

**THE EFFECT OF PERI-URBAN DEVELOPMENT ON THE LIVELIHOODS OF
INDIGENOUS HOUSEHOLDS: THE CASE OF LOWER KIANDANI AREA,
MACAHAKOS MUNICIPALITY**

BY

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DECLARATION

This research project is my original work and has not been presented for a degree in any other university.

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This research project has been submitted for examination with my approval as the university supervisor.

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DEDICATION

To the memory of my late brother and dear friend, Morris Musili Mutua.

ABSTRACT

Peri-urbanization and its effect on the livelihoods of agricultural households at the urban periphery has been a global concern owing to the many challenges it presents. Peri-urbanization often leads to declining household land holdings which, potentially, diminishes the economic significance of agriculture in urban peripheries. At the same time, new urban activities constitute an opportunity for new livelihoods in urban-based employment. Urbanization may also be synergistic to some forms of agriculture such as horticulture and dairying, due to increased urban demand for fresh farm produce. Arising from the foregoing, this study investigated how peri urban development affects the livelihoods of indigenous households, by using Lower Kiandani area of Machakos town, as a case study.

The study used a proportionate stratified random sampling technique to select three samples of the study population in three zones of the study area to carry out a locational analysis in order to: identify the causes of land sub-division and land use change; identify and characterize livelihood strategies; assess the effect of location on livelihoods and incomes and; estimate the relationship between household income and household space and locational factors. Face-to-face interviews using semi-structured questionnaires, and direct observations using observation forms, were used for the collection of key household data. The data were analyzed using both descriptive and inferential methods.

The study identified economic factors; commoditization of land; cultural factors and, institutional factors as the main drivers of land sub-division and land use change. Because of peri-urbanization, the study revealed, the economic significance of agriculture as a livelihood strategy in the area had diminished, as evidenced by the locational differential trend of livelihood diversification away from the activity, with distance towards the core, leading to multiple farm and off-farm strategies. In spite of this diversification, the study revealed that household incomes in Lower Kiandani are not influenced by household space and locational factors. On further investigation, however, it was revealed that majority of the households, especially in the inner areas, have not taken advantage of the opportunities of urban-based land use/activities. Based on these key findings, the study recommends policy interventions to manage peri-urbanization in Lower Kiandani, with a view to controlling land sub-division and land use change; promoting multiple livelihoods and; intensifying and diversifying agriculture in the study area.

TABLE OF CONTENTS

Declaration.....	i
Dedication.....	ii
Abstract.....	iii
Table of Contents.....	iv
List of Tables.....	xiv
List of Figures.....	xvi
Acknowledgements.....	xix
Abbreviations and Acronyms.....	xxi
1.0 CHAPTER ONE: INTRODUCTION.....	1
1.1 Background to the Research Problem.....	1
1.2 The Problem Statement.....	3
1.3 The Purpose of the Study.....	6
1.4 The Scope of the Study.....	6
1.5 Research Objectives.....	8
1.6 Research Questions.....	8
1.7 Research Hypothesis.....	9
1.8 Justification and Significance of the Study.....	9
1.9 Limitations and Assumptions of the Study.....	11
1.9.1 Limitations.....	11
1.9.2 Assumptions.....	11

1.10 Operational Definition of Terms and Variables.....	12
2.0 CHAPTER TWO: LITERATURE REVIEW.....	15
2.1 Introduction.....	15
2.2 Urbanization.....	15
2.2.1 The Causes and Consequences of Urbanization in Africa.....	16
2.2.1.1 Economic Causes.....	17
2.2.1.2 Social Causes.....	18
2.2.2 The Consequences of Urbanization.....	19
2.2.3 Urbanization and Economic Development.....	20
2.2.4 Urbanization and Land Use.....	22
2.3 The Concept of Land.....	23
2.3.1 Historical Perspective.....	23
2.3.2 Why Land is Important.....	24
2.4 The Economic Nature of Land Use.....	25
2.4.1 Land Use, Economic Rent and Land Value.....	25
2.4.2 Land Use and Land Price.....	26
2.4.3 Land Allocation and Land Use.....	26
2.4.4 The Nature of Land.....	27
2.5 Theoretical Orientations of Urban Land Use.....	28
2.5.1 Von Thunen’s Model of Agricultural Land Use.....	28
2.5.2 Descriptive Concepts of Urban Land Use.....	30

2.5.2.1 The Concentric Zone Concept.....	30
2.5.2.2 The Sector Concept.....	32
2.5.2.3 The Multiple Nuclei Concept.....	34
2.5.3 Explanatory Concepts of Urban Land Use.....	35
2.6 Key Systems Affecting Urban Land Use.....	38
2.7 A Historical Synopsis of Kenya’s Urbanization.....	39
2.8 Small Urban Areas in Kenya.....	41
2.9 Urban growth and Peri-urban Development.....	42
2.9.1 The Peri-urban Zone.....	42
2.9.2 What is Peri-urban Development?.....	45
2.9.3 What is Peri-urban?.....	46
2.9.3.1 The Peri-urban as a Place.....	47
2.9.3.2 The Peri-urban as a Process and Concept.....	48
2.9.4 A Synthesis of the Main Characteristics of Peri-urban Areas.....	50
2.9.4.1 Environmental Characteristics.....	50
2.9.4.2 Social Characteristics.....	52
2.9.4.3 Institutional Characteristics.....	52
2.9.5 The Peri-urban in the Globalizing World.....	53
2.9.6 Land Use Change and Contestation in the Peri-urban.....	54
2.9.7 Some Models of Peri-urban Development.....	55
2.9.7.1 The Spreading Pancake Model.....	55

