only when regional cooperation prevails over regional competition.
- Mandatory implementation: planning statutes, as with any other statutes are most effective if implementation is spelled out and mandatory. States received credit based on the quality of their implementation language.

Findings showed that regional planning was an ideal solution to urban sprawl, but it requires an organisation with the power and authority to coordinate development on a larger scale. To solve this problem in US, the state legislative passed a bill to create a new regional organisation called the Georgia Regional Transportation Authority (GRTA). The agency had the authority

- To require any county that had violated federal air-quality standards to develop a transit system if it doesn't already have one. In addition, it had the ability to help develop a regional transportation plan.
- Had some say over land use issues, with the authority to review very large projects such as regional shopping malls and giant subdivisions. If it disapproves of the project, it would withhold all state and federal transportation funds.

They also found out that there was need for a plan on how best to carry out the implementation. For example, Vermont came up with a five-point plan on implementation of urban sprawl management, they are,

**1. Research:** Extensive research was conducted to define sprawl and the cause and effects of sprawl in Vermont.

**2. Local and Citizen Action:** Vermont developed planning tools and training for local officials and concerned citizens. *Way to Grow!* Program was a program that included education and training, web site resources.

**3. Collaboration:** The Vermont Forum on Sprawl helped to initiate the Vermont Smart Growth Collaborative, a growing group of ten organizations cooperatively addressing the issues of sprawl effectively utilizing each one's area of expertise and influence.

**4. State and Federal Initiatives:** The Vermont Legislature passed the Downtown Bill as to strengthen community centres by creating financial and permitting incentives for development in town and village centres

**5. Communication/Education:** Vermont also builds public awareness on sprawl and smart growth through special events, conferences, and media work.

Vermont State continues with the smart initiatives, which have seen them stop thousands of agricultural land being lost to urban sprawl.

## **2.8 Summary**

Urban Sprawl has been associated with rapid geographic expansion of urban areas in leapfrog low density pattern, segregation of distinct land uses, heavy dependency on automobile travel with extensive construction from the centre to the periphery, and relatively weak regional planning. Urban fringe on the other hand has been defined as a region that lies immediately outside the designated urbanizable limits, which has a strong interaction with present city, and bears an urban reflection on the physical, occupational, and demographic characteristics.

Past experience from various studies have shown that urban fringe is fluid and unless land use developments are managed, the area can decay. Some of the issues highlighted include,

### **(a) Urban sprawl**

- To quantify and categorise urban growth in a way that is useful and meaningful, decisions on land use should be made at the municipal, regional, and state levels.
- Urban sprawl developments follow lines of least resistance and monitoring of such areas should be consistent.
- Urban sprawl occurs through low-density development over a large area, or intense development along highways.

- Causes of urban sprawl depend on the forces at work in an area and differ from one community to another.
- Spatial Urban growth may not necessarily be influenced by population increase. In some instances, the rate of spatial growth may be higher than the rate of population growth.
- Public investments in infrastructure such as roads, public buildings, water; sewer and other infrastructure encourage settlements on the urban fringe.
- Urban sprawl has been regarded as negative phenomenon by most scholars who associate it to the interruption of farm activities by urban type developments
- Urban sprawl can be caused by the consumer desire for rural lifestyle or preference of business and industry for easy highway access.
- Method used to steer away development from agricultural land include, zoning, and redensification of urban centres.

**(b) Urban Fringe**

- Urban fringe are those areas that lies immediately outside the designated urbanizable limits and enjoys the urban services and facilities but usually do not pay for them.
- Land use changes at the urban fringe are associated with the transfer of land from rural to urban purposes and much sharper increase in land values
- Rarely is the planning of urban fringe seen as the first stage in the planning areas of new development or as an integral component of an expanding city region

**(c) Theoretical analysis**

Alonso, Vonthunen, and Wingo have argued that spatial distribution of residential, commercial or agriculture land depends on the demand of locations having the greatest relative advantage to the centre.

- Firey has however argued that, choices of locations are influenced by social values, tastes, symbols, and social choices that will frequently vary among various social and ethical groups of a particular society. Thus, people in groups choose locations not merely in relation to the market consideration but also in response to social values.

- Availability of transportation, compatible conditions, historical conditions, and government policy have also been cited to influence land use and land values of an area.

**(d) Towards management of urban fringe**

The following issues were highlighted,

- Green belt movements have not stopped urban growth
- Political influence in the planning of urban fringe can hinder or facilitate sustainable development
- State and community partnership in management of urban fringe have been successful in various areas
- Use of new technologies such as GIS and Remote Sensing in data acquisition, retrieval, and management has made it easier in monitoring land use changes on urban fringe.

It is clear that sustainable management of land use changes on the urban fringe require a holistic approach due to its rapid dynamic nature. New technologies have become handy in monitoring the land use change in these areas so that they are noticed on the initial stage, before haphazard developments occurs. Political good will has a major role to play in the formulation, implementing, and enforcement of land use policies.

## CHAPTER THREE: THE STUDY AREA

### 3.1 Nairobi City

The city of Nairobi started as a railway Camp in 1899 and soon became a centre of communication, administration, and commerce. With time, the town grew in size and function to become the major metropolis in Eastern Africa. The inhabitants of Nairobi have always taken it as a working place and not a residence. During colonial times, for the Africans, Nairobi was a place of work and temporary residence, the Europeans regarded Europe as their true home and the Asians still had their roots in India or Pakistan. In this respect, Nairobi has not enjoyed the benefits of a stable urban population whose total commitment and efforts are towards the welfare of the city. The city has grown significantly over the years, Nairobi's current night population is approximately 3 million from a mere 350,000 in 1963 compared to 9.6 million day time. Population living in urban areas has also been rising over time from 828,000, 1,325,000 and 2,137,000 in 1979, 1989, and 1999 respectively. The population is expected to grow to 3.1 million in year 2005. (NMGS draft, 2004). The inter-censal growth rates of Nairobi have been 4.7% and 4.8% for the 1979/1989 and 1989/1999 periods, which are very high compared to the overall national growth rate of 2.9%-3.4% over the same periods. In the past, the growth was mainly due to rural-urban migration, but natural growth is now the most important factor. Nairobi's population in the day is much higher than in the night. In the day, it serves the neighbouring districts of Thika, Kiambu, Muranga, Kajiado and Machakos. Which are not considered in city planning yet they have direct impact on the city. Some of the impacts include, inadequate housing, proliferation of informal settlements (estimated to house about 60% of Nairobi's population) traffic congestion, inadequate provision and maintenance of infrastructure services such as water supply, sanitation and pollution of its rivers. This has resulted to urban sprawl to outlying areas like Thika, Athi River, Limuru, Ongata Rongai, Ngong and Kiambu.

This large population continues to pose serious problems for the Nairobi City Council as the population tends to move to the outskirts of the city in the designated urban/trading centres and in the surrounding ‘shamba’ areas of Kiambu, Thika Kajiando, and Karuri. The surroundings have grown into major population centres or dormitories, which depend largely on the City of Nairobi for services and employment, a fact that is usually ignored when planning for city services. This has posed a major challenge in plan preparations of Nairobi city, which are normally based on administrative boundary of the City of Nairobi. (Karuga, 1993)

### **3.1.1 Planning experience**

The early planning of Nairobi was on somewhat ad hoc basis and it was not until 1948 when ‘Nairobi Master Plan for a Colonial Capital’ was completed. The plan laid down guidelines for the City’s development for the next 20 years. With independence in 1963, however, the Master Plan became obsolete because:

- City boundaries were extended from the area of 90 square Kilometres to an area of 690 square Kilometres
- Population growth increased beyond plan targets
- With the change of government orientation, new sets of policies were needed to guide development of the city along non-colonial lines.

The outcome of this was the Nairobi Metropolitan Growth Strategy in 1973, which consisted of a series of policies related to the major aspects of urban development and the broad physical structure within which these policies could be realised. It was hoped then that the City would maintain a continuous review of policies and structures and adjust them to suit the changing circumstances but this has not happened. Attempts to come up with a Nairobi Metropolitan Growth Strategy after the expiry of the 1973 plan was made in 2003 by Nairobi City in conjunction with Department of Physical Planning, Ministry of Land and settlement and other stakeholders. This was however not completed due to conflict rising from the ownership of the document ( PPD,NCC, 2005). This then has left Nairobi city without any planning policy as the 1973 plan expired in 2000. This coupled



with lack of National Land Policy (which is in the process of formulation) makes it difficult for management of land developments within the city.

Nairobi is worst hit with rapid urbanization with about 200,000 people adding to its population annually (NMGS draft, 2003). This growth has not been matched by a corresponding increase in the provision of infrastructure services. This combined with an inelastic supply of land has resulted in an inorganic spread of the city way beyond its boundaries. Today Nairobi faces serious problems of inadequate housing, proliferation of informal settlements (estimated to house about 60% of Nairobi's population) traffic congestion, inadequate provision and maintenance of infrastructure services such as water supply, sanitation and pollution of its rivers. Owing to the aforementioned problems, Nairobi has consistently been exerting a lot of pressure on the surrounding regions of Machakos, Kajiado, Kiambu and Thika. This can be viewed in terms of population overflow to these regions leading to urban sprawl and the resultant problems of uncontrolled settlements, diminishing agricultural land, human wildlife conflict to mention but a few.

It is important to note that, discouraging further growth of Nairobi would be difficult to justify in purely economic terms since urbanization as a process cannot be stopped but can be controlled and managed ( Local Government officer, 2005) In fact some experts agree that urbanization can be viewed as an opportunity rather than a problem.( Goetz, 2004)

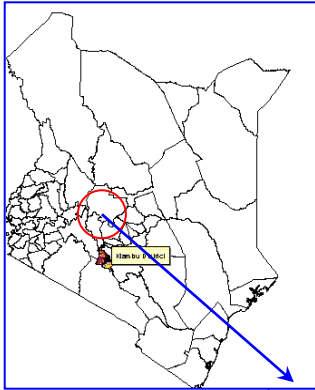
### **3.2 Kiambu District**

Kiambu district lies between latitudes 0<sup>0</sup>75'' and 1<sup>0</sup>10'' south of equator and longitudes 36<sup>0</sup>54'' and 38<sup>0</sup> W. It is one of the districts that comprises Central Province. It lies within the Southern part of Central Province sharing boundaries with Nairobi and Kajiado to the South, Nakuru to the West, Nyandarua to the Northwest and Thika to the east. It covers an area of 1,329.9Km<sup>2</sup> out of which 928 Km<sup>2</sup> is available for agriculture production. It has diverse Agro ecological zones ranging from forest zones which occupies about 400Km<sup>2</sup>, tea, coffee zones, and semi arid zones to the west of the district

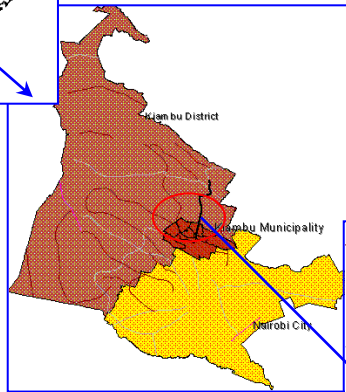
covering Ndeiya division, Karai and Escarpment locations. It is divided into seven administrative units (divisions), namely Kiambaa, Lari, Githuguri, Limuru, Kikuyu, Municipality, and Ndeiya. There are 21 locations and 108 sublocations. Regional setting is as shown below,

**Map 1: Regional Setting of the Study area**

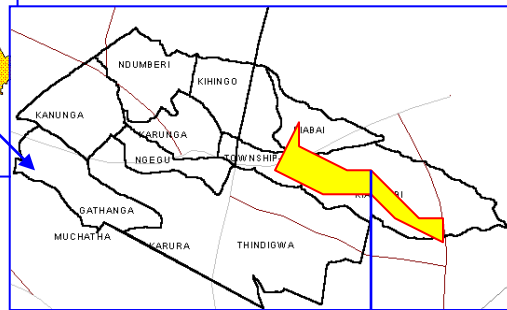
Location of Kiambu District



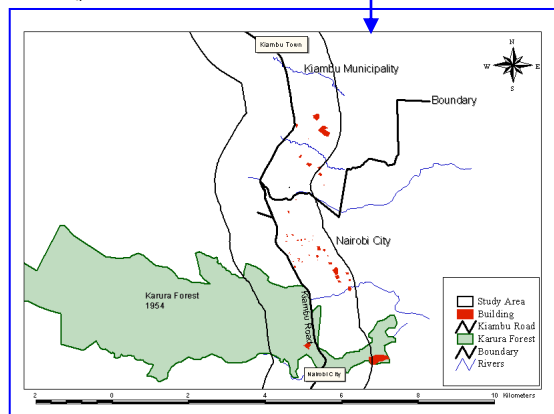
Location of Kiambu Municipality



Location of Study area



The study area



Source: Survey of Kenya, 1978

### **3.3 Municipal Council of Kiambu**

The municipality is about 57 Km<sup>2</sup> in size and lies roughly between 1<sup>0</sup>10' and 1<sup>0</sup>15' south of the equator and longitude 36<sup>0</sup> 45 and 36<sup>0</sup>54' Greenwich Meridian. Kiambu municipality is located within Kiambu District. It lies in the catchment area of Nairobi and is within what is generally known as the Nairobi Metropolitan Region. It is located about 13 Kilometers away to the north of Nairobi CBD, shares a boundary and the town lies only 5 Km from the built up area of Nairobi. (DURP, 2003). It is accessible from Nairobi via Muthaiga through the main Nairobi – Kiambu road. It is accessible to other towns within Kiambu district i.e. Ruiru, Lari, Limuru, Githunguri, Gatundu, Karuri and Thika through tarmacked road network.

#### **3.3.1 Historical development**

The history of Kiambu municipality can be traced back to the development of Kiambu town. Kiambu town started originally in 1903 at a site known as “Thathi-ini” on which now lies the Kirigiti stadium. The then colonial district commissioner with his offices used to stay there and administered the region around. The name “Kirigiti” is coined from the game cricket, where the colonialists used to play it at the stadium. The establishment of the administrative offices triggered the developments of other services such as residential houses to accommodate the officers and commercial centres to cater for other requirements, thus the centre started assuming urban status as these developments took place. The district commissioner offices were later removed from Kirigiti site to the present area fronting the road to Nairobi. The town subsequently grew and expanded outward from the area.

During the colonial days, a lot of Asians established themselves very prominently on Kangoya Ridge where now lies the present Kangoya ward. At that time, the area was referred to as “Kwa Uhindi” (The place of Asians). Here they engaged themselves in business ranging from retail and wholesale to light industries.

The town had an assortment of farmhouses and huts to serve the settlers by then. It was later endowed with a shopping street, and a number of ‘dukas’ emerged which belonged

to Indians called Indian Bazaars. The old Kiambu town still has the remnants of these 'dukawallas' and up to present day it is referred to as "ng'ambo ya wahindi" or the Indian Bazaar. In 1963, Kiambu town acquired urban council status and in 1974, it was made a town council. By this time, the township measured about 1.5 Km<sup>2</sup> but in 1984, Kiambu town council acquired municipal council status increasing the area to 57Km<sup>2</sup>. Kiambu town has grown both as the headquarters of the district and as the market centre for the surrounding agricultural area. Kiambu town is the district headquarters of Kiambu District.

Kiambu municipal council was dominantly agricultural as noted by the ministry of agriculture (AAR,1997) where out of the divisions total area of 191.7Km<sup>2</sup>, about 190Km<sup>2</sup> is arable. Muhia had noted that approximately 56 percent of the area of the municipality consisted of large coffee plantations (Muhia, 1992). The rest of the land was a mixture of planned settlement villages and small agricultural holdings.

Municipal Council of Kiambu is divided into 8 electoral wards namely Kangoya, Kanunga, Biashara, Hospital Ward, Ndumberi, Riabai, Kanunga and Turitu Wards.

### **3.3.2 Physical characteristics**

#### **a) Topography**

Topography in Kiambu consists of broad flat topped to round ridges separated by steep convex to uniform sided valleys on the north and west of the municipality. To the south and east of the municipality, that is mainly a large scale coffee growing area, ridges become broader due to various streams joining to form rivers and valleys while ridge tops have a greatly undulating topography. Kiambu district is divided into 4 broad topographical regions; the upper highland area, the lower highland area (where Kiambu municipality lies), upper midland and lower midland as shown below,

**Table 1: Ecological Zones**

| ZONE           | PHYSICAL CHARACTERISTICS          | AREA COVERED   |
|----------------|-----------------------------------|--|
| Upper Highland | Highly dissected ranges           | Parts of Githunguri, Lari and Kikuyu                   |
| Lower highland | Medium spaced parallel ridges     | Part of Kiambaa  |
| Upper Midland  | Wide spaced parallel ridges       | Kiambaa, Githuguri, Kikuyu and limuru                  |
| Lower midland  | Generally level with fewer ranges | Eastern part of Githuguri, and southern part of Kikuyu |

Source, Annual report, Ministry of Agriculture, 2004

Kiambu Municipality falls in the lower highlands zone that consist of medium spaced parallel ranges. This type of ecological zone is suitable for farming as well as human settlement because of low gradient that makes the soils to be well drained.

### **b) Climate**

The municipality generally experiences moderate temperature and maximum mean annual temperatures range between 22<sup>0</sup>C and 26<sup>0</sup>C in the months of January and February, with minimum mean annual temperatures ranging from 10<sup>0</sup>C to 14<sup>0</sup>C in the months of June and July which may simply be described as chilly. The temperatures and humidity are modified by altitude and slight variations exist within the municipality.

### **c) Soils**

Soils within the municipality are highly fertile and well drained ranging from deep grey/red to dark brown friable clay. Ridge tops are covered with red friable clays while the lower, flatter and poorly drained areas have yellow to brown or yellow to red friable clays of acidic humic top soils. These soils are suitable for tea, coffee, Horticulture and food crops like maize, potatoes, bananas and fruits.

#### **d) Water drainage and catchments areas**

The two principal sources of water in the municipality are surface and underground. The surface water comprises many permanent rivers and springs such as Riara river, Gatharaini and Kiu, well distributed all over the municipality. The municipality is surrounded by water catchment areas e.g. the Aberdare ranges, the Kikuyu escarpment.

### **3.3.3 Population, demography, and housing**

#### **a) Population and Demographic Characteristics**

Urban population has grown from 3.8 million in 1989 to 9.9 million in 1999, constituting 34% of the total population and is projected to grow to 16 million by 2005. Women form about 49% of urban dwellers. (CBS, 1999).

In 1989 Population of Kiambu municipality was estimated at 56,500 inhabitants of whom only 7,000 would be categorised as urban population that concentrated in the old township area of 1.5 Kilometre Square. There were also the semi-urban areas in Kanunga, Ndumberi, and Riabai villages. During the period, Kiambu Town accommodated about 1200 people who worked in Nairobi either because they were unable to find accommodation in Nairobi or preferred to live in rural areas while working in large urban centre (Muhia, 1992).

The population in Kiambu Municipality had increased to 60,605 people by 1999 with 30,236 males and 30,369 females. The municipality growth rate was 3.7%, which is higher than the national rate of 2.4%, while population projection by 2033 was found to be 318,183 people, (DURP,2003).

#### **b) Housing**

The major concern while assessing housing situation in a given region pertains to the quality and stock of the existing houses. In urban areas, 76% of the poor and 80% of non-poor rent their dwellings, over 47% of Kenyan urban dwellers seek shelter in informal settlements. Housing in Kiambu municipality is provided by three players, namely, the

municipal council of Kiambu, public staff housing, and private housing. The municipal council has about 50 rental houses within Kiambu town.

A site and service scheme exists west of old Kiambu town. About 40 serviced plots were availed by the municipal council with water, leveled roads, and electricity. Public staff housing, mainly housing government department workers in the municipality are found behind the district hospital and administrative blocks and are mainly for middle-income earners. High-income houses especially private are found in Thindigua areas and off the Nairobi Gigiri road.

Researchers have noted that the demand for housing is very high in Kiambu municipality as evidenced by the high rate of residential construction within municipal leasehold land and in the immediate agricultural freehold land being converted to rental housing. Coffee plantations along Kiambu-Nairobi road were subdivided into small parcels of land that attracted high-income earners due to their location and accessibility. Squatter settlements along the 60 meters road near Kiambu sewerage works, and dilapidated formerly Indian like structures within the town manifested the quality of housing in the municipality (DURP, 2003).

## **b) Agriculture**

Agriculture is the main economic activity in the country and so is Kiambu district. About 90% of the total population in the district derive their livelihood from the sector and it accounts for 80% of employment in the district. Climate is favourable for growth of cash crops in Kiambu such as tea, coffee, pyrethrum, flowers, horticultural crops, and subsistence crops like Maize, beans, potatoes, and bananas. Arable land in the district accounts for 90% under smallholder farming while 10% is under large-scale commercial farming.

Kiambu municipality has three regions of economic activities namely the settled area, the rural area, and the urban area. The settled area is part of former European settlements and constitutes 65% of the municipal area. It is largely large-scale coffee farming towards Ruiru, Githunguri, Kanunga. Some small areas of land are under horticultural

cultivation. The settlement pattern has few isolated homes and a few large villages – coffee bushes are being replaced by high income residential e.g. Muthithi of Kanunga, Turitu, Ngegu, Riabai, Ting’ang’a, Ndumberi and Kangoya. The urban area is the town proper and is the built-up area generally known as Kiambu town. Most of the residents are engaged in agriculture practises. There are 174,165 small farm holdings and 442 large-scale farms in the district.

Major problems identified in the agriculture sector were:

- Decreasing farm sizes
- Inadequate use of appropriate technology
- Unreliable rainfall
- Poor marketing infrastructure
- Limited access to credit
- High cost of farm inputs – agricultural machinery
- Poor market information and early warning systems
- Lack of a land use policy.

### **c) Forestry**

The objectives of the forestry policy include, reservation of land, protection, management of sustained yield basis, promotion of recreation, conservation of flora and fauna, and promotion of research and education. Forest area in Kiambu covers approximately 49800.12 hectares of gazetted forests including environmental, protective, and productive forests. Most of the man made forests are found in Kinale in Lari division.

## **3.3.4 Infrastructure services and community facilities**

### **a) Water**

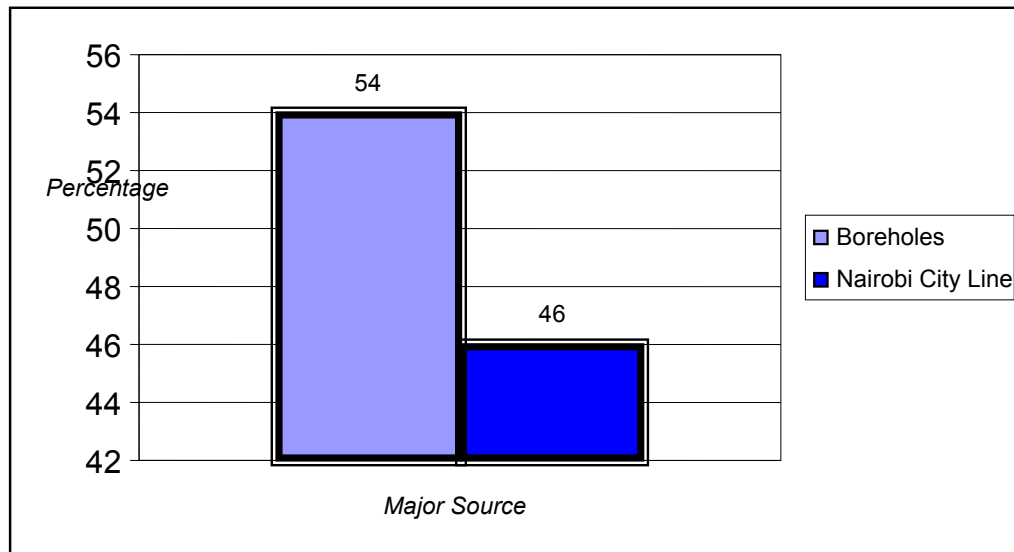
Use and management of water resources in the country is currently managed by the sessional paper No. 1 of 1999 on national policy on Water Resources Management and Development. The overall goal of the national water development policy is to facilitate the provision of water in sufficient quantity and quality and within a reasonable distance to meet all competing users in a sustainable, rational, and economical way. The sources



of water supply in Kiambu district are rivers, boreholes, springs, dams, and boreholes. Surface water comprises permanent rivers and springs e.g. Kamiti, Riara, Kiu, Ruiru, Gatamaiyu, Komothai and Ndeiya, all well distributed over the district except Karai and Ndeiya locations. Despite presence of permanent rivers and boreholes, about 50% of total population in the district does not have access to clean water part of which is polluted by agricultural and industrial activities.

Trunk pipes traverse the municipal area from Sasuma and Ruiru dams to Nairobi. There is a serious water shortage in the municipality occasioned by water shortage, pump breakages, and sabotage by residents. The chart below shows the main sources of water in Kiambu Municipality.

**Chart 2: Sources of Water**



Source: DURP,2003

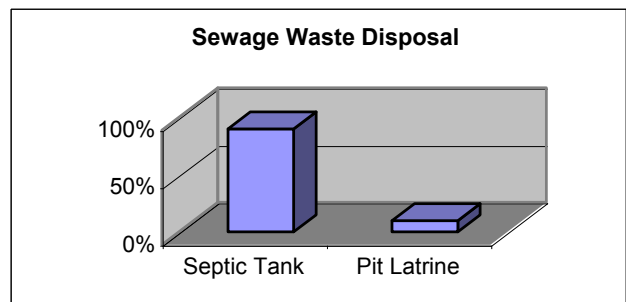
*b) Sewerage Reticulation*

Most people within the municipality use pit latrines partly due to the old design of the houses and due to the lack of adequate water supply to provide toilets. Septic tanks are also in great use and the area is therefore in dire need of an exhauster service. The sewerage services are connected only to the main urban centre and the sewerage treatment is only about 60% utilized. The sewerage system covers about 2 kilometers. The area covered by the sewer is about 3.5% of the total area of the municipality although the sewerage treatment works is designed to a capacity of 8000 persons. The plant receives

approximately 800m<sup>3</sup> of wastewater per day, and can hold up-to 1200 m<sup>3</sup> of wastewater per day. In addition, the sewer plant has one oxidation pond, which is mechanically aerated. According to a survey by DURP, it was revealed that, approximately 62% of the households use pit latrines, 18% septic tanks, and 20% municipal sewer line service. Along the kiambu corridor however, it field survey showed that majority uses septic tank as shown below,

**Table 2: sewage waste disposal**

| Sewage waste disposal | Method | Percentage |
|-----------------------|--------|------------|
| Septic Tank           | 88     | 90%        |
| Pit Latrines          | 10     | 10%        |
| Total                 | 98     | 100%       |

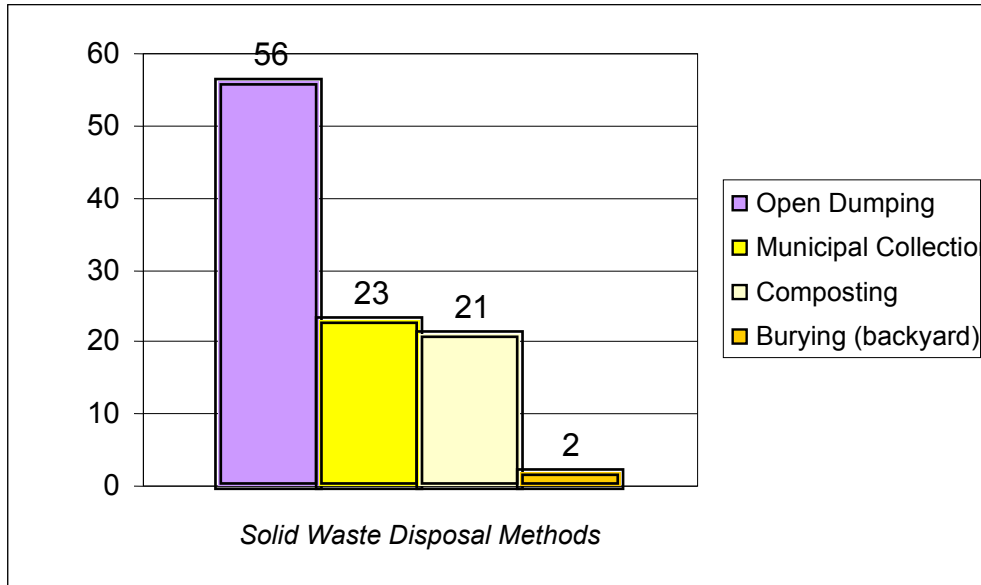


Source: Njoroge C. G. 2005

#### **d) Solid Waste Management**

Solid waste management is mainly concerned with handling solid wastes, its storage, collection, processing, and disposal. This kind of service absorbs a considerable proportion of municipalities' effort, budgets, and work force. There is therefore an increasing demand in improving efficiency in the disposal and management of solid wastes within the jurisdiction of the municipality of Kiambu. A report by durp showed that about 56% of the households resort to dumping their wastes on open ground, 23% and 21% rely on municipal council collection and composting respectively and 2% bury at their back yard. This is as summarised below,

**Chart 3: Solid Waste Disposal**



Source: Durp, 2003

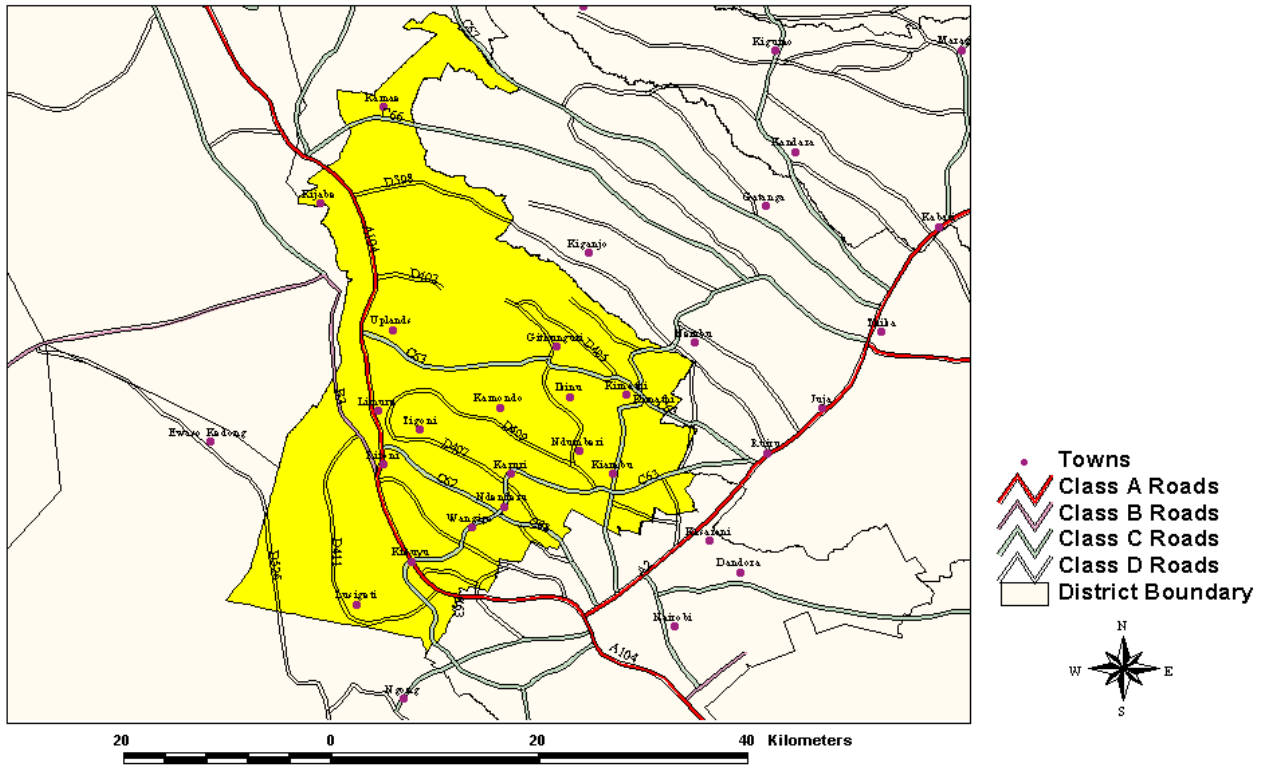
This however defers with the Nairobi Kiambu corridor findings where majority burnt their solid wastes, while others paid private collectors. Along the corridor, the municipal council was accused of not collecting the waste.

## **b) Transport**

### **i) Road transport**

Kiambu district is covered by a total of 539.1km of road, 392.6km of bitumen standard, 93.4km of gravel and 53.1km of earth roads supplemented by unclassified feeder roads. The divisions best served by road transport are Kikuyu and Limuru while Lari is the least served. Road classification in Kiambu is as shown below,

**Map 2: Road Network in Kiambu District**



Source: Ministry of Public works,2005

The municipality is at the crossroads of two regional roads; Nairobi-Githunguri and Kikuyu-Ruiru roads. 2 other roads radiate from town to Limuru and Marigi trading centre with other roads linking the municipality to Lari, Karuri, and Kikuyu. There are other murrum and earthroads within the town.. There is one parking facility mainly used by matatu that is small and cannot accommodate all traffic. Private car parking is not provided except kerb parking which is common. There is street lighting within the built up area.

**d) Education**

Education is a fundamental strategy for human resource development. The challenges facing the education sector are cost of education and training, in equity, in access, high wastage rates, problems of relevance and quality, and under-enrolment in key post school course. (NDP, 2002)

In the municipality of Kiambu, pre-primary and primary schools are fairly well distributed with a high enrolment of girls than boys. Secondary schools and government colleges are inadequate in the district. Numbers of education facilities in Kiambu municipality are as follows,

**Table 3: Pre-primary enrolment and The Number of teachers by Operators**

| ITEM              | OPERATOR |         |         |               |       |
|-------------------|----------|---------|---------|---------------|-------|
|                   | COUNCIL  | MISSION | PRIVATE | COMMUNIT<br>Y | TOTAL |
| NUMBER OF SCHOOLS | 10       | 33      | 37      | 3             | 83    |
| ENROLMENT         | -        | -       | 1200    | -             |       |
| TEACHERS          | 27       | 111     | 121     | 4             | 262   |

Source: Kiambu District Development Plan (2002-2008)

**Table 4: primary and Secondary school enrolment by Sex**

| ITEM              | Primary schools | Secondary schools |
|-------------------|-----------------|-------------------|
| Number of schools | 13              | 14                |
| Enrollment: Boys  | 6658            | 1729              |
| Girls             | 6695            | 3564              |
| TOTAL             | 13353           | 5293              |
| Staff: Male       | 79              | 155               |
| Female            | 240             | 169               |
| TOTAL             | 319             | 324               |

Source: Kiambu District Development Plan (2002-2008)

There are about 83 pre schools in the municipality with a total enrolment of 200 children mostly built of non-permanent materials. There are 13 primary schools with a population of approximately 6000 pupils. Secondary schools are 14 in number in the municipality.

There are several commercial colleges offering computer and business related courses in Kiambu built up area. Kiambu Institute of science and technology (KIST) offers business and technical training in specialized areas and attracts students within and without the district. Interestingly, the majority of the residents along the corridor take their children to Nairobi for primary with 78.4% with their children in Nairobi schools, 19% in Kiambu schools and 2.6% in other areas.