2.9.7.2 The Development Node Model.....	55
2.9.7.3 The Village Magnet Model.....	56
2.9.7.4 The Ribbon Model.....	56
2.9.8 The Implications of Peri-urban Development.....	57
2.9.9 Planning in the Peri-urban Context.....	58
2.9.10 Land Use Planning in the Peri-urban.....	59
2.9.11 Contemporary Peri-urbanization Trends in Kenya.....	64
2.10 Urban and Peri-urban Agriculture.....	67
2.10.1 Urban and Peri-urban Agriculture and the Poor.....	68
2.10.2 The Main Actors Involved in Urban and Peri-urban Agriculture.....	69
2.10.3 The Potentials and Risks of Urban and Peri-urban Agriculture.....	70
2.10.4 UPA in Kenya.....	72
2.11 Peri-urban Recreation.....	75
2.12 The Concept of Livelihoods.....	76
2.12.1 Sustainable Livelihoods.....	77
2.12.1.1 Sustainable Livelihoods Framework.....	78
2.12.1.2 Policies, Institutions and Processes in Sustainable Livelihoods.....	80
2.12.2 Urbanization and Household Livelihoods.....	80
2.12.2.1 Urbanization and gendered Livelihoods.....	81
2.12.2.2 Urbanization and Differentiated Livelihoods.....	81
2.12.3 Peri-urban Livelihoods.....	82

2.13 Institutional Factors Influencing Urban and Peri-urban Development in Kenya.....	84
2.13.1 Legal Frameworks.....	85
2.13.1.1 The Physical Planning Act, Cap 286.....	85
2.13.1.2 The Local Government Act, Cap 265 and LA By-Laws.....	86
2.13.1.3 The Land Control Act, Cap 302.....	87
2.13.1.4 The Public Health Act, Cap 242.....	87
2.13.1.5 The Agriculture Act, Cap 318.....	88
2.13.1.6 The Building Code.....	88
2.13.1.7 The Registered Land Act, Cap 300.....	88
2.13.2 Government Agencies.....	89
2.13.2.1 Local Authorities.....	89
2.13.2.2 Divisional Land Control Boards.....	90
2.13.2.3 District Physical Planning Departments.....	90
2.13.2.4 District Public Health Departments.....	90
2.13.2.5 Municipality Physical Planning Liaison Committees.....	90
2.14 Summary.....	91
2.15 The Conceptual Framework.....	94
3.0 CHAPTER THREE: THE STUDY AREA.....	95
3.1 Introduction.....	95
3.2 The General Setting of Machakos Town within Machakos Municipality.....	95
3.2.1 Location and Size.....	95

3.2.2 Historical Background.....	95
3.2.3 Physiographic and Physical Factors.....	98
3.2.3.1 Topography and Drainage.....	99
3.2.3.2 Geology and Soils.....	100
3.2.3.3 Climate.....	100
3.2.3.4 Vegetation.....	100
3.2.4 Demographic Factors.....	101
3.2.5 Economic Factors and Land Use.....	101
3.2.5.1 Agriculture.....	101
3.2.5.1.1 Cash Crops.....	102
3.2.5.1.2 Horticultural Production.....	102
3.2.5.1.3 Subsistence Agriculture.....	102
3.2.5.1.4 Livestock Production.....	103
3.2.5.2 Industry, Commerce and Employment.....	104
3.2.5.2.1 Industry.....	104
3.2.5.2.2 Commerce and Trade.....	104
3.2.5.3 Mining.....	104
3.2.6 Human Settlement Patterns.....	105
3.2.6.1 Clustered or Nucleated Settlement.....	105
3.2.6.2 Linear Settlement.....	106
3.2.6.3 Dispersed Rural Settlement.....	106

3.2.7 Physical Infrastructure and Service Facilities.....	107
3.2.7.1 Transportation.....	108
3.2.7.2 Water Supply.....	108
3.2.7.3 Energy.....	109
3.2.7.4 Waste Disposal.....	110
3.2.7.4.1 Liquid Waste Management.....	110
3.2.7.4.2 Solid Waste Management.....	110
3.2.7.5 Community Facilities and Services.....	110
3.3 Main Land Uses within Machakos Town.....	111
3.3.1 Residential Land Use.....	112
3.3.2 Commercial Land Use.....	113
3.3.3 Industrial Land Use.....	113
3.4 Lower Kiandani Area.....	113
3.4.1 Location and Size.....	113
3.4.2 Population and Demographics.....	114
3.4.3 Existing Land Uses.....	114
4.0 CHAPTER FOUR: STUDY METHODOLOGY.....	115
4.1 Research Design.....	115
4.2 Population and Sample.....	115
4.3 Data Collection and Analysis.....	120
4.3.1 Overview.....	120

4.3.2 Data Collection.....	120
4.3.2.1 Data Types and Sources.....	120
4.3.2.2 Data Collection Methods.....	121
4.3.3 Data Analysis.....	122
5.0 CHAPTER FIVE: RESEARCH FINDINGS AND DISCUSSION.....	123
5.1 Introduction.....	123
5.2 Research Findings and Discussion.....	124
5.2.1 Land Sub-division and Land Use Change.....	124
5.2.1.1 Economic Factors.....	127
5.2.1.2 Commoditization of Land.....	128
5.2.1.3 Cultural Factors.....	139
5.2.1.4 Institutional Factors.....	131
5.2.2 Livelihood Strategies and Livelihoods Diversification.....	133
5.2.2.1 Agriculture.....	134
5.2.2.2 Non-Agricultural Land Use Activities.....	146
5.2.2.3 Formal and Informal Employment.....	153
5.2.3 Household Location, Household Land holding and Household Income	156
5.2.3.1 Hypothesis Testing.....	156
5.2.3.2 Correlation Coefficients.....	165
5.2.3.3 Standard Deviations and Coefficients of Variation.....	166
5.2.4 Preferred Interventions for Improvement of Household Livelihoods.....	170

6.0 CHAPTER SIX: SUMMARY, CONCLUSION AND RECOMMENDATIONS.....	172
6.1 Summary.....	172
6.2 Conclusion.....	172
6.3 Recommendations.....	174
6.3.1 Interventions for Sustainable Peri-urban Livelihoods.....	175
6.3.1.1 General.....	175
6.3.1.2 Some Specific and Targeted Interventions.....	177
6.3.1.2.1 Regulating Land Sub-division and Land Use Change.....	178
6.3.1.2.2 Strategies for Multiple Livelihoods and Agricultural Development.....	181
6.3.2 Methodological Issues that Could Require Review for Future Research.....	184
6.3.2.1 The Measurement of Household Income.....	184
6.3.2.2 The Scope of the Peri-urban Area and Type of Data Used.....	185
6.3.3 Areas of Further Research.....	185
6.3.3.1 Gender-differentiated Household Effect of Peri-urban Development.....	186
6.3.3.2 Effect of Peri-urbanization on Household Social Capital.....	186
REFERENCES.....	188
APPENDICES.....	197
Appendix 1: Research Permit.....	197
Appendix 2: Household Scheduled Questionnaire.....	198
Appendix 3: Scheduled Questionnaire for the Town Clerk,	

Municipal Council of Machakos.....	203
Appendix 4: Scheduled Questionnaire for the District Physical Planning Officer, Machakos.....	205
Appendix 5: Scheduled Questionnaire for the Secretary, Machakos Central Division Land Control Board.....	207
Appendix 6: Scheduled Questionnaire for the District Agricultural Officer, Machakos.....	209
Appendix 7: Data Analysis Tables.....	211

LIST OF TABLES

Table	Page
Table 2.7: Urbanization Trends in Kenya, 1948-2009	40
Table 3.2.4(a): Population of Machakos Municipality	101
Table 3.2.4(b): Population of Machakos Town, 1969-2009	101
Table 3.4.2: Population of Lower Kiandani, 1999-2009	114
Table 4.2(a): Original Land Parcels in the Peri-urban Sub-zones	116
Table 4.2(b): Sample Sizes by Sub-zones	117
Table 4.2(c): Sampling Information	117
Table 5.2.1(a): Locational Variation of Land Sub-division among the Study Households	126
Table 5.2.1(b): Locational Variation of Land Use Change among the Study Households	127
Table 5.2.1.1: Locational Variation of the Incidence of Land Acquisition by Purchase and Land Sub-division for Sale among the Study Households	128
Table 5.2.1.3: Locational Variation of the Incidence of Land Acquisition by and Land Sub-division for Inheritance among the Study Households	130
Table 5.2.1.4(a): Respondents by Awareness of Public Agencies Regulating Land Use	132
Table 5.2.1.4(b): Respondents by Awareness of Roles of Public Agencies Involved in Land Use	132
Table 5.2.2(a): Households by Sources of Income	134
Table 5.2.2(b): Locational Variation of Households by No. of Income Sources	134
Table 5.2.2.1(a): Households by Husbandry Practices	136
Table 5.2.2.1(b): Locational Variation of Agricultural Production among the Study Households	141
Table 5.2.2.2(a): Locational Variation of the Incidence of New Land Uses among the Study Households	147
Table 5.2.2.2(b): Sources of Household Income in the Inner Peri-urban	153
Table 5.2.2.2(c): Households by Main Sources of Income in the Inner Peri-urban	153
Table 5.2.2.2(d): Household Income by Sources in the Inner Peri-urban	153

Table 5.2.2.3: Locational Variation of Formal and Informal Employment among the Study Households	156
Table 5.2.3.1(a): Sample Household Incomes in the Inner Zone	156
Table 5.2.3.1(b): Sample Household Incomes in the Middle Zone	157
Table 5.2.3.1(c): Sample Household Incomes in the Outer Zone	157
Table 5.2.3.1(d): Frequency Distribution for Sample Household Incomes in the Inner Zone	158
Table 5.2.3.1(e): Frequency Distribution for Sample Household Incomes in the Middle Zone	159
Table 5.2.3.1(f): Frequency Distribution for Sample Household Incomes in the Outer Zone	160
Table 5.2.3.1(g): Sum of Squares of Deviations of Sample Household Incomes from the Sample Mean in the Inner Zone	161
Table 5.2.3.1(h): Sum of Squares of Deviations of Sample Household Incomes from the Sample Mean in the Middle Zone	162
Table 5.2.3.1(i): Sum of Squares of Deviations of Sample Household Incomes from the Sample Mean in the Outer Zone	162
Table 5.2.3.1(j): The ANOVA Table for the Hypothesis Test	163
Table 5.2.3.2: Household Income, Land Holding and Distance from the City Centre	164
Table 5.2.3.3(a): Standard Deviation and Coefficient of Variation in Household Incomes	166
Table 5.2.3.3(b): Standard Deviation and Coefficient of Variation in Household Land Holdings	166