#### **e) Health**

Health facilities are fairly well distributed in the district with 6 hospitals, 19 health centres, 37 dispensaries, and 55 clinics. There is a doctor/population level of 1:30,000 slightly below the national ration of 1:33,000. The main health facility serving the municipality is Kiambu district hospital. Other health facilities are private clinics, health centres and dispensaries. Just like the schools, it was found that residents along the Nairobi-Kiambu Corridor went for health services at Nairobi.

### **3.4 Summary**

Background information has brought out clearly that Kiambu has physical and climatic environment with suitable conditions for farming as well as human settlement. It has a low flat relief with well-drained red soils. Red soil forms good foundations for buildings and therefore construction costs are reduced. Temperatures range between 22<sup>0</sup>C and 26<sup>0</sup>C in the months of January and February, with minimum mean annual temperatures ranging from 10<sup>0</sup>C to 14<sup>0</sup>C. These temperatures are suitable for human habitant as they are not extremes. The availability of water from the Nairobi water line that crosses the study area, and accessibility through Nairobi-Kiambu road, present the infrastructure requirement for human settlement. The main problem is however, the fact that planning for the City does not accommodate the needs of these residents and this is what has led to inadequate provision of infrastructure and other services.

Another important factor highlighted is the agricultural potential of the study area with proper management; Kiambu can be the food basket for Nairobi City. The soils and

climatic conditions are suitable for horticulture and other food crops while dairying is widely practised. Due to accessibility and nearness to the city, management of urban farming in this area would provide not only domestic but also exports produce. No wonder Kiambu area had been recommended for protection for agriculture produce in the 1973 Nairobi Metropolitan Growth Strategy.

On solid and water wastes, the problems may not be experienced due to the available open spaces and green cover that absorbs the pollution from burnt solid waste. This may be a problem in future however as land use changes to higher densities which also is accompanied by reduction of use of organic matter to inorganic which may not be easily recycled. Thus, unless the solid waste is institutionalised, as densities increase, it would be hard to keep the area pleasant.

## **CHAPTER FOUR: POLICY INSTITUTIONS FOR MANAGEMENT OF URBAN FRINGE**

### **4.1 Introduction**

An important feature of Kenya's land legislations is its diffuse nature, with provisions being contained in about 50 statutes. This has made management of land uses a challenging task and especially where two or more legislations conflict. Some of the major legislations address land issues include,

- Land tenure and land use legislations
- Environmental legislations
- Forestry legislation
- Water laws
- Public Health Act
- Constitution of Kenya

#### **4.1.1. Land tenure and land use legislations**

Over fifty statutes administer Land ownership and land use. They include the Government Lands Act (Cap280), The Registration of Titles Act (Cap 281), The Trust Land Act (Cap 288), The Local Government Act (Cap 265), The Land Acquisition Act (Cap 295), The Registered Land Act (Cap 300), The land Control Act (Cap 302), The land Adjudication Act (Cap 244), The Physical Planning Act of 1996, The Agriculture Act (Cap 318), The Crop and Livestock Act (Cap 321) and others.

Despite the existence of these legal instruments, there has not been proper and comprehensive land use/environmental planning and coordination in Kenya. Instead, there has been uncoordinated and unsuitable land uses, conflicts and environmental degradation, increasing inequality in land distribution, and loss of diversity. ((Situma, 2003)

To address land related problems, the government of Kenya through successive National Development Plans since 1979 has shown aspirations to establish Land use commissions. In 1999, the Government created the Njojo Commission of Inquiry on



Land Laws, this was followed by Ndugu Report released in 2004, and currently the government is working on National Land Policy which is aimed at harmonising the land issues.

#### **4.1.2 Environmental Legislations**

There are about 77 statutes, which address the environment, and not until 1999 when EMCA was enacted, there was no specific framework for environmental legislation. This type of legislation is an important component for sustainable environmental management in that it establishes national environmental principles and provides guidance and coherence to good environment management. It further deals with cross sectoral issues such as sustainable development, overall environmental policy formulation, environmental planning, protection and conservation of environment, environmental quality standards, environmental protection orders, institutional coordination and conflict resolution.

EMCA specifically “covers the protection and management of wetlands, hilly and mountainous areas, forests, environmentally significant areas, the ozone layer, and the coastal zone” (EMCA, 1999). It requires that an Environmental Impact Assessment (EIA) is carried out to determine whether or not a programme, activity or project will have any adverse impacts on the environment. It is important to note that these activities include human settlement.

Kiambu corridor is an environmentally sensitive area which requires environmental management, for example Karura forest which is the only forest in the city falls on the corridor, rivers cross through the area, while the soils are specifically potential for agriculture farming. Thus Kiambu Corridor requires sound environmental management to conserve natural biodiversity and sustainable developments.

#### **4.1.3 Forestry legislation**

The principal legislation that governs the conservation, management and utilization of forests and forests products is the Forest Act (Cap 385). Other important Acts which have a bearing on forest include, Plant Protection Act (Cap 324), Timber Act (Cap 386), Water

Act (Cap 372), Wildlife Act (Cap 376), Local Government Act (Cap 265) and many others.

Over the past 20 years, Kenya has experienced intense deforestation. It is estimated that about 19,000 ha of forest cover are felled or converted each year. In response to this unsustainable practice, significant changes are taking place in the forest sector by way of

- Provision of the framework environmental law which outlays indiscriminate forest destruction under the pretext of development
- Restructuring of the forestry department
- Rejuvenating the efforts of implementing the Kenya Forestry Master Plan adopted by the government in 1994
- Adoption of an all inclusive new Forest Policy
- Stake holder's involvement in the development of the new Forests Bill in the Parliament for enactment into law.

Karura Forest is not an exceptional to the above problems, though the problem has been controlled, it is reported that about 90.4 ha out of 807.75ha of karura forest had been cleared. The forestry department is in the process of reforestation of the area that has been infected by Lantana Camara weeds (A weed which colonizes other plants and prevents them from growing). The weed is associated with the clearing of the forest.

The impact of clearing Karura forest can be major, especially on rivers that get exposed resulting to high evaporation and reduction in water volumes. Karura forest is also the air cleanser for highly populated city and any reduction on forest cover is detrimental to resident's health. Thus, there is major reasons why Karura forest should be protected from urban sprawl.

#### **4.1.4 Water Laws**

The principal legal frame for managing water resources in Kenya is the Water Act (Cap 372). Other legislations that have a bearing on the management of water resources include the Forests Act (Cap 385), the Irrigation Act (Cap 347), the National Water Conservation and Pipeline Corporation Act(Legal notice No. 270 of 1988), the Agriculture Act, the

Lakes and Rivers Act (Cap 409)the river Basin development authorities Act (Cap 443) and others.

In Kenya, water is a vital but scarce resource that is distributed disproportionately in time and space relative to demand. The demand for water is increasing as the increasing population creates more pressure. Furthermore, water quality is deteriorating as more pressure is put on the scarce supplies, rivers are running dry as abstractions increase, and as the buffering capacities of catchments are reduced by urbanization and devegetation. (Sitanda, 2004).

An important conceptual advancement has been made by the water Department in the recognition of the need to manage catchments and river basins in an integrated manner through a Sessional Paper No. 1 of 1999 on National Policy on Water Resources Management and development. The water department has adopted a long term strategy that is leading to integrated Water resources Management. It is worth noting that under the proposed framework, a National Standing Committee will be established to spearhead the formulation of a consolidated policy on land, water and forests. In addition, a new Water bill is in the parliament waiting approval for enactment.

Human settlements on catchments areas have been reported to have adverse effects on water resources that not only affect the residents within the area but also the people downstream who depend on the same source. For example within the study area, residents were found farming up to the river riparian which have contributed to the water pollution and diversion of water from its natural channel for purposes of irrigation. As the human settlement increases, this is expected to increase which leads to reduction in water volumes and eventually drying up of streams. To protect such eventuality, management of urban fringe is required which should protect such sensitive areas.

#### **4.1.5 Public Health Act**

The Public Health Act does not have planning standards per se but it has discretionary powers to approve or reject plans on buildings based on the grounds of health that is

based on quality and sanitary conditions of the shelters. This has made it very crucial in planning because it defines the quality of structures and the facilities that go with it. Its main emphasize is on

- Good sanitation ensuring healthy environment
- Engineering standards as regards sewerage reticulation
- Defines need for access

This is strengthened by other legislatives such as Local Authority by-laws and building codes. Thus the Act is applicable in planning as it affects the sustainability of the developments.

#### **4.1.6 Constitution of Kenya**

Section 71 of the constitution, deals with the right to life, and encompasses the right to clean and healthy environment. This right can only be meaningful if enjoyed within a conducive environment. A case has been made in the constitutional review process on the right of the individuals to enjoy a clean and healthy environment to be incorporated in the constitution. Such constitutional entrenchment would give the desired visibility to land and environmental matters and assist in the enhancement of the level of public awareness about the critical importance of such matters.

#### **4.2 Historical background of land use planning laws in Kenya**

The East Africa Protectorate 1903 Ordinance was the first land use statute in Kenya enacted barely 2 years after completion of the Uganda railway line. This was followed by the Land use proclamation of 1911. This applied to towns of Nyeri, Embu and Meru whose territorial jurisdictions were limited to 1 mile from the administrative flag post. This coincided with the Simpson Committee Report of 1911-1912 that gave local authorities powers to make by laws that were to be approved by the governor in council. The committee recommended zoning of Nairobi albeit on the basis of racial segregation.

In 1919, the Town Planning Ordinance was enacted and remained the only planning legislations for twelve years until 1931 when the Town Planning Act cap 134 was

enacted. The Town Planning Act remained in force until 1961 when Development and use of Land (Planning) regulations were enacted. One of the major contradictions was noted on section 8 which provided for public participation in plan making while section 52 allowed secret planning. The Development and use of Land regulations became the Land planning Act Cap 303 in 1968. The Town Planning Act of 1931 however remained in the effect and both Acts run parallel in management of land use in Kenya. This remained in force until 1996 when both Acts were relinquished for Physical Planning Act of 1996 that is currently in force.

### **4.3 Physical Planning statutes**

#### **4.3.1 The Town Planning Ordinance, 1931 (CAP 134)**

Two sections of the Ordinance, sections 23 and 24 were the basis of which control of development and preparation of township plans by the Government Town Planning Department were undertaken. Section 23 concerns the preparation of Town Planning Schemes (Development Plans) outside Municipalities and Townships. Town Plans were prepared by the Town Planning Advisor and approved by the Commissioner of Lands. Section 24 permits the commissioner of Lands to control the development and subdivision of plots in municipality and townships. The study area is within a municipality and therefore falls under what was described by this Act.

The regulations outlined in the act to address urban fringe were as following,

1. All areas within a distance of 5 miles of the boundaries of municipalities, Townships and Former Towns
2. All land except land in Municipalities, situated within 400 feet of the roads specified in the schedule
3. All land in Kilifi and kwale District excluding Townships, former Townships and trust land.

According to section 12(1), central Government would also have powers to refer a case to the local Authority in the area where no interim planning authority exist, if the case is on

- i) Application of change of use of agricultural land where the plot of land concerned exceeds 20 acres
- ii) An application to subdivide agricultural land into plots of less than 20 acres where the plot to be subdivided exceeds 20 acres
- iii) In the case of an application in the respect of land within three miles of an adjacent municipality, the case is referred to the adjacent municipality
- iv) To such other authority as the Central Government may think proper.

The study area falls within the 5 miles from the city boundary hence requires special planning under the Act.

#### **4.3.2 The Land Planning Act 1968 (CAP 303)**

The Act is the enactment of the Development and use of Land (Planning) Regulations 1961 into an Act. The Act is concerned with the preparation of development Plans, the appointment of Planning Authorities and the control of development. Part 11 of the Act allowed the Local Authority to assume control over areas for which planning schemes have been prepared and gazetted. A preparatory authority would prepare schemes; in practice the Town Planning Adviser would have no power over such areas once the scheme has been gazetted. The major plans carried out under this framework included the Nairobi Metropolitan Growth Strategy (NMGS) of 1973, structure plans for most of the municipalities like Thika, Nakuru, Eldoret, Mombasa and Kakamega, and Human Settlement strategy (HSS), (Simiyu,2002).

A central player in the Land Planning Act was the Minister responsible for Physical planning. The Minister's role included preparation of Town plans, area plans, Subdivision plans and use plans in respect of unalienated government through the Commissioner of Lands office and the Physical Planning Department. The Commissioner of lands was responsible in the approval of plans and ensuring enforcement and compliance of the same. This is a role which has been vested on the Director of Physical Planning in the current Act (Physical Planning Act Cap 286).

### 4.3.3 Physical planning Act (Cap 286)

According to physical planning (Cap 286) section 5, preparation/formulation of plans is mandated to the Director of physical planning. Functions of the Director of Physical planning as outlined in the Physical Planning Act (PPA) are to:

1. *Be responsible for the preparation of all regional and local physical development plans.*
2. *From time to time initiate, undertake or direct studies and research on matters concerning physical planning.*
3. *Advise the commissioner of lands and local authorities on matters concerning alienation of land under the Government Lands Act and the Trust Land Act respectively.*
4. *Advise the commissioner of land and local authorities on the most appropriate use of land including land management such as change of user, extension of user, extension of leases, sub-division of land and amalgamation of land, and*
5. *Require local authorities to ensure the proper execution of physical development control and preservation orders.*

Section 29 of the same Act mandates local authorities the power to control the developments.

- a) *“To prohibit or control the use and development of land buildings in the interests of Proper and orderly development of its area*
- b) *To control or prohibit the subdivision of land or existing plots into small areas”*

Section 30 gives further emphasize on development Control under Local authority where it states that *“the LA may charge fines, demolish illegal structures to ensure compliance with approved plans”*

An analysis of the above clauses reveals that,

While the mandate to prepare the Physical Development Plans has been vested on the Director of Physical planning, it is clear that the department is not adequately staffed. The department is therefore unable to prepare Physical Development Plans on time and this

limits the capability of the Local government to control developments without guiding plan. The PPA requires that all Regional Physical Development plans be prepared on the basis of the National Physical Development Plan and all local Physical Development plans to be based on the Regional Physical Development Plan. Currently, National and Regional Physical Development Plans have expired and are yet to be prepared. Qualified physical planners are required to make physical development plans, while there are about 97 qualified physical planners in the country.

The Act has also failed to recognise the importance of collaboration of the stakeholders in the process of preparation and implementation of the Act. Whereas the Director of the Physical Planning prepares Development Plans without regard to the local authorities, development control becomes difficult, as the plans are prone to misinterpretation. The Act also fails to recognise that majority of the local authorities lack professional personnel. This has increases the risk of interpretation of the plans as well as disowning of the plan. The power of the Physical Planning department also seems to be concentrated at the National level and the local authorities are only seen as development control agencies. This has denied the LA the right to plan as empowered by Local Government Act cap 265, section 166.

A major issue not discussed by the Physical Planning Act is the management of urban fringe that had been provided in the Town and Land Planning Acts. The Acts had stated that incase of developments within 8 miles from the municipal or Township boundaries, the central government had the control and the next municipality would be consulted where interim Planning authority was lacking. This clause was removed without replacement and such areas have become a no man's control zones because each authority has only powers to the fixed boundary. This clause was also very important because any changes on the fringe areas have major impacts on existing towns or cities and their comments are highly needed to guide such development. The acts hadalso provided on the management and planning of road reserves (400 feet from the roads), which is not catered for by the PPA. This has brought about major conflicts on road



reserves where the law is not clear on who is responsible to control developments on road reserves.

The Act also does not indicate the action to be taken in case of the defaulters. This has made it very difficult to determine the punishment in court and in most cases; the fines are too low to deter the defaulter from repeating the same act. This has discouraged the officers from taking such cases to court as highlighted by both the local and central government officers.

The above loopholes have made it difficult for local government to implement and control developments as they were not involved in the preparation. It also creates room for misinterpretation of the plans because land control agencies, and local government officers are not involved in the preparation process. This has also been made worse, where the local authorities lack professional personnel to interpret the plans. The above loopholes have contributed to fast growing informal settlements in urban areas in Kenya.

#### **4.3.4 Local Government Act (Cap 265)**

Under Local Government Act Cap 265, section 166 provides that,

*“Every Municipal Council, county council or town council may, subject to any other written law relating thereto, prohibit and control development and use of land, and orderly development of its area.”*

The Local Government Act empowers local authorities to implement physical development plans and control developments in their area of jurisdiction. However as discussed above, the preparation of Physical development plans is vested on the Director of Physical Planning who is based in the Ministry of Lands and Settlement. Since the same institution does not carry out the preparation and implementation, the process is faced by misinterpretation. The LA lacks ownership and incentive in the implementation of the plan because they are not involved in the preparation stage. This coupled with lack of planning professionals in most local authorities has led to unplanned developments.

Section 162 cites on subdivision regulations, where the local authority is empowered to control subdivision of land or existing lots into smaller areas until an approval certificate is issued. Where such subdivisions require change of user from agriculture, they should be registered as leases for ease of planning and development control. The objectives of controlling subdivisions as outlined by the Physical Planning Handbook (draft, 2003) are as follows,

- i) Ensuring that resultant plots are accessible
- ii) Ensuring that proposed population density is in accordance with available services such as water, sewer, roads, and drainage
- iii) Ensuring that there is planned and coordinated developments and
- iv) Ensuring that proposed use (s) is/are compatible with surrounding use(s)

The planning considerations in determining subdivision proposals include:

- a) Proposed use of subplots in compliance with provision of an existing development plan or zoning regulations for proposed subplots are for the area
- b) Proposed subplots are adequately accessed
- c) Size and density of subplots are in accordance with zoning regulations for the area
- d) Boundaries, dimensions and acreage of subplots are clearly indicated
- e) Open spaces and social infrastructure are adequately provided
- f) Proposed subplots are compatible with adjacent development
- g) Favourable impact on the environment and level use of existing facilities such as roads, water and sewage disposal
- h) Minor access roads of 9 meters reserve width provided should not be more than 100 meters long or serve utmost 20 plots
- i) Provision of 6 meters greenbelts along ring roads and bypasses

Though the above objectives and well wished for orderly developments, rarely are the standards maintained. This has been attributed to the lengthy process in acquiring the approvals on subdivisions and developments from the council. (Muhia, 1992)

Closely related to Local Government Act is The **Land Control Act Cap 302**, which specially deals with controlling transactions in agricultural land.

Section 2 describes an agricultural land as that land which is not within

- i) “A municipality or a township....
- ii) Nairobi Area or in any municipality, township, or urban...”

The act outlines the mandates to control all dealings on agricultural land that include sale, mortgage, lease, exchange, partition, and others on agricultural land. The act provides guidelines in dealings on agricultural land where the division of any such agricultural land into two or more parcels to be held under separate titles, other than the division of an area of less than twenty acres into plots in an area to which the development and use of Land (Planning) regulations, 1961 for the time being apply. Consent can also be refused in the case of the division of land into two or more parcels, where the division would be likely to reduce the productivity of the land. (Section, 9). As mentioned in the background information, about 75% of land in Kiambu Municipality is agriculturally used and this act plays a major role in management of such land.

This is a section, which has been largely misused. The fact that the Act does not specify the minimum subdivision for agricultural land has made it a toothless Act. It was upon the discretion of Land Control Board to approve or reject a subdivision. Due to the openness of the clause, by the time the Minister of Lands declared the minimum subdivision of agricultural land to two and half acres, it was found that some boards had approved as low as 1/16 of an acre. This was possible because the Act has not categorically indicated the minimum land subdivisions for agricultural land.

## **4.4 Institutional Analysis**

### **4.4.1 Introduction**

- The key institutions involved in land use planning are;
- The Central Government
- Local authority
- Community

#### 4.4.2 Central Government

The main player in central government in land use planning is department of the Physical Planning, Ministry of Lands, and housing.

The director of physical Planning or the district Planning Officer is mandated to initiate the preparation of any plan in consultation with the local authorities and other stakeholders. The director of Physical Planning then carries out the plan preparation. As shown above, the department is represented at provincial and district levels. It was also found out that, the department works closely with the Local authorities in matters related to physical planning in their areas of jurisdiction. In Kiambu, a physical Development Plan has not been prepared for the municipality and the one that exist for the town is dated way back to 1981.

Other central government institutions that provide information in the preparation of Physical development Plans include,

**Central Bureau of Statistics (CBS):** This department provides very important information on demographic information of the planning area. The data reveals the characteristics of the population being planned for, the densities, and the expected projections. This information is very important in determining the demand for various services such as Education, health, Water and others.

**Ministry of Lands and Housing:** This is the ministry that provides information on Land administration which include, land tenure, values, land uses, existing encumbrances on land, and topographic cadastre and aerial maps which shows the physical features of the area. This information has the influence on the size holdings and type of ownership, the trend of land uses, while it reveals the topography of the area.

**Ministry of Environment and Natural Resources:** The Ministry is mandated to conserve, and manage natural resources for sustainable development. Major resources under this ministry include Water, Forestry, and conservation of biological diversity. The management is carried out through NEMA (National Environmental Management Authority). NEMA is formed through a parliamentary Act of parliament EMCA to

provide for the establishment of an appropriate legal and institutional framework for the management of the environment. The purpose of NEMA is to

- Exercise general supervision and coordination over all matters relating to the environment; and
- Be the principal instrument on the Government in the implementation of all policies relating to the environment

This Act has become crucial in planning because any development should meet the standards of sustainable development.

**Ministry of Water and irrigation:** The Ministry is the custodian of surface and underground water information. It records the surface water flows showing level changes over time, quality, and quantity. Underground water is also examined showing the quality, quantity (yield), and the location of the boreholes, wells and springs. This information is very important when dealing with the impact of human settlement on water resource. It also reveals the available supply of water for various uses.

**Ministry of Agriculture:** The ministry of agriculture provides information on the climatic conditions of the area, the type of crops commonly grown, the yields, and income earned from the produce. It also shows the employment level in the agriculture sector. The ministry highlights on recommendable land sizes and farming trends, which have an influence on the land use. The minimum agricultural land is however not indicated as it emphasises on economical size.

**Ministry of Public works and Roads:** Accessibility is major factor in planning. During subdivisions, provision of roads is recommended. Roads department provides information on existing road network, type and condition of roads, and other type of transport information. Some land uses such as heavy manufacturing industries may require good roads while tea and coffee producing areas requires all weather roads. Thus, the ministry provide crucial information in planning.

Other central government ministries include education, police, telecommunications and health to determine the level of services required.

#### **4.4.3 The Local Authorities**

Local authorities in Kenya are corporate bodies established by the Act of parliament (LGA, Cap 265). Though the Act mandates them to plan and control developments within its jurisdiction, this is not the reality on the ground. Instead, the local authorities act as semi-autonomous institutions of the central government, concerned with the planning, development and provision of services at the local level. (Simiyu, 2002)

##### **City/Municipal institutions**

The organizational structure of both Nairobi city and Municipal council of Kiambu are made of two arms, the political, and the executive or technical arm. The political arm is headed by the mayor who is elected under section 13 (1) of the Local Government Act (LGA). Under the mayor is the deputy Mayor also elected under section 16 (1) of LGA. The mayor chairs the full council, which is the final policy making committee of the council. The Town Clerk deputized by the Deputy Town Clerk both appointed by the Public Service Commission on a full time basis heads the executive or technical arm. The Town Clerk is the chief executive and administrative officer of the local authority and has the general responsibility of coordinating the work of the council, advises the council on all matters and corresponds on behalf of the council. A director in the city council heads planning department while Town planning is a subsection of the building section amongst garage and workshop, road and draughtmanship, and survey in Kiambu municipality under the docket of the clerk. Unlike the Municipality where planning section lacks a professional planner, Nairobi City Council has professional planners.

#### **4.4.4 Local Communities along Nairobi Kiambu Corridor**

Community participation in planning or development control is bound to be more successful than top down planning. This culture is taking root in the country and especially with the introduction of Constituency Development Fund (CDF), where proposals come from the community for Funding. According to two successful stories

along the corridors, Muthithi estate is well planned because the community does management of development under its area, while Karura Forest has recognised public/private participation in the management of the forest, which is bearing fruits. It is then clear that for management of urban fringe, community participation is a prerequisite to success and the residents of Nairobi- Kiambu corridor should be involved in plan preparation and implementation.

#### **4.5 Summary**

The following issues have been raised on land policy and institutions in the management of the urban fringe.

- There exist diverse laws in the management of Land use, which have made management of land uses a challenging task. The legislations have been uncoordinated because the country lacks a comprehensive land use policy, which is in the process of formulation by the Ministry of Lands and Housing.
- The current Physical Planning Act Cap 286 has not included a clause on the management of urban fringe that had been contained in the Town Planning Act Cap 134. The Act had vested the powers to the central government to manage all that land which falls within 5 miles from the urban boundary. The study area falls within the 5 miles from the Nairobi city boundary.
- Sustainability of land laws requires enforcement and responsibility for the impacts of decisions. The law alone cannot enforce the common interest but requires effective institutions to carry out the preparation and enforcement of the laws. There are various institutions in central and government levels that lack coordination. This has resulted into haphazard development because it is not clear on the roles and responsibilities of various institutions. Community participation has also been lacking that would provide community knowledge, and support, which is required. This is best achieved by decentralising the management of resources upon which local communities depend, and giving these communities an effective say over the use of the resources. Thus, land laws need to entrench

public participation and especially neighbourhood associations in plan preparation and implementation.

Thus, the existing land laws need to entrench a clause on the management of urban fringe as well as find ways of harmonising the land use management institutions so that all stakeholders are involved in a coordinated manner. Successful management of urban fringe however requires strong enforcement body to monitor the dynamic land use changes on the urban fringe.



## CHAPTER 5: RESEARCH FINDINGS

### 5.1 Introduction

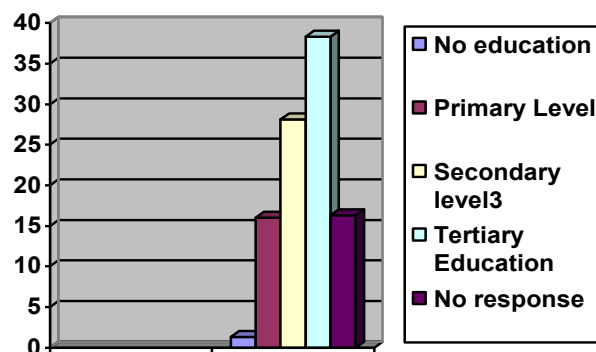
The purpose of the study was to examine land use changes on the urban fringe and propose planning approaches that can be adopted for sustainable development of the area, using Nairobi–Kiambu corridor as a case study. To achieve this, the study set out to investigate the land use changes, which have taken place along the Nairobi-Kiambu Corridor, find out the driving force to these changes, the economic, social and environmental impacts of the land use changes, and finally the existing legal and institutional establishments in the management of the fringe areas. These form the basis of the proposed planning approaches.

#### 5.1.1 Demographic characteristics

The study found out that, population ratio on male to female in the study area was 1:1 with 88:95, male to female. Education level in the area is high with 45.8% of household members having attained tertiary level, 33.6% had attained secondary level, 19.1% had attained primary education, and only 1.5% had not gone to school. Findings are as summarized below,

**Table 5: Respondents Level of Education attained**

| Level of Education attained | Frequency | Percentage |
|-----------------------------|-----------|------------|
| No education                | 4         | 1.3        |
| Primary Level               | 50        | 16.0       |
| Secondary level3            | 88        | 28.1       |
| Tertiary Education          | 120       | 38.3       |
| Sub Total                   | 262       | 83.7       |
| No Response                 | 51        | 16.3       |
| TOTAL                       | 313       | 100.0      |



Source: Njoroge, C. G, 2005

Interestingly, population structures along the corridor showed that majority of the household members were aged 15-35, accounting for 50.4 %, and only 8.3% were over 55 years. Those aged below 14 years were 9.6%. This is as summarized below,

**Table 6: Age structure**

| Age group   | Number | Percentage |
|-------------|--------|------------|
| 1-14        | 30     | 9.6        |
| 15-35       | 158    | 50.4       |
| 36-55       | 92     | 29.4       |
| 55 and over | 26     | 8.3        |
| No response | 7      | 2.3        |
| Total       | 313    | 100        |

Source: Njoroge, C. G, 2005

The age group structure is important in planning for community services that may differ from one age group to another.

### **5.1.2 Land tenure**

Land tenure describes the manner in which rights in land are held. Legal security of ownership with clear identification of owners and what is owned, mechanism of efficiently transferring rights in real estate and the restrictions on the use of land are prerequisite to the type of developments on land. Along Nairobi Kiambu Corridor, the section falling under Nairobi city jurisdiction is held on leasehold ownership for 99years. This was not the case however on the Kiambu municipality side where 60% held freehold ownership, 31% had leasehold ownership and 9% were tenants on less than 5 years lease. Freehold ownership was found to be more favorable by the investors and homeowners than leasehold tenure because the owner has absolute rights to the use of land unlike leasehold ownership, which is renewable subject to fulfillment of set conditions. This was evidenced along the corridor where leasehold properties had been controlled to a minimum of  $\frac{1}{2}$  an acre compared to Freehold tenure where land had been subdivided to below  $\frac{1}{4}$  of an acre.

## 5.2 Land use changes

A fundamental objective of good land administration is to ensure sustainable development. All landscapes change over time, whether through human interference or by natural processes. It is therefore essential that these changes are monitored and understood and that the uses to which the land is put are sustainable. A mixture of land uses characterizes Nairobi-Kiambu corridor with agricultural land being converted into urban land uses. Patches of Coffee plantations are still in place but residential settlements are eating up most of the coffee land. The types of developments coming up are of high class standard with pockets of low class developments. The Plate below shows some of the buildings coming up along the corridor, coffee plants are visible in the background. This is common at Muthithi estate where the residents control the development types and other community facilities.

**Plate 1: Controlled developments at muthithi Estate**



Source: Njoroge, C. G, 2005

Flats are also coming up in some areas and especially the 500meters stretch from the main Nairobi-Kiambu Road. At Thindigwa and Kasarini Estate, Plate 2 shows the kind of flats coming up. This is an indication that there is high demand for accommodation because several blocks could be seen on various stages of completion as shown below,

**Plate 2: Thindigwa Estate**



**Plate 3: Blocks of flats at Kasarini Estate**



Source: Njoroge, C. G, 2005

Coffee crop can be seen at the foreground, which shows that land use changes are taking place and coffee farms are being replaced by human settlement.

To find out the land use changes along Nairobi Kiambu Corridor, a time series Model for 1954(base year) and 2003 (Current) was developed to analyse changes in land/parcel size, forest cover change and built up area. . This was done using GIS and Remote sensed data with aerial photos dated 1954, 1978, and 2003,

### **5.2.1 Change in Vegetation Cover**

The presence and abundance of vegetation in urban areas has long been recognised as strong influence on energy demand and development of the urban heat island. Urban vegetation influences air quality and human health because trees provide abundant surface area for sequestration of particulate matter and ozone. This creates a strong case for preservation of vegetation on urban fringe. Karura Forest is very important being the only forest within Nairobi City and acts as air cleanser for the highly populated city. According to the officer in charge of Karura forest, the forest cover has been maintained over time and the forest has not been severed as many people have implied. It was clear however that a large portion of the forest had been cleared as shown by the data below,

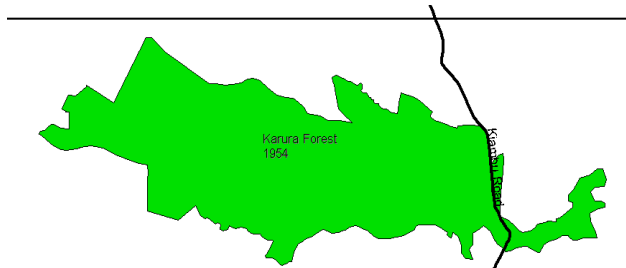
**Table 6: Types of Forest cover by areas they occupy**

| Current Forrest                            | Status (Hectares) |
|--|-------------------|
| Indegenious trees                          | 807.75            |
| Exotic plantations                         | 143.15            |
| Lantana camara (“mukenia”) and other weeds | 90.4              |
| <b>Total Area</b>                          | <b>1041.3</b>     |

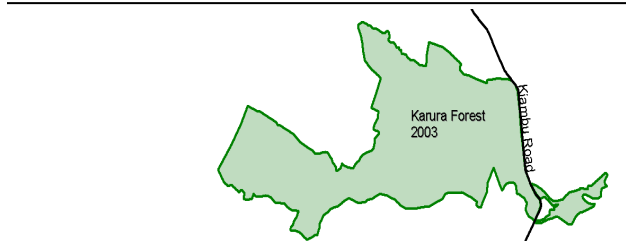
Source: Department of Forestry, Karura Forest, 2005

Lantana Camara was described as a weed that is dangerous to other trees because it colonises an area and prevent others plants from growing. It spreads very fast after clearance of the forest. This was made clearer by GIS and Remote sensed data which identified the reduction of vegetation cover on Karura forest as shown below, (aerial photos-1954, and 2003)

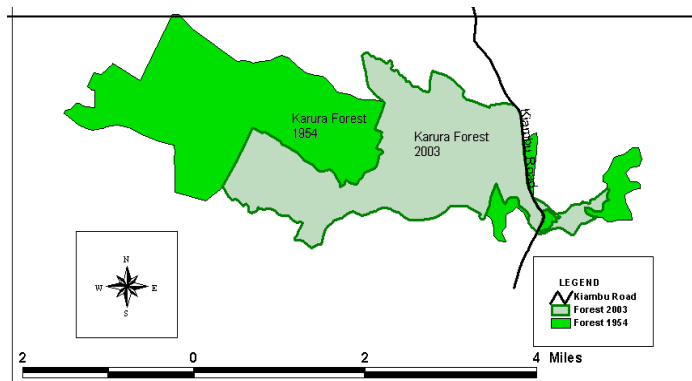
**Map 3: Karura forest by 1954**



**Map 4: Karura Forest by 2003**



**Map 5: Karura Forest 1954/2003**



Source: Aerial Photos, 1954 and 2003

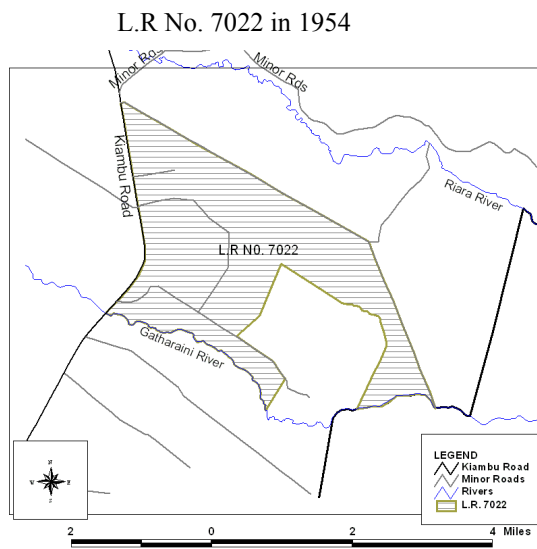
The size of the forest has reduced drastically from 1954 to year 2003 as shown on map 5.