LIST OF FIGURES

Figure 2.5.1: Von Thunen’s Model of Agricultural Land Use.....	28
Figure 2.5.2.1: The Concentric Zone Concept.....	30
Figure 2.5.2.2: The Sector Concept.....	33
Figure 2.5.2.3: The Multiple Nuclei Concept.....	34
Figure 2.12.1.1: The Sustainable Livelihoods Framework.....	79
Figure 2.15: The Conceptual Framework.....	94
Figure 3.2.1(a): Map of the Location of Machakos County in Kenya.....	96
Figure 3.2.1(b): Map of the Location of Machakos Municipality within the Nairobi City Metropolitan Region.....	97
Figure 3.2.1(c): Map of the Location of Machakos Town within Machakos Municipality.....	98
Figure 3.3: Map of the Main Land Uses within Machakos Town.....	111
Figure 3.3.1: Peri-urban Areas of Machakos Town.....	112
Figure 3.4.1: Lower Kiandani in Relation to Machakos Town.....	114
Figure 4.2(a): Map of Lower Kiandani Area Showing the Three Sampling Zones.....	118
Figure 4.2(b): The Spatial Distribution of Sample Households within the Study Area.....	119
Figure 5.2.1(a): Sample Households by Mode of Land Acquisition.....	124
Figure 5.2.1(b): The Incidence of Land Sub-division among the Sample Households.....	124
Figure 5.2.1(c): Reasons for Land Sub-division by Sample Households.....	125
Figure 5.2.1(d): The Incidence of Land Use Change among the Sample Households.....	127
Figure 5.2.1.4(a): Survey Beacons Denoting Land Sub-division in the Middle Peri-urban.....	133
Figure 5.2.1.4(b): A New Block of Flats Denoting Land Use Change in the Middle Peri-urban.....	133
Figure 5.2.2.1(a): Some of the Agricultural Activities in the Study Area.....	134
Figure 5.2.2.1(b): Involvement in Agriculture among the Sample Households.....	135
Figure 5.2.2.1(c): Main Land Uses among the Sample Households.....	135
Figure 5.2.2.1(d): A Cow Tethered next to A maize Crop in the Outer Peri-urban Denoting Mixed Farming.....	136
Figure 5.2.2.1(e): Crops Grown by the Sample Households.....	136
Figure 5.2.2.1(f): Animals Kept by the Sample Households.....	137
Figure 5.2.2.1(g): Respondents by Occupations.....	139

Figure 5.2.2.1(h): Household Income Sources among the Sample Households.....	139
Figure 5.2.2.1(i): Sample Households by Main Sources of Income.....	139
Figure 5.2.2.1(j): Contribution of Different Sources of Income to Aggregate Households Income.....	140
Figure 5.2.2.1(k): A Green House in the Inner Peri-urban Denoting Agricultural Intensification.....	144
Figure 5.2.2.1(l): A Zero-grazing Cattle Shed in the Inner Peri-urban Denoting Agricultural Intensification.....	144
Figure 5.2.2.1(m): Caged Chicken in the Middle Peri-urban Denoting Mixed Farming Under Land Pressure.....	145
Figure 5.2.2.1(n): Cattle-grazing by the Roadside in a Residential Area in the Inner Peri-urban.....	145
Figure 5.2.2.1(o): Agriculture-related Problems Cited by the Sample Households.....	145
Figure 5.2.2.2(a): Open Farms in the Outer Peri-urban Indicating Lack of Urban Activity.....	148
Figure 5.2.2.2(b): Small Village Shops in the Outer Peri-urban.....	148
Figure 5.2.2.2(c): A Block of Flats in a Maize Farm in the Middle Zone.....	149
Figure 5.2.2.2(d): A Small Shop at the Entrance of a Residential Development in the Middle Zone.....	149
Figure 5.2.2.2(e): A Signboard Giving Direction to an NGO Offices in the Middle Peri-urban.....	149
Figure 5.2.2.2(f): A Restaurant in the Middle Peri-urban.....	149
Figure 5.2.2.2(g): Temporary Structures next to Blocks of Flats in the Inner Peri-urban.....	150
Figure 5.2.2.2(h): Residential Development alongside Cultivation in the Inner Peri-urban.....	150
Figure 5.2.2.2(i): A Shop, Hotel and Bar in the Same Building in the Inner Peri-urban.....	151
Figure 5.2.2.2(j): A Mortuary in the Inner Peri-urban.....	151
Figure 5.2.2.2(k): A Roadside Motor Vehicle Repair Garage next to a Block of Flats in the Inner Peri-urban.....	151
Figure 5.2.2.2(l): High-end Maisonettes and Bungalows in the Inner Zone.....	151
Figure 5.2.2.2(m): Households by Land Uses in the Inner Peri-urban.....	152
Figure 5.2.4: Respondents' Preferred Interventions for Improvement of Livelihoods in Lower Kiandani.....	170