The causes of Forest clearance were not easily established, but media reports had stated that Karura forest had been grabbed for private development and in such, vegetation clearance could be associated with the same. Neighbouring communities were also cited to have been stealing the timber and firewood but this had stopped with the introduction of community participation in the forest management that was introduced in 2003. Karura forest was used as a case study to highlight the loss of vegetation cover to the urban land uses. It was found that Karura Forest has reduced almost by ½ by 2003 of what it used to be in 1954.

### 5.2.2 Land Subdivisions

Land subdivision refers to the process of subdividing one piece or parcel of land into two or more parcels to meet individual needs. Currently the main acts that control land subdivisions include Land Control Act Cap 302, Physical Planning Act Cap 286 and Local Government Act Cap 265. Along Nairobi-Kiambu corridor, the land control falls under two jurisdictions namely Municipal council of Kiambu and Nairobi City Council. A snapshot of subdivision trend along the corridor showed the following changes during the years 1954, 1979, and 2000.

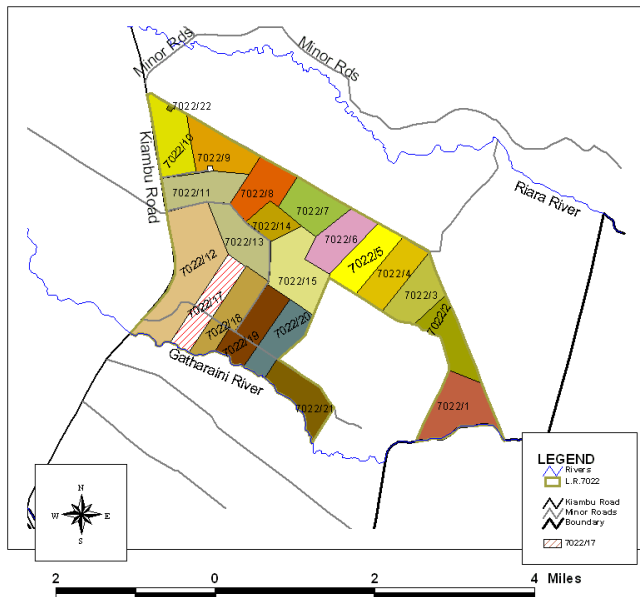
**Map 6: Land sizes in 1954. A case of L.R Number 7022**



Source: Survey of Kenya, RIMs

The above case shows the average size of land on the Nairobi Kiambu Corridor by the year 1954. The size averaged 400 hectares with very little settlement. This however changed with time and by 1979, the land had been subdivided to 20-hectare parcels resulting into 20 parcels as shown below,

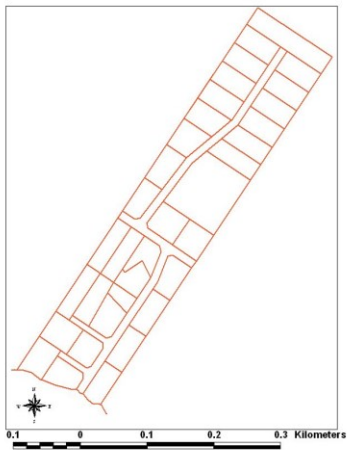
**Map 7: L.R No. 7022 in 1979**



Source: Survey of Kenya, RIMs

With the size reduced to 20 hectares, these were indications that more people were expected to settle in the area because they could afford to buy the land. At this time, assumptions were that, a parcel of land, which originally measured 400ha, had been divided into twenty parcels of 20 hectares each, attracting twenty settlements in the area. Subdivisions continue, and by 2000, the twenty hectare parcels had been subdivided further into 0.2 hectares as shown below,

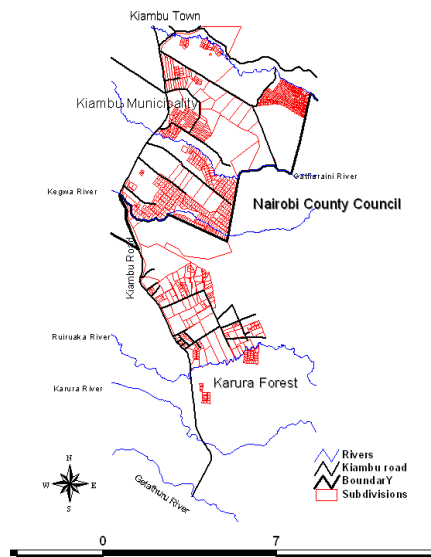
**Map 7: Part of L.R. No. 7022 in 2000**



Source: Survey of Kenya, (2005) RIMs

Assuming that all the 20 hectare parcels would be subdivided to this extent, each resulting to about 35 parcels, it is then true to indicate that by 2000, the 400 hectare owned by one person in 1954, may be currently owned by up to 700 people, (assume ownership of one parcel of 0.2 ha per person). At the same time, the subdivision results to uneconomical agricultural land that indicate that land use changes from agriculture to residential or commercial use. This is common along the Nairobi-Kiambu corridor and especially on the Kiambu side where subdivisions are intense as shown below,

**Map 8: Land subdivisions along the Nairobi-Kiambu Municipality boundary**



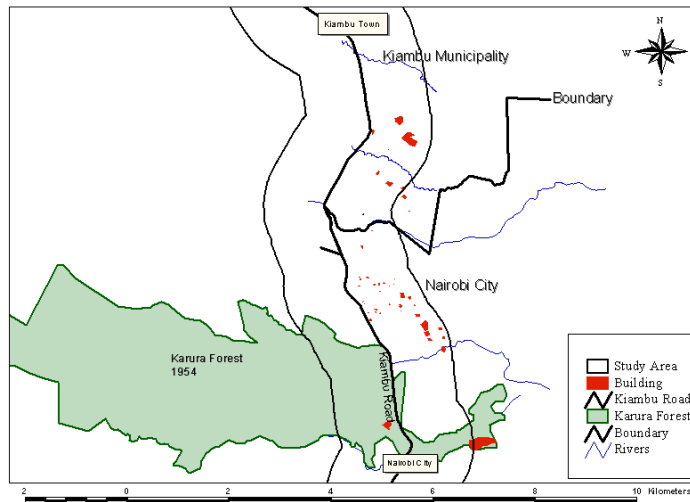
Source: Survey of Kenya, RIMs



### 5.2.3 Land use change in Built up area

Analysis on both aerial photos and field data showed that built up area has been increasing proportionately with land subdivisions. These are as shown below on aerial photos for 1954, 1978 and 2003. In 1954, there were less than 20 structures within the study areas and it was clear that most of them were coffee factories while human settlement was negligible. This is as shown below,

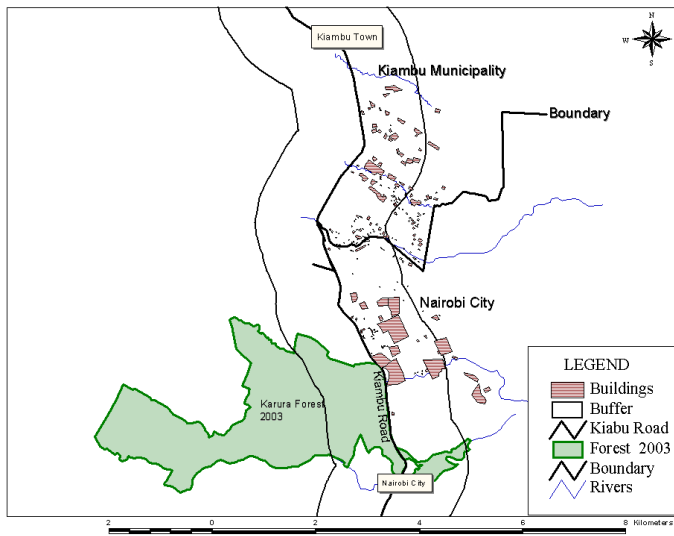
**Map 9: Built up area by 1954**



Source: Aerial Photo:1954

By 1978, this had changed and nucleated human settlement could be seen spreading to other parts and land subdivisions taking place. By this time, it was clear that human settlement was in the increase and planning intervention was required to direct the development, but it seems that no intervention was taken. This is as shown on the map below (1978) with over 100 buildings coming up,

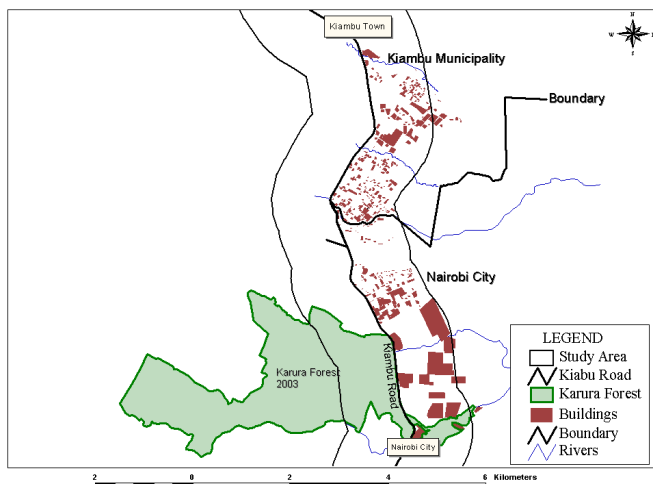
**Map 10: Built up area by 1978**



Source: Aerial Photo, 1978

It is important to note that the settlement is dispersed over the area with a few areas, which seems to record concentrated settlements. It is however clear that built up area is more concentrated on the Kiambu side than the Nairobi side. By 2003, human settlement had spread widely replacing the agricultural land use with human settlement. Land measuring over 100 hectares could not be found along the corridor during the field survey and where coffee is still the main crop, it is in small parcels of 5-10 hectares. The built up area by 2003 is as shown below,

**Map 11: Built up area by 2003**



Field survey revealed that, built up area and subdivisions are on the increase. The Government's declaration on minimum agricultural land to 2.5 hectares may be hard to implement in Kiambu where the subdivisions are below 0.2 ha as discussed above. This is a clear indication that the fringe area is in dire need for development guidelines if sustainable development is to take place.

### **5.3 Causes of the subdivisions and increase in built up area**

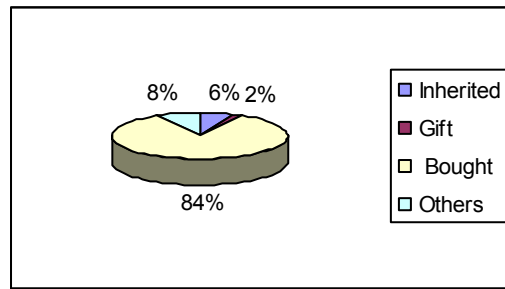
During the study, several factors were raised having accelerated the subdivisions of land within the area. They include,

- **Land values within Nairobi City boundary:** This was the result of urban land prices soaring beyond the expectation of the ordinary Kenyan within the confines of the city boundary. Alternative land at the periphery and within commuting distance to the city centre was an attractive pull for most urban dwellers that wanted to invest in housing. This has also led to speculative banking of the land within the periphery in the hope of selling at higher prices in the future. In this way, Nairobi has acquired its symbiotic relation with its hinterland and fringe so that planning for the city, for instance, while leaving out the fringe is completely unrealistic. It was surprising that land within the boundary of Nairobi and Kiambu differed in values depending on the side of the boundary at which the land fell. At ridgeway estates, an acre would go for as high as 10.2 million compared to approximately 6 million at Muthithi estates in Kiambu and as low as 4.8 million at Thindigwa estate in Kiambu side.
- **Population pressure:** it is important to note that apart from the population pressure from Nairobi, Kiambu municipality has experienced high growth rates. Thus, big parcels are subdivided to small parcels to meet demand. Population increase within the municipality was noted where land was subdivided and inherited while outside pressure was noted by those who bought land from other places. It was clear that high pressure was from the immigrants than natural growth as shown below,

**Table 7: Land Acquisition**

**Types of Land acquisition in the study area**

|              | Frequency | Percent      |
|--------------|-----------|--------------|
| Inherited    | 6         | 6.1          |
| Gift         | 2         | 2.0          |
| Bought       | 82        | 83.7         |
| Others       | 8         | 8.2          |
| <b>Total</b> | <b>98</b> | <b>100.0</b> |



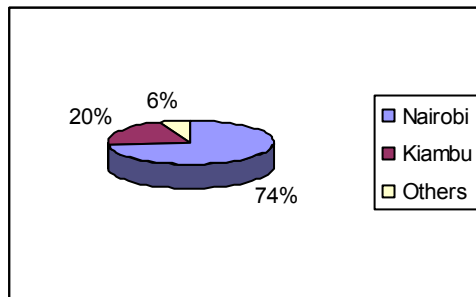
Source: Njoroge C. G, 2005

It is clear that about 84% of the residents of Nairobi-Kiambu corridor have bought land compared to only 6% who have inherited. This shows that urban fringe experiences more pressure from the external forces/in migration than the natural population growth within the area. This was further realised when the analysis on the place of work showed that majority of the households head were working in Nairobi compared to those working in Kiambu. The analysis were as follows,

**Table 8: Place of work**

**Place of Work of Household's head**

|              | Frequency | Percent    |
|--------------|-----------|------------|
| Nairobi      | 72        | 73.5       |
| Kiambu       | 20        | 20.4       |
| Others       | 6         | 6.1        |
| <b>Total</b> | <b>98</b> | <b>100</b> |



Source: Njoroge C. G. 2005

**Land Tenure:** According to the Kiambu land office, subdivisions of land held under Freehold is not easily controlled because it does not fall under their jurisdiction. The municipal council of Kiambu in collaboration with the ministry of agriculture controls the subdivision of such land because most of it is under agriculture use. Since the land control Act does not indicate the minimum acceptable subdivision, it was noted that some subdivisions have been approved to the size of 1/16 of an acre, (a size which cannot be regarded as economical for agriculture production). The resident Physical planner,

Agricultural Officer and the Surveyor indicated that there was a general understanding among the officers that agricultural land should be subdivided to a minimum of ¼ of an acre, which is not adhered to. Where the land is held under leasehold, the subdivision size is easily controlled as shown on the Nairobi side where subdivisions have been controlled to a minimum of ½ an acre compared to Kiambu fringe. Land ownership within Kiambu municipality was found to be as follows,

**Table 9: Land Tenure types in Kiambu Municipality**

| <b>Existing Land Tenure in Kiambu Municipality</b> |            |           |
|--|------------|-----------|
| Ownership  | Area Sq.Km | % Holding |
| Government Land                                    | 7.125      | 12.5      |
| Trust Land   | 7.125      | 12.5      |
| Private Land                                       | 42.75      | 75        |
| Total  | 57         | 100       |

Source: Kiambu lands office, 2005

The existing land tenure shows that privately owned land forms the highest percentage in Kiambu that amounts for 75% of the total land in the municipality. Privately owned land is not easily available and controlled like government or trust land because of the individual rights to their land. Where land is required for community purposes, Compulsory Acquisition Act allows for the acquisition of private land but it is quite expensive. Thus, the type of tenure has an impact on the planning of an area.

**Table 10: Private land ownership**

| Private Land | Area Sq.Km | Percentage |
|--------------|------------|------------|
| Leasehold    | 10.6       | 30%        |
| Freehold     | 32.06      | 70%        |
| Total        | 42.75      | 100%       |

Source: Kiambu lands office, 2005

Enforcement of developments control on freehold tenures has not been easy because unlike leasehold land that gives conditions on the land use, freehold tenure gives absolute rights to the use of land. Development control on such land is therefore based on Health Act, Agriculture Act, and Land Control Act. A major conflict occurred at Thindigwa estate in Kiambu where some of the owners wished to have the developments within the

estate controlled to single storey buildings while the rest favour flats and other commercial buildings. The lands office could not solve the conflicts as it did not fall under their jurisdiction, the Physical Planner was toothless because she does not have a physical development plan for the area, while the municipal council of Kiambu were helpless because it was difficult to determine the type of developments in the area which is still under agriculture use. The Local government, urban planning department had to intervene and the case is still unsolved. Though the Local government aims at recommending the area a low-density zone, field survey revealed that the major issue is the conflict between the rich and the poor within the estate. While the poor wishes to build commercial houses such as rental structures, the rich want to have a low density, quite area. Since the rich are able to push there complains to higher authorities, the poor have withdrawn and do not participate in the decision making of development control in the area. (See, appendix 7, the letter to the clerk from the Local Government office).

**Institutional/legal capacity:** As discussed above, various institutions among them, ministry of Lands, municipal council, ministry of Agriculture, and ministry of local government are involved in development control. The Land control Act, Local Government and Physical Planning Act empowers the local authorities to control subdivisions within their jurisdiction. The main problem however lies on the Capacity of the authorities to carry out their duties. Municipal Council of Kiambu lacks professional personnel in physical planning. Nairobi council has professional personnel but their area of jurisdiction is too large to meet the demand. Apart from the capacity, the institutions lack facilitating equipments such as vehicles and computers, which delays the work. Bureaucracy in the institutions was also cited as a major cause of illegal subdivisions. A Development approval should in theory take 30 days but in reality, it takes not less than 3 months.

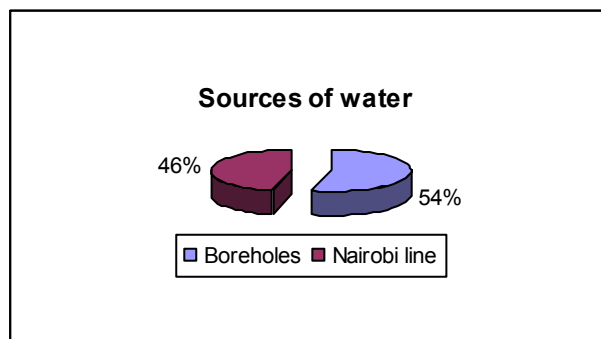
Legally, a municipality is required to have a land control board to foresee land subdivisions, and a district liaison committee according to the Physical planning Act to foresee planning issues. Municipality Council of Kiambu does not have a Land Control Board and the District Liaison Committee has not been active for the last two years. The Physical Planner reported that she was in the process of reviving the District Liaison committee that would look into development plans and subdivision problems in the area.

What came out of the discussions however was the fact that there was no collaboration among the institutions mandated in making decisions on the management of developments and control of the developments within the urban fringe. Although in theory, any development along the corridor requires comments from all the relevant ministries, rarely is the comments solicited and when such is done, the officers concerned take it as a formality, and approves without much consideration. These posed several problems in the working environment; for example, the Municipality could approve some plans without approval from the District Planning office, and rarely invited the ministerial officers to planning meetings.

**Availability of infrastructure:** Kiambu municipality is well served by roads connecting it to various towns. The municipality is at the crossroads of two regional roads; Nairobi-Githunguri and Kikuyu-Ruiru roads. Two other roads radiate from town to Limuru and Marigiti trading centre with other roads linking the municipality to Lari, Karuri, Kikuyu, which are all, tarmacked. There are other murram and earthroads within the municipality especially on former coffee plantations. Kiambu-Nairobi Road is part of part of Nairobi-Githunguri Road and it's fairly maintained. It only takes about 15 minutes drive from Kiambu town to Nairobi city.

Kiambu Municipality is also adequately served with water and electricity. Though a higher percentage of the population uses borehole water, Nairobi water line serves Nairobi-Kiambu Corridor. Main Water Sources for Kiambu Municipality are as follows,

**Chart 4: Sources of water**



Source: The Municipal Council of Kiambu, 2005

The plate below shows Sasamua water line that traverses along the study area. Though the pipeline is meant to serve NCC, residents of Kiambu municipality have been connected to the same source under the management of NCC.

**Plate 4: Sasamua water line**



Source: Njoroge C. G, 2005

Electricity supply is also adequate with over 90% of the residents within the study area connected to electricity, which was said to be adequate. Availability of the above infrastructure has therefore facilitated subdivisions as most people wishing to work in Nairobi can live in Kiambu municipality and commute to work.

**Availability of spacious land and Environmental cleanliness:** As the land in the city gets congested and more expensive, those in need of more space are able to move to Kiambu municipality where they are readily available. This encourages subdivisions to meet the demand. The fact that the sale of such land is always at a higher value than would be for agricultural land also encourages subdivisions. For the rich, this forms a good place where one has enough space for recreation facilities within their compound. The study revealed that about 70% of the people living along the Nairobi Kiambu Corridor, preferred the area because of environmental factors and availability of spacious land.

**Coffee prices:** a major cause of subdivisions within kiambu municipality and part of Nairobi, which was originally coffee estates, was the low prices of cash crops and especially coffee. Since 1999 when coffee prices dropped, coffee cooperatives started



subdividing their land for sale. This has encouraged change of user of prime land from Agriculture to commercial or residential leading to subdivision.

Field survey noted cases where coffee crops were left unattended, while in some cases it had been cleared in preparation of developments. The photographs below show unattended coffee on the foreground of blocks of flats, and cleared farms in preparation of developments.

**Plate 5: Urban developments on the former coffee farms and the clearing of coffee crops**



Source: Njoroge, C. G,2005

**Political influence:** was cited as a cause of land subdivisions in Kiambu Municipality. The officers are sometimes forced to act on the advice from the “above”. For example, a case was cited when the officers had agreed to control subdivisions of agricultural land to a minimum of a  $\frac{1}{4}$  of an acre. They however received a call from the headquarters requiring them to withdraw the decision and approve the subdivisions as per the clients demand. In such a case, the officers are reduced into rubber stamps and professionalism does not apply.

## **5.4 Consequences of Land subdivisions, land cover clearance and increase in built up areas**

### **5.4.1 Reduction of farm sizes**

As discussed above, Peri-urban agriculture on large farms or estates has reduced drastically through subdivisions. This has also led to change in agriculture from the major cash crops to demand driven farm produce such as dairy cattle for milk, poultry to provide eggs and meat, horticulture and others. Thus, reduction in farm sizes has not lead to reduction in agriculture production, because the type of farming has also changed. Urban or peri urban agriculture is in the increase, which refers to “*small farm units close to town which operate semi- or fully commercial farms to grow vegetables and other horticulture, raise chicken and other livestock, and produce milk and eggs*”(NMGS, draft, 2003). Peri-urban agriculture occurs within and around cities throughout the world. Kambu urban fringe seems to be taking that direction. In almost all households with ½ an acre of land or more, peri-urban agriculture activity was being carried out. In Kenya urban agriculture is a recent phenomenon, which is still in the grey area of urban planning. To the urban planner, urban agriculture is a challenge and a dilemma because:

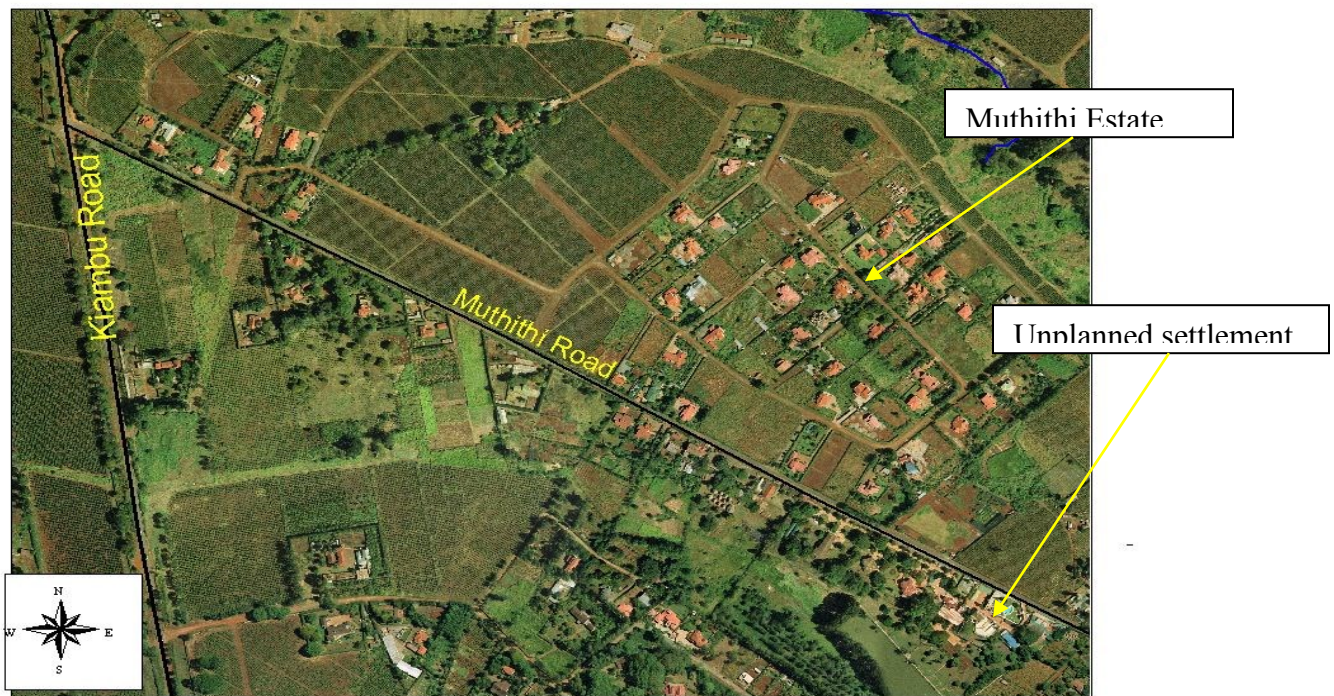
- Urban agriculture is not often recognized as a land use in the urban space in laws of Kenya.
- On the other hand, peri-urban agriculture is practised around the city and agriculture is accepted as a land use, and the close proximity to the city of Nairobi opens it to a large market. The problem and challenge here is that conversion to non-agricultural uses often takes place without planning permission resulting in urban sprawl and the juxtaposition of conflicting land uses.

### **5.4.2 Unplanned settlements**

Kiambu municipality does not have a physical development Plan and therefore any development or change of user does not fit in a planned framework. This has been a major problem particularly to those estates with residents differing on the best kind of development for the estate. A case in study is the Thindigwa Estate discussed above, where the rich wanted to keep the development of the estate to a high standard while the

poor had no reason for such standard and their wish was to build flats and other commercial developments. However, neighbourhood associations have been able in some instances to come up with a planned estate according to their standards. Muthithi estate is a good example where community planning has been effective. Road reserves have been maintained within the estate but the problem is the narrow roads such as Muthithi Road which was not originally planned to cater for high traffic.

**Plate 6: Muthithi estate**



Source, Survey of Kenya, 2003 (Aerial Photo)

The standards would however be sustainable if a development plan exists. From the aerial photograph above, unplanned settlement seems to be forming just adjacent to Muthithi estate. Due to the unplanned nature of developments, neighbourhood concept is also lacking in the estates without a market centre, sports field, or any other centre to which the residents can identify with. Instead, ribbon developments have occurred providing groceries and other consumable products. It is therefore clear, that unless a physical development plan is prepared soon; land use conflicts are expected to increase.

### **5.4.3 Environmental degradation**

Environmental degradation was cited as a major consequence of urban sprawl on the corridor,

- There are several rivers that cross Karura Forest, and when such wetlands are interfered with, it affects the ecosystem which risks destruction of the catchments areas. Secondly, Karura forest is the air cleanser for Nairobi and reduction of forest cover has direct impact on the air quality and human health. Ecosystem balance is also disturbed by the clearing of the forest, which can lead to loss of biodiversity.
- Environmental degradation is also caused by agricultural activities as well as human settlements. Human settlement generates solid wastes as well as sewage wastes that may have harmful chemicals to the water. When such wastes are disposed to the rivers, the water is polluted while burning of the solid wastes causes air pollution. According to the field survey, 81% of the residents burnt their solid wastes while 19% engaged private collectors or converted it to manure. Septic tanks were common methods of sewage waste disposal with 96% and only 4% were used pit latrines. The pollution caused by such methods of sewage waste disposal to the underground water cannot be ignored. The subdivisions are quite small which means the required standards on the location of septic tank at six meters from the building line are not adhered to.

### **5.4.4 Lack of up to date data**

The rapid subdivisions, coupled with property developments requires up to date information if the changes have to be managed. This is lacking for Nairobi- Kiambu corridor because some of the developments are not approved, so are some of the subdivisions. This coupled with low manpower and professional capacity in the municipality, use of manual technologies in acquisition of the data, and lack of machinery for the facilitation of the officers to go to the field has led to delays in acquisition and updating of the information. For example, the planner at Kiambu is not provided with a vehicle for field survey and still users a manual typewriter to process the documents. New technologies such as remote sensing and GIS have also not been

embraced in planning. Thus, unplanned developments and illegal subdivisions take place without the knowledge of the officers. Developers in some instances have taken the advantage to alter approved plans in the implementation stage. This has resulted to encroachment on road reserves and open areas.

#### **5.4.5 Legal/institutional conflicts**

Decisions making on land use changes along the Nairobi Kiambu Corridor fall under various government institutions among them agriculture, forestry, urban planning, transportation, and environment. City council and municipal council of Kiambu have the mandate to enforce development plans. This has not made management of urban fringe any easier; conflicts have occurred between the institutions that aim at achieving their goals without any regard to their sister institutions. For example, agriculture ministry recommended the control of subdivision to a minimum of  $\frac{1}{2}$  acre while municipal council and the ministry of lands recommended for a smaller size of  $\frac{1}{8}$  of an acre. The Physical planning Act (1996) on the other hand mandates the Director of Physical Planning to prepare a Local Development Plan while local authorities are mandated to implement the plan. This is not working as expected because the Physical Planner has not prepared a Physical Development Plan for the area. Other institutions include Community Based Organisations, NGOs, and religious organisations. These stakeholders need to be considered during plan preparation, approvals, and implementation that have not been involved in the management of development in the corridor. This has resulted in poor plans that are not acceptable by the people. There is therefore need to incorporate all the stakeholders in the plan preparation, to implementation, monitoring and evaluation stages. There is also need to initiate programmes geared towards better coordination and information sharing by all stakeholders.

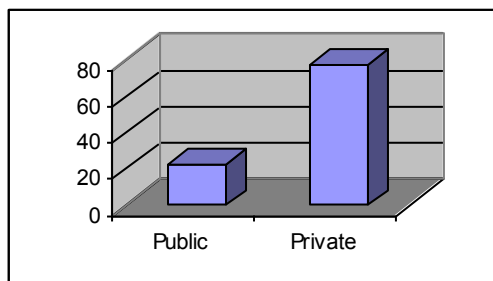
#### **5.4.6. Inadequate infrastructure**

The importance of infrastructure and regulatory institutions cannot be overlooked. It is now clear that the city's physical infrastructure has not kept pace with the ground developments. Traffic jams are common phenomena along Nairobi-Kiambu road

especially from ridge ways estate to Thika road junction on peak hours. This has been associated with rapid development within Kiambu and its environs, which is one of the dormitory satellites for Nairobi workers. The major roads which originally served very low traffic with a population of about 6,000 at kiambu town, and only 1,200 working in Nairobi by 1979, is currently used by over 60,000 people from Kiambu municipality and many more from the environs. Field survey revealed that majority of the people living in this area uses private cars instead of public means of transport as shown below,

**Table 11: Mode of Transport**

|         | Frequency | Percent |
|---------|-----------|---------|
| Public  | 22        | 22.4    |
| Private | 76        | 77.6    |
| Total   | 98        | 100.0   |



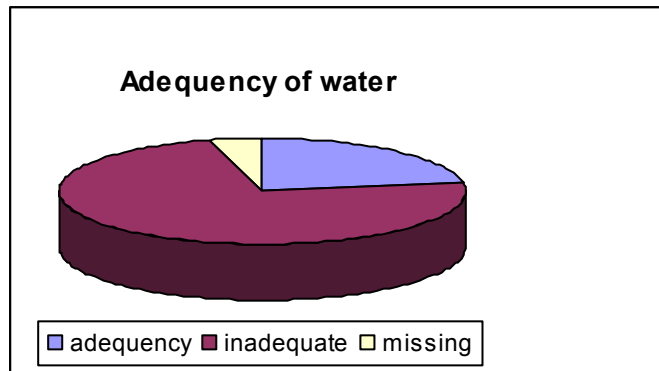
Source: Njoroge

C. G., 2005

Due to the above scenario, traffic jams are then experienced as the densities increases behold the planned infrastructure capacity.

Secondly, water sources are impacted on by human settlement. Farming is practised at the banks of the rivers, vegetation cover is cleared in preparation of construction as well as concrete surfaces leads to high run off during rainy seasons. Such practices lead to pollution of surface waters. Demand of water has also increased drastically with the population increase leading to water shortages. For example, at Thindigwa where a resident living about 2 Kilometres from the main Nairobi water line complained that water irregularity was too common that their taps always run dry day time and they are forced to fetch water at night when others are sleep. This is however, only a small proportion of residents in the area experiencing water shortages as shown by the chart below. This however cannot be taken lightly because it is an indication of problems to come as settlement densities increase. If the opportunity were taken now to plan for such a service, future water conflicts would be avoided.

**Chart 5: Adequacy of water**



### **5.7 Summary**

The trend shows that Nairobi Kiambu Corridor is rapidly getting subdivided and developed. Land has reduced in size from farm estates that were over 400 hectares to plots of  $\frac{1}{4}$  acres and the trend seems to continue. Agricultural Land has been lost in the process, and the existing laws are not effective in maintaining large farms in the area. The main problem however is the fact that new developments are unguided and have resulted to negative impacts such as unplanned settlement, environmental degradation, and reduction in forest cover. This is a challenge to the urban planners, to investigate the best planning approaches that would guide developments in urban fringes and lead to sustainable developments.

## **CHAPTER SIX: A FRAMEWORK FOR MANAGEMENT OF URBAN FRINGE DEVELOPMENT**

### **6.1 Introduction**

There is the inherent challenge of recognizing rapidly changing urban conditions. Urban Planners are faced with difficult choices especially at the fringe as to whether to restrict urban sprawl, allow mixed development, separate users, preserve agricultural land against speculative forces, etc. Each of these choices has a different economic cost and they all have to be weighed against a horde of all other key factors. There is therefore the inherent need to set a programme geared towards stakeholder's coordination and information sharing in management of urban fringe. Research findings revealed a trend with rapid developments and subdivisions, which are expected to continue due to the high demand of land within the corridor. The corridor is changing from agriculture to residential land use and reverting it to large coffee estates is not feasible. A new framework is therefore necessary to guide the new developments and minimize land use conflicts.

From the literature review, various methods have been adopted in the management of urban fringe in other countries which would be applicable to the study area, the background information made it clear that the environmental conditions and availability of infrastructure along Nairobi Kiambu corridor make it suitable for human settlement, while the existing laws have several weaknesses which make it difficult to control land subdivisions. These factors coupled with lack of local development plan has led to haphazard developments, environmental degradation and loss of farm land to urban land uses. The above factors set light on the main issues to be dealt with in the management of the urban fringe that can be summarised as follows,

- Preparation and implementation of Physical Development Plan
- Strengthen planning institutions
- Harmonise land use legislations
- Adopt new technologies in data acquisition
- Public/ private partnership in management of urban fringe



## **6.2 Preparation and implementation of Physical development Plan**

A Physical development Plan does not exist for the study area and any development approvals are based on Part Development Plans that cannot be related to a wider framework. Nairobi City Council however bases their approvals on the zonal maps, which have not been revised since 1979. Kiambu Municipality does not have Physical Development Plan covering the entire areas under its jurisdiction. The only Part Development Plan covering parts of the municipality is for the old town that covers only 1.5 kilometres compared to the municipality area of 57 Kilometres.