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ABBREVIATIONS AND ACRONYMS

CBD	:	Central Business District
CBO	:	Community-Based Organization
DURP	:	Department of Urban and Regional Planning
GPS	:	Global Positioning System
HH	:	Household
ICT	:	Information Communication Technology
IT	:	Information Technology
KNBS	:	Kenya National Bureau of Statistics
LA	:	Local Authority
LCA	:	Land Control Act
LCB	:	Land Control Board
LGA	:	Local Government Act
MCM	:	Municipal Council of Machakos
NGO	:	Non-Governmental Organization
NMT	:	Non-Motorized Transport
PHA	:	Public Health Act
PIP	:	Policies, Institutions and Processes
PPA	:	Physical Planning Act
PUI	:	Peri-Urban Interface
RLA	:	Registered Land Act
SL	:	Sustainable Livelihoods

SLF	:	Sustainable Livelihoods Framework
SSS	:	Site and Service Scheme
TPS	:	Tenant Purchase Scheme
UN	:	United Nations
UNECA	:	United Nations Economic Commission for Africa
UNEP	:	United Nations Environment Programme
UoN	:	University of Nairobi
UPA	:	Urban and Peri-urban Agriculture

1.0 CHAPTER ONE: INTRODUCTION

1.1 Background to the Research Problem

“To the visually trained or sensitive person today, the assault of urban anarchy on the senses is remorseless and unremitting. It is an outstanding fact of modern life, an expression of brutalism as harsh and as significant as slave labor, atomic warfare or genocide-and it reveals the same disregard for life. Our cities are neither an expression of civilization nor a creator of civilized men.”

The words of Frederick Gutheim, President, Washington center for Metropolitan Studies, in Wingo (1963:116).

Since the last half of the 20th century when most countries in Africa attained political independence and lifted restrictions on urban in-migration, the search for work and better life has led to rapid urbanization in the continent (Mabogunje, 1990). According to the United Nations (2007), between 1950 and 2000, Africa’s urban population more than doubled, increasing from 15% to 36 %. Quoting UN-Habitat’s *The State of African Cities 2010* report; Kihang’ah (2011) observes that Africa’s urban population is projected to “more than triple over the next 40 years”. Africa’s urbanization when compared to the rest of the world is unique in the sense that the phenomenon is more rapid and chaotic owing to problems related to governance systems, infrastructural development, land administration and low industrial growth. Rakodi (2005) in Mandere et al. (2010:74) adds that these factors combine to form what can be called the “African urban crisis” which has been manifest through uncontrolled spatial expansions and associated socio-economic problems. In spatial terms, Africa’s urban areas are growing faster than the urban population and this is partly attributable to changing housing preferences (Mandere et al, 2010).

As observed in other countries of Africa, Kenya’s rapid urbanization began in earnest with the attainment of political independence in 1963. The removal of restrictions on movement from rural to urban areas coupled with a renewed sense of nationalism and nation-building caused the “urbanization boom” (Macharia, 2003) as many people moved from rural to urban areas to look

for jobs. To date, many urban areas in the country experience unprecedented population increases and associated socio-economic and spatial problems. The situation is not helped by the fact that Kenya has had no clear national policy on urbanization. Moreover, institutional problems of low capacity, inadequate resources and gross mismanagement associated with Local Authorities, the public bodies responsible for urban management, serve to exacerbate the problem.

In as much as the phenomenon of rapid urban population growth means more people living in established urban areas, it also means more people living in the outward thrusts of these urban areas which form the peri-urban areas. As Kessides (2006) observes, urbanization involves the transformation of rural settlements at the urban periphery which become more densely populated and less dependent on agriculture. As a result of population pressure, rural areas of cities and towns are continuously converting to peri-urban status so that their land uses change from those dominated by agricultural activities to multiplicities or mixes of new land uses as landscapes transit from *rurality* to urbanity. This state of transition is characterized by intense interactions between the urban areas and their fringe lands so that the divide between rural and urban becomes very thin. What this essentially means is that traditional (rural) farming activities come into conflict with alternative land uses that compete for the same land to serve economic, residential and recreational interests as households “retain footholds in both the rural and urban economies”(Kessides, 2006:8).

The above situation is compounded by commoditization of land in the country. Land is seen as a commodity that can be traded at will so that the existence of value differentials between new (residential and other urban land uses) and traditional (farming) activities almost invariably imply that farming communities in urban fringes choose to release their land for non-agricultural uses that promise higher returns on investment rather than continue to hold the same under agricultural use. Moreover, true to what Mather (1986) observed, albeit in North America, even mere anticipation of future urban development is usually enough reason to increase land values in a given area in Kenya. Speculators are usually content to just buy land and “bank it” unused for some time so as to enjoy capital appreciation as opposed to annual income. A case in point is the proposed ICT (or techno) City in Malili, Makueni County. Writing in the Daily Nation’s

County Edition about this proposed city, Odalo (2011) points out that... “recent signals from the Government have rekindled hope and kicked off a rush for land within the centre”. He continues to add that even as the government, through the Permanent Secretary, Local Government, tried to control developments within the vicinity of the proposed city through a letter to neighbouring Local Authorities in the region, dated September 24th, 2010 (Odalo, 2011),...“the warning came a little late as brokers and unscrupulous land owners took advantage of the Government’s previous silence to subdivide their land into tiny plots.” The proposed Tatu city in Kiambu County is another example where proposed/anticipated urban development often leads to skyrocketing land subdivisions/changes of use and land values within and near the affected areas. And the ultimate loser here is agriculture. However, as transition from rural to urban sets in, new infrastructure and services associated with the urban environment (such as roads, electricity, water, sanitation etc) are bound to emerge to offer new economic opportunities (livelihoods and incomes) in the form of new activities leading to businesses and jobs to the peri-urban communities. But this is relative and it varies from region to region depending on the local planning authorities’ initiatives and the developers involved. Mandere et al. (2010) opine that the chances that infrastructural development will offer sustainable alternative livelihoods to the peri-urban communities (especially the poor) are indeed slim.