This shows that there is need for a comprehensive Physical Development Plan that would guide both Nairobi and Kiambu councils on the management of urban fringe. In preparing the plan, the boundary should be determined by various factors such as built up area, level of subdivisions and availability of infrastructure and not just on fixed boundaries. This is in recognition that some impacts on change of user may not be limited to the boundary such as reduction in water volumes or environmental degradation and in such a case, a plan need to be based on a regional context.

## **6.3 Strengthen planning institutions**

It has been noted that various institutions among them CBOs, NGOs, Ministry of Natural Resources, Land and housing, Agriculture, Local government and many more have a role in the management of urban fringe. This has created more confusion than clarity in the management of urban fringe. It was noted that for example the residents of Kasarini estate did not know who was responsible for controlling encroachments on roads reserves within the estates. A resident indicated that they had reported the case to the municipal council without any help and were planning to report the same to the ministry of roads. Some of the central and local Government officers were also not clear on their responsibilities. For example, an officer in the Municipal Council of Kiambu indicated their area of jurisdiction as the township and not the whole municipality.

Another institutional weakness cited was the bureaucratic process in the approvals of land use changes or developments control. Development approval would take three to six months on average; though theoretically it is supposed to take only 30 days. In such a case, the developer always started the development process before the approvals, while others failed to seek for the approvals. This leads to unplanned developments.

Local authorities were also accused of political interference. Legally the Planning Committee which is comprised of the councillors have the mandate to grant development approvals and the technical arm only gives an advice, which can be accepted or rejected. Infact, the director of physical planning does not vote in the approval of the proposals, which exempt him from decision making. In case of delay of these meetings by the councillors, the approvals are also delayed.

The above confusion coupled with the limited capacity of the professionals in the district offices, the bureaucratic and political interference within the local authorities made it difficult to solve urban fringe issues. There are three scenarios in improving the institutional performance at the urban fringe as discussed below,

- i) Establish planning units in all the municipalities with professional planners and equipments to facilitate planning within the local authority. This would increase the effectiveness in development control within the area of jurisdiction but may not necessarily bring collaboration between the stakeholders.
- ii) Secondly, the office of the director of physical planning can be merged with development control in the local authorities so that the preparation of physical development plans and the implementation (Development control) falls under the same docket for proper running. The local authority under which it falls would manage the urban fringe.
- iii) Lastly, taking into considerations the dynamic nature of the urban fringes there is needed to have an autonomous authority to manage the urban fringe in consultation with stakeholders. The authority would be required to have

professional planners and equipments to facilitate acquisition of up to date data. It would be necessary to entrench the clause in the Act on the management of urban fringe such as the one contained in the Town Planning Act Cap 134, where about 3 miles from the City, Town, and Municipal boundaries and 400 feet from road reserves was managed by the Central Government. This has been successful in some countries such as United States of America where an authority governs the fringe and in case of change of user, the residents are given for example ten years notice while the developers overall planning context for the urban fringe which is not available to individual local authorities. This would reduce many problems related to unplanned growth which extend beyond city and municipal borders. Thus the Authority would cater for regional planning which is ideal solution to this dilemma, and which requires an organization with the power and authority to coordinate development on a larger scale.

#### **6.4 Harmonize land use legislations**

As discussed earlier, there are over 50 statutes in Kenya to administer land ownership and land use. Despite the existence of these legal instruments, there has not been proper and comprehensive land use/environmental planning and coordination in Kenya. Instead, there has been uncoordinated and unsuitable land uses, conflicts and environmental degradation, increasing inequality in land distribution, and loss of diversity. Furthermore, the complicated land laws governing land use raises the transaction costs for land acquisition to the private sector. For example, all the concerned institutions are not located in the same area and one has to make several trips to get the land transaction completed. In Kiambu municipality for example, Land Control Board is located at Karuri town while Lands office, municipal council of Kiambu and the office of Director of physical planning are located at Kiambu town. Above all, Kenya lacks a national land use policy to guide the land development. The Ministry of Land and Housing is in the process of formulating the policy that is expected to form the basis of land use in Kenya, based on the Physical Planning Act Cap 286 where the Director of Physical Planning is mandated

to prepare National, regional and local physical development plans. It is however important to note that some of the loopholes in the existing legislations render them toothless. For example, the Physical Planning Act does not indicate the punishment/fine or the action to be taken in cases of defaulters. According to city council development control section, defaulters taken to court are charged too little to have any impact on development control. While Local Government Act Cap 265 authorises the Local authorities to make plans, Physical Planning Act mandates them only to control developments. This has also created some loopholes and local authorities have been giving provisional approvals of the plans without consultation to the district planner at Kiambu. The same problem is experienced in the implementation of Land Control Act on the agricultural Land. While the Act states that the subdivisions are to be controlled, it does not indicate the minimum size and it is upon the discretion of the officers to decide on the size. This has led to haphazard development because by the time the physical planner is sought, development has already taken place.

Due to the above conflicts and loopholes on legislations, to close the gap, land laws should be repealed. For example there is need to indicate on the minimum subdivisions and the key ministries should have a strong hand in deciding together with the stakeholders. For example agricultural land should deal with by the ministry of Agriculture and Land Control Board should only implement what has been recommended. Where the acts are not in harmony, there is need to repeal the acts. For example Town Planning Act had provided a clause in the management of urban fringe which is not included in the Physical Planning Act; strengths and weaknesses of such acts need to be examined and the act repealed to accommodate the best management practices. This would go along way in management of urban fringe where such laws have been used to support subdivisions of agricultural land to uneconomical sizes. It would also be important for the Acts to indicate the minimum size to which a land should require change of user. It was noted that these loopholes are what prompted the Minister of Lands and Housing to declare minimum subdivisions of agricultural land to 2.5 acres. Though the declaration has received a lot of criticism on the minimum size, (see appendix 8, highlighting the major weaknesses and strengths of the declaration,

newspaper cutting) it is up to the concerned stakeholders to prove the Minister wrong or right and provide an appropriate minimum size to fill the gap.

### **6.5 Adopt new technologies in data acquisition**

Effective and realistic land use management presupposes availability of reliable and adequate data. A major problem in Kenya is that city and municipal planners and administrators still lack the required knowledge of the tools of GIS and RS to enhance their efficiency at work. The rapid changes in the urban land use and their expansion need to be monitored frequently for effective physical planning of the urban sprawl and to check uncontrolled growth of the city. Satellite remote sensing technique provides an effective system of temporal monitoring of urbanisation with consequent depletion of other natural resources in the immediate environs of big cities. It will provide inputs in the urban land use planning of large cities and metropolis with futuristic trend based on the past dynamic observation. For the management of these urban and peri-urban areas, accurate and updated land use information base is required. Urban land use/land cover categories and their spatial extensions can easily be temporarily monitored using remotely sensed data.

In other countries such as India, Small Format Aerial photography has become a new planning and administrative tool for town planners and has reported success in monitoring urban sprawl. Nigeria, Columbia, Netherlands, and many other countries have shown the importance of using GIS and RS in management of urban areas. This has been successful and especially in Netherlands because land use changes are detected at early stages which allows for intervention.

Secondly, a Computerised Land Information System would facilitate land management/administration. Currently, lands data in Kenya is stored in various forms, which hinder faster retrieval and updating. This has made data collection, retrieval, and updating for development planning a time wasting and expensive exercise. Furthermore, there is little communication between the local authorities and the Ministry of Lands especially regarding newly approved plans and subdivisions and land transfers. A centralised and computerised land information system would facilitate data acquisition,

retrieval and up dating. Thus, there is need to train the planners at both central and local levels in the use of GIS and RS which would be used to acquire data on land use change on urban areas and integrating the same with other information providing information for regional planning.

### **6.6 Public/ private partnership in management of urban fringe**

The process of the plan preparation, implementation and area of jurisdiction can make management of urban fringe effective or ineffective in achieving sustainable development. It has been cited from other countries such as United States and Netherlands on the importance of community participation (Neighbourhood groups) in the preparation and implementation of the development plans that have had tremendous results. In this case, several neighbourhood groups were identified along the corridor that included, Thindigwa residents association, Muthithi residents Association, Ridgeway association and others. The major tasks performed by this Community Based Association (CBO) include foreseeing security matters in the estate, solid waste management, and development controls. These groups would therefore be very resourceful in the preparation and implementation of physical development plans if involved in all steps of the planning process. For example Muthiti Residents are aware what they need to maintain their estate and they would provide such ideas and even make their own plans if facilitated those in authority. The same case was reported for Thindigwa Estate where the residents have been demanding for development control (See Appendix, 7). Karura Forest reported a major success in the protection of the forest after involving neighbouring communities. Thus community participation in planning process would motivate the community to protect what they own unlike the top down planning which prompts resistance. This would leave the government officers with only facilitating role in the Planning process.

### **6.7 Summary and Recommendations**

This chapter has highlighted planning techniques suitable for management of urban fringe. It is however important to note that, political influence will also have a major role

in planning process as he is the decision maker. This factor cannot be taken for granted but the planner may not have any power to change political stand because it depends on the regime in power and their policies. The planner can however involve the politicians in the initiation of the planning process or the idea so that they feel they own the idea. In such cases, the politicians' end up supporting the planners' decisions. Political influence notwithstanding however, the weaknesses of existing institutions such as low manpower, lack of up to date information, and lack of collaboration need to be tackled. Introduction of new technologies should also be embraced in the institutions to improve on data acquisition, retrieval, and manipulation. Harmonisation of legal legislations also requires urgent attention because most of the land legislations have not been repealed which renders some parts irrelevant with the changing times. This coupled with preparation of a Physical Development Plan would improve development of urban fringe into an orderly development.

However, further studies on urban fringe dynamics would be necessary so as to come up with a reliable policy, which would be applicable to all urban fringes.

## **6.8 Conclusions**

The key issues identified in the study include,

- Nairobi –Kiambu corridor is experiencing rapid land use changes from agriculture to residential land uses
- The main pressure for land subdivision along the corridor is caused by Nairobi residents who are converting it into a dormitory satellite
- The climatic, physical and accessibility characteristics make Nairobi-Kiambu Corridor suitable for human settlement
- Legal policies and institutions have not been successful in the management of land use changes on the corridor hence haphazard developments are taking place

The above land use changes has created land use conflict due to,

- Lack of a Physical Development Plan to guide the new development
- Uncoordinated planning institutions
- Loopholes in the existing land use legislations

- Manual technologies in data acquisition, which take too long to gather the required information for planning
- Lack of public involvement in management of urban fringe

The following approaches have been recommended to address the above issues,

- Preparation and implementation of Physical Development Plan
- Strengthen planning institutions
- Harmonise land use legislations
- Adoption of new technologies in data acquisition
- Public/ private partnership in management of urban fringe

Planning for Kiambu Municipality and Nairobi City fringe, calls for collaborative initiation between the stakeholders without which management of the corridor would not be effective. This is because land use changes and especially human settlement along Kiambu fringe are experiencing rapid changes which requires consistent monitoring. At the same time, it is important to note that problems related to unplanned growth, environmental degradation associated with urban sprawl extends beyond city and municipal borders, and effective planning should embrace regional planning. Though Regional planning could be an ideal solution to this dilemma, its success requires organization with the power and authority to coordinate development on a larger scale. Thus, creation of an autonomous authority for management of urban fringes would come in handy to streamline developments on urban fringes. Such authority would also be well equipped to deal with all major issues that affect all urban fringes unlike the local planning units, which would deal with local issues.



## List of References

Alonso W., (1964). Location and Land Use. *Towards A General Theory Of Land Rent*. London: Havard University Press.

Archer, R. W., (1973). *Land Speculation and Scattered Development: Failures in Urban Fringe Land Market*. Urban studies 10, 367-372, New York: The free press.

Campbell, W. G. et al, (Sixth edition). Form and Style, Theses, Reports, Term Papers, Houghton Mifflin Company Boston.

Dale F.D & J. D. Mclaughlin., (1999). *Land Administration, Oxford*, University press.

Damen M. C , G. S.Smit and H. T. Verstappen.,(1986). *Remote Sensing for Resource Development and Environmental Management*. Volume 2, proceeding of the seventh International symposium on Remote sensing for resource development (ISPRS), Netherlands.

Davidson J.,and Wibberley G. (1978). *Planning and the rural environment*. Urban and Regional Planning series, Volume 18, pergason press

El-Shakhs S.,and R. A. Obudho (1975). *urbanization, National Development and Regional Planning in Africa*. NewYork: Praeger Publishers.

Fasona M. J. and A. S Omojola ., (2004).. *GIS and RS for Urban Planning: A case of Festac town, Lagos, Nigeria* Proc. 12<sup>th</sup> Conference on Geoinformatics- Geospatial Information Research: Bridging the Pacific and Atlantic. University of Gavle, Sweden, 7-9<sup>th</sup> june 2004.

Garreau, J., (1991). *Edge City: Life in the new frontier*. New York: Doubleday

Gregory D. S., (2002). *Urban Sprawl: Causes, consequences, and Policy responses*. Washington: Urban Institute Press.

Harvey J.,(1996). *Urban Land Economics*. London: Macmillan.

Hearley, P. et al., (1995). *Making strategic Spatial Plans: Innovation in Europe*.London: UCL Press.

Howard F., (2001). *Urban Sprawl and Public Health*. Department of Environmental and Occupational Health, Atlanta

James H. J., (1974). *Suburban Growth*. Geographical Processes at the Edge of the City. London: John Willy and sons.

Jassen L. F., (2000). *Principles of Remote Sensing*, ITC series Book, Netherlands

- John H., (1984). *The Outer City*. London: Harper and Row publishers.
- Kain, F. K. ,(1962). The journey to work as a determinant of Residential Location, a paper presented on the proceedings of Regional Science Association, Vol. 9 (1962)
- Karuga J. G.,(1993), *Actions Towards A Better Nairobi*, Report and Recommendations of the Nairobi City Convention. “The Nairobi we want”, 27-29,1993,Nairobi NCC
- Kingoria G. K., (1980). *Policy Impacts on Land Use Patterns in Nairobi*, Kenya 1899-1979. Terre Haule, Indiana: Doctoral dissertation, Indiana University
- Kombe, W. J., (2000), *The Institutionalisation of Environmental Planning and Management Concept: Success and Challenges*, Dar es Salaam, Tanzania. University College of Land and Architectural Studies, Dar es Salaam (draft)
- Kothari C. R., (2004), *Research Methodology. Methods and Techniques*. Dheli: New Age International Publishers.
- Krumar R., (1996). *Research Methodology. A step-by-step guide for beginners*. London: SAGE publications, London
- Louis K. L., (1971). *The Problem of Urban Sprawl*, Urban studies-An Introductory Reader. New York: The free press.
- Morgan W.T. W., (1967). *Nairobi City and Region*. New York: Oxford University press
- Mugenda O.M and A. G Mugenda., (2003). *Research Methods: Quantitative and Qualitative Approaches*. Nairobi: ACTS press.
- Muhia A.W., (1992), *Land subdivision and its implications on the growth of Kiambu town-Nairobi*: M.A thesis (Unplished), University of Nairobi
- Ngechu M., (Undated). Understanding the research process and Methods: *An Introduction*, university of Nairobi
- Netzer, D., (1974), Economics and Urban problems. *Diagnosis and Prescriptions*.New York: Basic Books, inc., publishers.
- Hall P. George A., and Unwin., (1973), *The Containment of Urban England*, Great Britain
- Rakodi, C., (2001). Forget Planning, Put Politics First? Priorities For Urban management in Developing Countries. Cardiff University, UK
- Richard E. R and Rodney R. W., (1989). *African Cities In Crisis-Managing. Rapid Urban Growth. African Modernization and Development Series*, WestView Press.

Saini N.S. (1987). *Urban and Regional Planning Information Systems*, school of planning and Architecture, Deemed University

Simiyu L. Bureza ., (2002). *Effects of Urbanization on the Use and Control of Land: A case of Ngong Fringe*. Nairobi: M.A thesis (Unplished), University of Nairobi

Small C. and Miller R. B., (2000).. *Monitoring urban Environment from Space*, . New York: Columbia University.

Smith D. D., (1986). *Urbanization in the Developing World*. New York: Antony Rowe Ltd.

Thomas L. B., (1974). *The International Urban Crisis*, The Chaucer press Ltd, Great Britain

UNCRD., (1996). *How Cities will look in the 21<sup>st</sup> century*, Proceedings of Habitat 11, Dialogue, 14th June 1996, Istanbul, Turkey

United Nations .,(1997).. Prospects of urbanisation, united Nations

White R. R., (1989). *The Influence of Environmental and Economic Factors on the Urban crisis*

### **Government publications**

Kenya, Republic of.,(1973). *Central Province Regional Physical Development Plan 1973*, Government Printer, Nairobi.