While the phenomenon of peri-urban development must be acknowledged as inevitable, it is worth noting, as Brook and Davila (2000) point out with respect to their observations in Kumasi, Ghana, that even in Kenya “there appears to be no recognition of the changes being caused or to be caused by the presence and growth of urban activity including the inherent opportunities and threats. Similarly, problems and benefits of urban spatial expansion are not fully recognized”. Paradoxically, agriculture remains an important livelihood activity among the majority of indigenous peri-urban communities.

1.2 The Problem Statement

Whereas urban growth and associated spatial expansion is a common phenomenon in all urban areas in Kenya, the city of Nairobi and the surrounding smaller urban centers are the most affected. The 2009 census showed that Nairobi is home to a little more than 3 million people. It is projected that by the turn of the decade, this figure will have grown by a million more people

(KNBS, 2010). Because of this growth, the city is exerting pressure in the entire Nairobi Metropolitan Region. It has been observed that when driving from Nairobi to its outlying areas such as Limuru, Thika, Athi River, Kangundo, Kiambu, Ruiru, etc, one would be forgiven for thinking that the city does not end (Makathimo, 2010). The proximity of these areas to the capital city has induced extensive conversion of land use away from agriculture, mainly through land sub-division and land use change processes often sanctioned on individual-case basis, without reference to the wider ramifications of such actions. The drive for private profiteering arising from the new urban developmental activity appears to have overshadowed the greater public interest that would call for considerations relating to agriculture, food production and livelihoods for the city's peri-urban regional communities.

Kessides (2006) has observed that “much public attention about urban growth focuses on the proliferation of mega cities” (p.6) yet “urban population in Africa is widely dispersed across mainly small settlements” (p.7). This observation appears to sound a warning that the socio-economic impacts of urbanization, and indeed peri-urbanization, could be more critical in small and medium size urban centers which, although generally expanding at relatively lower rates than cities and bigger urban areas, are often ignored and not given much planning attention. Urban mismanagement under the defunct local authorities has also been a common feature of most urban areas in Kenya. Machakos town, the geographical area of the proposed study, is one of those smaller urban areas in the country that are urbanizing rapidly, partly because of the *pull* factors due its location within the Nairobi City Metropolitan Region and, partly because of the *push* factors associated with agricultural stress in the wider semi-arid Ukambani region. Rapid urbanization, consequently, has caused and continues to cause new urban activity (especially residential development) in the surrounding hitherto rural peripheries of Lower Kiandani, Mumbuni, Misakwani, Kiima-Kimwe and Katoloni. A preliminary inquiry at the relevant local offices, coupled with a cursory visual observation of urbanization patterns in and around the town, revealed that Lower Kiandani is the most rapidly-urbanizing peri-urban area of Machakos town.

The introduction of urban activity in Lower Kiandani, obviously, means new land uses are displacing agriculture as an economic activity. Thus, it can be argued, the economic significance

of agriculture as a livelihood strategy in the area is potentially on the decline, especially for the indigenous households who are often most dependent on agriculture as a livelihood activity. The foregoing therefore suggests courtesy of the “encroaching” urban activity, the indigenous peri-urban households in Lower Kiandani may stand more exposed to the potential livelihood shocks and stresses associated with this apparent agricultural decline. On the contrary, however, new urban land uses and activities often present new opportunities for engagement in non-farm/off-farm employment. Proximity to urban development may also be complementary to some forms of agriculture such as dairy farming and horticulture. Peri-urban development, therefore, may have presented new opportunities to the indigenous households - opportunities that could be economically more rewarding. Much of the peri-urban literature reviewed for this work appears to support the above sentiments, with many researchers observing that urbanization has a direct effect on household livelihoods (Maxwell et al., 1998; Gough and Yankson, 2006). Others, among them Maxwell et al., (2000); Brook and Davila (2000) and; Narain (2010), have indeed been more categorical to state that peri-urbanization often occurs to the detriment of rural livelihoods.

In addition to the above postulations, it is worth noting that the peri-urban itself (and therefore peri-urban development) together with its consequential socio-economic change is, conceptually, a rather dynamic problematic. It has been described as a concept that is difficult to define universally because it evokes different mental images depending on local contexts, meaning the term *peri-urban* can only be used provisionally, each time assigning it context-specific interpretations in relation to the local peri-urban situation (Nottingham and Liverpool Universities, 1998: in Adell, 1999; McGregor et al., 2006; Marshal et al., 2009; Narain, 2010). Thus, it is suggested, there can never be anything like “standard prescriptions for universal peri-urban challenges”. Understanding the peri-urban dynamics in Lower Kiandani would, certainly, be a precursor to any meaningful livelihoods intervention strategy. In view of the foregoing, and considering that the indigenous peri-urban communities are, generally, recognized as a special category of vulnerable groups (Maxwell et al., 2000), there is a need for a scientific inquiry to find out how peri-urban development impacts on the livelihoods of the indigenous households of Lower Kiandani. This, in turn, will inform choice and implementation of the most appropriate

policy with a view to reducing and enhancing livelihoods vulnerability and resilience respectively, among these people.

1.3 The Purpose of the Study

In view of the issues discussed in 1.2 and 1.3 above, the purpose of the study was to investigate how peri-urban development affects the livelihoods of indigenous peri-urban households. To achieve this, Lower Kiandani, a peri-urban area of Machakos town which is also an administrative sub-location, was used as a case study.

1.4 The Scope of the Study

As is already highlighted in the preceding sections, the study population is the indigenous households of Lower Kiandani, a peri-urban area of Machakos town which is also an administrative sub-location of Machakos District, Machakos County. Acknowledging that a peri-urban analysis may involve investigation of diverse socio-economic variables and on varied inhabitants, the study, deliberately, elected to dwell on how the process of peri-urban development, and the resulting socio-economic environment in the peri-urban, impacts on the livelihoods of the indigenous households living in the study area. Because the indigenous peri-urban households were largely subsistence farmers and their livelihoods essentially rural-based (because subsistence farming is the dominant rural economic activity in the area) before the invasion of urban activity, the study involved an analysis of whether, from a land use point of view, urban development at the expense of agriculture, is a positive or negative experience for the livelihoods of the study population.

For avoidance of doubt therefore, it is emphasized that the study was NOT concerned with the whole of peri-urban Machakos BUT only the Lower Kiandani area. The research subjects were NOT any households in the Lower Kiandani area of Machakos town BUT only those households that are indigenous in the area. And regarding the study theme, the investigation was concerned with livelihoods and NOT other aspects of peri-urban socio-economic and environmental change such as environmental degradation, infrastructure, facilities and services etc.

Another clarification that should be made at this point is the scope of measurement of the household *livelihood*. Within the broader concept of livelihoods and livelihood assets, the study focused on only two types of livelihood assets namely natural capital and financial capital. And within these two categories, the study further focused on how peri-urbanization directly affects indigenous households' land holdings and economic activities thereon (representing natural capital) and how this, ultimately, impacts on the incomes (representing financial capital) of these households.

During preliminary investigations prior to the study, it was established that it would be difficult to access adequate time-series data for the investigation within the study timelines, meaning the preconceived and ideal historical analysis of peri-urbanization and livelihoods based on historical secondary data on the major study variables was ruled out. Thus, the methodological variant adopted by the study was to carry out a locational analysis of the key household variables in three zones of the study area, defined on the basis of their radial distance from the local urban core. The study methodology (Chapter 4.0) further elaborates this.

This study report is made up of four parts as here under:

- ❖ Preliminaries- cover page, signatory/declaration page, dedication, acknowledgements, table of contents, list of tables, list of figures, abbreviations and acronyms and, abstract.
- ❖ The main body comprises:
 - Chapter One - Introduction
 - Chapter Two - Literature Review
 - Chapter Three - The Study Area
 - Chapter Four - Research Methodology/Design
 - Chapter Five - Research Findings and Discussion
 - Chapter Six - Conclusion and Recommendations
- ❖ References
- ❖ Appendices

1.5 Research Objectives

The main objective of the study was to investigate how the phenomenon of peri-urban development affects the livelihoods and incomes of indigenous local households. To achieve this broad objective, specific objectives were set as:

- a) To investigate the factors responsible for land sub-division and land use change in the study area,
- b) To identify and describe existing household livelihood activities and sources of income in the peri-urban area,
- c) To analyze how household location influence household livelihood activities among the indigenous peri-urban households,
- d) To determine the relationship between household income and household space and locational factors among the indigenous peri-urban households,
- e) To use the findings of the study to propose suitable policy and planning interventions for sustainable peri-urban livelihoods.

1.6 Research Questions

The research set out to answer the question: **“What is the impact of peri-urban development on the livelihoods of indigenous households?”** To answer this question, a number of more specific questions were set as follows:

- a) What are the main factors behind land sub-division and land use change in Lower Kiandani,
- b) What are the different kinds and forms of livelihood activities and sources of income available to the study households,
- c) Does household location with respect to the city centre influence household choice of livelihood strategies and income sources among the indigenous households in Lower Kiandani?
- d) Is there a significant relationship between household income and household space and locational factors among the study households?
- e) What do the study findings suggest about the effect of peri-urban development on the indigenous households? In view of these findings, what would be the best policy initiatives to promote the livelihoods of the research population?

1.7 Research Hypothesis

In view of the potential threats and opportunities that urbanization dynamics present to the village inhabitants in the peri-urban as discussed in sections 1.1 and 1.2 above, the study posited that peri-urban development has a significant impact on the livelihoods of the indigenous peri-urban households. However, for the purpose of measurement, and because it was difficult to access relevant time-series data for the investigation, the study used the established observation in much of the peri-urban literature that, naturally, the intensity of peri-urbanization would increase with distance towards the urban core. Therefore, by measuring and analyzing relevant variables at specified zones of the study area based on radial distance from the core, it would be possible to deduce how the invading urban activity impacts on the livelihoods of the target population. Also, fully aware that a household livelihood is a function of many variables (assets), the study deliberately posited that access to income is perhaps the most important indicator of a livelihood. Furthermore, a lot of literature has often used the two terms, *livelihood* and *income*, almost interchangeably. With the foregoing in mind, the study proceeded to hypothesize that **“Among the indigenous peri-urban households, household income depends on household location with respect to the city centre”**.