\_\_\_\_\_, (1973), *Nairobi Metropolitan Growth strategy*, Government Printer, Nairobi

\_\_\_\_\_, (2002), *National Development Plan, 2002-2008*, Government Printer, Nairobi

\_\_\_\_\_, (2004) *Economic Survey*, Government Printer, Nairobi

\_\_\_\_\_,(1999), *National Poverty Eradication Plan, 1999-2015*, Government Printer, Nairobi

\_\_\_\_\_, (2000), *Interim Poverty Reduction Strategy Paper for 2000-2003*, Government Printer, Nairobi

\_\_\_\_\_, Land Control Act, Cap 302, Government Printer, Nairobi

- \_\_\_\_\_ , Agriculture Act, Cap 318, Government Printer, Nairobi
- \_\_\_\_\_T, own Planning Act, Cap 134
- \_\_\_\_\_ , Land Planning Act, Cap 303
- \_\_\_\_\_ , Physical Planning Act, Cap 286
- \_\_\_\_\_ , Environmental Management Coordination Act (EMCA)
- \_\_\_\_\_ , Public Health Act, Cap
- \_\_\_\_\_ , Kiambu District Development Plan 1984-1988, Ministry of finance and planning-Kenya
- \_\_\_\_\_ , Kiambu District Development Plan 2002-2008, Ministry of finance and planning-Kenya
- \_\_\_\_\_ , Ministry of Agriculture, Farm Management Guidelines, Kiambu District, 2005
- \_\_\_\_\_ (1989), Farm Management Handbook, Central Province, Government Printer, Nairobi

Lock, S. C & Averley,H., (1971). Town Planning Handbook, Ministry of Lands and Settlement,

Physical Planning Handbook, Ministry of Lands and Settlement, 2003

#### **Internet sites**

Application of GIS and RS for Land use Change Detection in the Rural Urban Fringe Area of Enschede City, The Netherlands (Nigan, R. K, 1999)

[www.itc.nl](http://www.itc.nl) 19.4.2005

Monitoring of Changes in Land Use (Srivastava S .K, 2004)

[www.gisdevelopment.net/technology](http://www.gisdevelopment.net/technology) 19.4.2005

Monitoring Urban Sprawl around Barcelona Metropolitan Area with the aid of Satellite Imagery by Roca J., Burns M. C., Carreras J. M.5th June 2005      www.

ISPRS.org/istanbul2004

Monitoring Urban Sprawl in Kanpur, India

[www.gisdevelopment.net](http://www.gisdevelopment.net) 22.11.04

Regional Monitoring of urban Land Use and land Consumption by Siedentops and Meinel.G [www.ioer.de/mitarbeiter/sedentop](http://www.ioer.de/mitarbeiter/sedentop)

Solving sprawl by by F. Kaid Benfield, Jutka Terris and Nancy Vorsanger  
[www.nrdc.org/cities/smartgrowth](http://www.nrdc.org/cities/smartgrowth) 22.11.04

[www.washington.edu](http://www.washington.edu)- Introduction to urban planning-accessed on 5<sup>th</sup> Jan.2005

[www.washington.edu/students](http://www.washington.edu/students) urban planning uses of remote sensing-accessed on 5<sup>th</sup> Jan.2005

[www.itc.nl/edu](http://www.itc.nl/edu) urban planning and land administration-accessed on 5<sup>th</sup> Jan.2005

[www.remotesensingarabia.org](http://www.remotesensingarabia.org) Advanced Remote Sensing for earth observation-accessed on 5<sup>th</sup> Jan.2005

[www.gisdevelopment.net](http://www.gisdevelopment.net): improvement of Municipal management 15<sup>th</sup> July 2005-07-19

[www.gisdevelopment.net/Monitoring](http://www.gisdevelopment.net/Monitoring) of urban fringe using GIS and Remote Sensing techniques, by Aruna Saxena, lecturer, Architecture and Planning Department M.A.C.T Bhopal: 15<sup>th</sup> July 2005

[www.vtspawl.org/initiatives](http://www.vtspawl.org/initiatives) **Vermont forum on sprawl - five point plan**

Responsiveness of Rural and Urban **Land** Uses to **Land Rent** Determinants in the U.S. South  
<http://www.srs.fs.usda.gov/econ/pubs/misc/iqh001.pdf> date 17-5-2005

Land Rent Theory  
<http://faculty.washington.edu/~krumme/450/landuse.html> date 17-5-2005

Bid Rent and Location Gradients The Importance of Relative Location  
<http://www.uncc.edu/hscampbe/landuse/b-models/> date 17-5-2005

# Appendices

## Appendix 1: Household questionnaire

UNIVERSITY OF NAIROBI  
DEPARTMENT OF URBAN AND REGIONAL PLANNING  
MASTERS OF ARTS (urban and Regional Planning) Thesis Research  
Households –Questionnaire

---

**Title: SPATIAL DYNAMICS OF AN URBAN FRINGE**  
*A Case Study of Nairobi-Kiambu Corridor*

*Confidential:* The information provided under this survey shall be used for this study, and not for any other purpose.

---

Household serial Number/LR.No. \_\_\_\_\_

Date of the interview \_\_\_\_\_

Name of the interviewed  
(and Relationship to head) \_\_\_\_\_

Location \_\_\_\_\_

Division \_\_\_\_\_

### Household Characteristics

#### Household Head

| HH head | Date of birth | Education level                          | Occupation   | Place of work(Nairobi, kiambu,etc) | Marital status                        | Mode of transport                            |
|---------|---------------|--|--|------------------------------------|---------------------------------------|--|
|         |               | None<br>Primary<br>Secondary<br>Tertiary | Full time job<br>Parttime job<br>Selfemployed<br>Housework |                                    | Married<br>Single<br>Widowed<br>other | Public<br>Private<br>Walking<br>Cycling, etc |
|         |               |  |  |                                    |                                       |  |

#### Other Household members

| Name | Relationship to head of HH | Date of Birth | Education level | Occupation | Place of work/schooling | Mode of transport |
|------|----------------------------|---------------|-----------------|------------|-------------------------|-------------------|
|      |                            |               |                 |            |                         |                   |
|      |                            |               |                 |            |                         |                   |
|      |                            |               |                 |            |                         |                   |
|      |                            |               |                 |            |                         |                   |

1. Which year did you settle on this land? \_\_\_\_\_
2. Do you own the land? Yes/No
3. What were your main reasons for settling in this area?
  - Nearness to Nairobi
  - Accessibility to Nairobi-Kiambu Road
  - Availability of public transport
  - Availability of spacious land
  - Environmental cleanliness
  - Land tenure
  - Others (Specify)
4. Are the same reasons still applicable or some have changed?
  - Yes am still getting the same advantages
  - No some/all of the advantages have changed
5. If No to the above, what has changed, and what are the reasons you can attribute to the changes?

**Public utilities and facilities**

6. Where do you get the following services? Please indicate if within the estate, at Kiambu town, or Nairobi city.

|                  | <b>Within Estate</b>                | <b>Kiambu</b> | <b>Nairobi</b> |
|------------------|-------------------------------------|---------------|----------------|
| i) Schooling     | Pre-primary<br>Primary<br>Secondary |               |                |
| ii) Health       |                                     |               |                |
| iii) Library     |                                     |               |                |
| iv) Playground   |                                     |               |                |
| v) Entertainment |                                     |               |                |

**Accessibility**

- 7 What is the location of your land from Nairobi-Kiambu Road (distance in Kms)
- 8 How is the accessibility to other roads (Indicate weather, good, Fair, or poor)

**Water and Solid waste disposal**

- 9 Are you connected to pipe water? Yes/No
- 10 IF not, where do you get domestic water?
- a. Vendors
  - b. Wells
  - c. Boreholes
  - d. Rivers
  - e. Rain
- Others (Specify
- 11 If yes, is the supply adequate? Yes/No
- 12 Are you connected to sewer? Yes/No
- 13 If not, how do you dispose off the wastewater and effluent?
- 14 How do you dispose off Solid waste
- 15 Have you experienced any problem in the disposal of solid waste and effluent?  
Explain
- 16 are you connected to electricity
- 17 Is it adequate? (Regular)

**Land Issues**

- 18 How did you acquire this land?
- 1. Inherited
  - 2. Gift
  - 3. Allocated
  - 4. Bought
  - 5. Others (specify)
- 19 What nature of ownership do you have?
- 1. Freehold 99
  - 2. Leasehold 99 years
  - 3. Leasehold 999 years
  - 4. Government land
  - 5. Trust land
  - 6. Customary
  - 7. Temporary occupation license (TOL)



- 20 Please indicate land value changes over time.
- |                  | <b>Year</b> | <b>2000</b> | <b>2003</b> | <b>2005</b> |
|------------------|-------------|-------------|-------------|-------------|
| 1 acre           |             |             |             |             |
| 1/2acre          |             |             |             |             |
| 1/4acre          |             |             |             |             |
| Others (specify) |             |             |             |             |
- 21 What is the size of the land?
- 22 Does it have a title deed?
- 23 When was the last title transfer/change of user?
- 24 Approximately, How long did it take to transfer? From the date of land control board consent to the date the title was issued
- 25 What are the developments on the land?
- 26 If buildings, did you get plan approval? Yes/No
- 28 If yes to the above question, approximately how long did it take to get the development approval?
- 29 What are the planning methods/controls that you would recommend to improve in management of Nairobi-Kiambu urban fringe? These may include,
- Institutional models (Specify)
  - Policy changes (specify)
  - Land use controls (specify)
  - Others

**THANK YOU.**

**Appendix 2: Land Control Board Questionnaire**

**UNIVERSITY OF NAIROBI**  
**DEPARTMENT OF URBAN AND REGIONAL PLANNING**  
**MASTERS OF ARTS (urban and Regional Planning) Thesis Research**  
**Land Control Board Secretary –Questionnaire**

---

Title: **SPATIAL DYNAMICS OF AN URBAN FRINGE**  
**A Case Study of Nairobi-Kiambu Corridor**

*Confidential:* The information provided under this survey shall be used for this study, and not for any other purpose.

---

Date of Interview .....

Name and Designation of the interviewed .....

1. Who are the members of Kiambu Land Control Board?
2. Briefly state the functions of the Kiambu land control Board?
3. How often are the meetings held?
4. Has Land Control Board been effective in controlling urban developments in agricultural land? Yes/No
5. If not, what are the main challenges facing Land Control Board in the management of urban fringe?
6. Do you have any comments on how best urban fringe can be managed? Please give your suggestions.
7. Other comments?

**THANK YOU.**

## Appendix 3: Lands office Questionnaire

**UNIVERSITY OF NAIROBI**  
**DEPARTMENT OF URBAN AND REGIONAL PLANNING**  
**MASTERS OF ARTS (urban and Regional Planning) Thesis Research**  
**Kiambu Land's office–Questionnaire**

---

Title: **SPATIAL DYNAMICS OF AN URBAN FRINGE**  
**A Case Study of Nairobi-Kiambu Corridor**

*Confidential:* The information provided under this survey shall be used for this study, and not for any other purpose.

---

Date of Interview .....

Name and Designation of the interviewed .....

1. What is the area of your jurisdiction?
2. What type of land tenure exists in Kiambu? Specify the area.....
3. In your opinion, has any of the above posed a problem in management of Kiambu urban fringe? NO/Yes
4. If yes, Please explain.
5. What is the institutional framework in management of urban fringe in Kiambu?
6. Has the institution been successful in management of the urban fringe? No/Yes. If not, in your opinion, what may be the causes of this failure?
7. Please give some suggestions on how best to manage the urban fringe
8. Other comments

**THANK YOU.**

## **Appendix 4: Physical Planning officer questionnaire**

**UNIVERSITY OF NAIROBI**

**DEPARTMENT OF URBAN AND REGIONAL PLANNING**

**MASTERS OF ARTS (urban and Regional Planning) Thesis Research**

**Physical Planning Officer –Questionnaire**

---

**Title: SPATIAL DYNAMICS OF AN URBAN FRINGE  
A Case Study of Nairobi-Kiambu Corridor**

*Confidential:* The information provided under this survey shall be used for this study, and not for any other purpose.

---

Date of Interview .....

Name and Designation of the interviewed .....

1. What is the area of your jurisdiction?
2. What are the planning tools and instruments used to manage urban fringes?
3. How successful have they been?
4. What have been the main planning challenges in management of urban fringe regions?
5. What are the planning instruments that you would recommend for sustainable development of urban fringes?

**Kiambu**

1. What is the minimum size of land permitted for subdivision in Kiambu?
2. Has it been adhered to? Yes/No
3. If Not, what have been the main challenges?
4. What is the institutional and procedural framework in planning Nairobi Kiambu fringe?
5. What are the common problems experienced in the course of their practical operation?
6. In your opinion, what is the way forward for sustainable planning of Nairobi-Kiambu fringe area?
7. Other comments

**THANK YOU.**

## Appendix 6: Forestry officer Questionnaire

UNIVERSITY OF NAIROBI

DEPARTMENT OF URBAN AND REGIONAL PLANNING

MASTERS OF ARTS (urban and Regional Planning) Thesis Research

Forestry Sector–Questionnaire

---

**Title: SPATIAL DYNAMICS OF AN URBAN FRINGE**  
*A Case Study of Nairobi-Kiambu Corridor*

*Confidential:* The information provided under this survey shall be used for this study, and not for any other purpose.

---

Date of Interview .....

Name and Designation of the interviewed .....

1. What is your area of your jurisdiction?
2. What is the size of Karura forest?
3. What is the institutional/legal framework in management of the forested land in urban fringe in Nairobi?
4. Has the institution been successful in management of forested land on the urban fringe? No/Yes. If not, what has been the causes of the failure?
5. Has the forest reduced in size over time? Yes/No. If yes, what has been the causes of forest reduction and by how much has it reduced?

| Year | Cause of encroachment | Size of forest lost |
|------|-----------------------|---------------------|
|      |                       |                     |
|      |                       |                     |
|      |                       |                     |

- 6 In your opinion, has any of the above posed a problem in management of the forest? No/Yes. If yes, Please explain.

.....  
.....  
.....  
.....

- 7 What are the economics, social, and Environmental impacts associated with reduction of Karura forest?

.....  
.....  
.....  
.....

8 Please give some suggestions on how best to manage forested land on the urban fringe.

9 Other comments

**THANK YOU.**

## **Appendix 7: Land Use Conflict**

## **Loopholes in Kimunya's land size edict**

Published: 07/27/2005

By: IBRAHIM N. MWATHANE

---

When Lands minister Amos Kimunya pronounced in public forums earlier this year that the Government would in future not allow subdivision of agricultural land into sizes less than 2.5 acres, Kenyans did not appear to have taken him seriously. Last month, however, he took this to its logical conclusion and embedded it into law, using powers conferred to him by section 25 of the Land Control Act, Cap 302. This was done through a special issue of the *Kenya Gazette*.

The directive has since been translated into an administrative circular and distributed to all Land Control Boards around the country. In short, the Government will no longer formalise subdivision records for, and issue titles to, any agricultural land below 2.5 acres in size. It is only a matter of time before the full impact of this takes effect on rural communities. One only needs to look at current practices and sizes of agricultural land in Central Province, many districts of Eastern Province, the entire Western Province, Kisii and Nakuru District to appreciate the gravity of this challenge.

It should be easy for all to appreciate Government concerns. Agricultural land has been subdivided into narrow strips running from top to bottom, whereas in other areas, sizes have come down to one eighth of an acre where no agriculture can be gainfully practised. But will legislation be sufficient to contain these practices? Has adequate studies been carried out to form a good strategy given our socio-cultural backgrounds and our demarcation programmes before and after independence?

Firstly, agricultural potential differs from zone to zone. We have seen farmers turning out excellent results from dairy farming, bee-keeping and fruit or vegetable farming on sizes of land far less than 2.5 acres in some zones. In others, 50 acres may be non-viable!

Further, we have over the years treated land as a commodity to be inherited by generations down the family tree. This has been actualised through subdivisions and subsequent issuance of title. In addition, families under extreme pressure for school fees or medical bills have turned to subdividing parts of their land for sale.

In most cases, the proposed size for sale in these heavily-populated areas has been less than 2.5 acres since the original parcel was hardly more than 4 acres to begin with. In situations where farmers need to use land as collateral, they have also tended to subdivide it so as to charge only part of it.

Then, of course, the fervour with which Government popularised title to land after independence has led to a situation where no one feels fulfilled enough till they own a piece of land, however small, to which they hold title.

This situation becomes worse when understood in the context where, in some of the original adjudication programmes, due to the sheer number of people, the sizes of various parcels of land were less than 2.5 acres on first registration. This was common in highly-populated districts. It was so for some settlement schemes undertaken after independence as well.

President Moi added to the problem in the 1980s when he decreed that all company and co-operative farms must subdivide their land and transfer the parcels to respective shareholders. Most of these tuned



out to be too small.

The above reality will greatly complicate application of the recent Legal Notice. Families are likely to turn to transactions where land is subdivided, inherited and even sold without recourse to formal registration.

This will be a recipe for disputes and will seriously erode current efforts to update land records. Transactions will be done, and land and money will change hands outside the formal legal process. A huge number of Kenyans will also lose the benefit of using land as collateral.

There are arguments that proprietors are free to apply for change of user from agricultural into residential. However, experts will advise that it makes little sense to provide for change of user in the middle of a rural agricultural zone, yet this is where subdivisions occur. Government must therefore explore ways of realising its objective of promoting production from agricultural land through a variety of strategies:

- Ensure wise application of the broad but discretionary powers provided to Land Control Boards to protect agricultural viability of land units. This would be best realised by increasing technical capacity available to Boards from planners and agricultural experts.
- Ensure better enforcement of the Agricultural Act (Cap 318) by field extension officers. This empowers the minister to make orders to ensure the proper development of agricultural land.

### **Viable agricultural sizes**

- Lifting the still subsisting decree to land-buying companies to subdivide company and co-operative farms. Administrative circulars from the Office of the President to District Commissioners to this effect should be rescinded.
- Future land adjudication programmes and settlement schemes should only allow for parcels of viable agricultural sizes as determined by agro-economists.
- Deny approvals for subdivision in future to big farms in parts of Central, Rift Valley and Western provinces with vast tracts under pyrethrum, coffee, tea, pineapple and maize. The same should apply to ranches.
- Increase current Government efforts to improve access to markets and ensure favourable prices for farm produce both locally and externally to encourage intensive farming.
- Sensitise Kenyans on alternative options of wealth such as ownership of flats, investment in stock markets and other non-land based assets acceptable as collateral by lending institutions.

Legislative measures which run counter to practices developed over the years may be resisted with negative results.

*Mr Mwathane, a practising surveyor, is past chairman of the Institute of Surveyors of Kenya*

•