1.8 Justification and Significance of the Study

The expansion of urban areas into the surrounding rural environments, herein often referred to as peri-urbanization, is an inevitable global phenomenon. Urban areas will always grow by annexing adjacent lands into their peripheries. However, for peri-urbanization (and the resulting socio-economic dynamics) to be sustainable, it must, in space and time, promote both rural and urban interests. Obviously, while still in a transitory environment, the new urban activity that urbanization brings to the urban peripheries will co-exist with the traditional rural economic activities for some time, before the latter are modified and ultimately discarded.

Central to the above is the whole idea of the potential socio-economic opportunities and threats that peri-urbanization portends, especially with respect to the livelihoods and incomes of peri-urban residents. While the phenomenon presents opportunities for economic engagement in urban-based activity, it is also a threat to the established rural economy, in this case agricultural primary production. These two economic systems compete for the same land. Increasing urban

activity in the peri-urban, therefore, means increasing conversion of land use away from agriculture. Much of the peri-urban literature has underscored the fact that peri-urbanization without appropriate policy intervention often diminishes the economic significance of rural-based production and employment, ultimately jeopardizing the socio-economic well-being of those whose livelihoods are largely rural-based. However, the same literature suggests there is no consensus on what constitutes “the appropriate peri-urban policy intervention” because the peri-urban itself is difficult to define. Peri-urban dynamics, therefore, can only be understood in the context of local situations. In the absence of a “standardized prescription” therefore, a scientific inquiry must be a precursor to any form of meaningful policy intervention, hence the choice of the research theme.

The choice of the study subjects, the indigenous peri-urban households, was carefully arrived at in view of the fact that, from a livelihood vulnerability/enhancement point of view, these households, compared to the newcomers, are more predisposed to either suffer livelihood loss due to the agricultural decline or benefit by enhancing their livelihood portfolios from the new urban-based opportunities. Indeed, some researchers {e.g. Maxwell et al. (2000)} have recognized indigenous peri-urban communities as a special category of vulnerable groups. Regarding the study area, three considerations justified the choice of Lower Kiandani in Machakos town. Firstly, the regional situation and economic status of Machakos town- lying within the Nairobi City Metropolitan Region and being the economic hub of much of the semi-arid, less-productive Ukambani region – attracts in-migrants hence the pressure for spatial expansion which is visually evident in the “native” areas surrounding the town. Secondly, Machakos is one of those small urban centers in the country that are ever expanding, but which have not received much planning attention. Thirdly, based on preliminary investigations at the Municipal Council of Machakos, Lower Kiandani area was found to be the most rapidly-expanding peri-urban area of the town where, it was felt, the socio-economic dynamics of peri-urbanization would be most at play.

Because Machakos town and the study area may represent the average Kenyan town and its peri-urban environs, it was presupposed the study findings would find widespread general applicability to inform policy decision-making and implementation to manage urbanization, and

therefore peri-urbanization, in the many other similar urban contexts in the country. Kenya's urbanization has been cited as one devoid of growth. Growth is central to livelihoods. The significance of the study, therefore, cannot be over-emphasized.

1.9 Limitations and Assumptions of the Study

1.9.1 Limitations

While there were no severe problems encountered throughout the study, a few challenges - which were anticipated anyway and were overcome - are worth mentioning. Firstly, like with any other research, time was of the essence. Research tasks were to be completed within strict timelines as set in the University calendar and this was no mean task. Secondly, undertaking the study was expensive as it involved hiring research assistants; meeting transportation, food, accommodation and field logistics costs; costs related to the production of the research report, etc – all privately financed by the researcher, a civil servant. This was quite a challenge in these hard economic times. Thirdly, some interviewees were uneasy at some stages of the interviews, ostensibly because they were uncomfortable with divulging sensitive family information – particularly about land and incomes. Sometimes it took more time to convince them than was otherwise anticipated. Fourthly, official Government bureaucracy in many offices where secondary data was sought would often delay collection of secondary data as envisaged. Finally, women in some households simply refused to be interviewed because, culturally, the “de facto” household heads (i.e. men) were not available then, sometimes necessitating later visits.

1.9.2 Assumptions

The study assumed that peri-urban development is basically a *spreading pancake* and is primarily a function of spontaneous land subdivision and land use change. Its intensity, therefore, decreases with increasing distance from Machakos town centre. Further, it was assumed that in Lower Kiandani, only buyers and sellers of land, with limited governmental intervention through laws and regulations applicable in freehold land determine the availability of and demand for land in the local market. Economic considerations, therefore, influence land allocation between competing potential land uses so that the concept of economic rent, the net value of the returns arising from the use of land over a given period of time, was the principal consideration among land owners and users. Rational land users/owners therefore, it was assumed, always sought to

maximize their net incomes from land by choosing those land uses that present the highest reward in terms of economic rent.

1.10 Operational Definition of Terms and Variables

Like with many other research works, this study has used some terms which usually have broad and dynamic meanings. It has also used variables which may be measured in different ways. The study, therefore, cannot purport to qualify these diverse meanings and dimensions in absolute terms. Because of this reason, some terms and variables were assigned suitable operational definitions (but within their broad meanings) so as to align their use to the specificities under investigation. The work was hinged around three key terms: **peri-urban development**, **livelihoods** and **indigenous households** which, for purposes of clarity, require context-specific definitions as outlined in (a) – (c) hereunder.

- a) A review of diverse literature has suggested that the term *peri-urban* (and therefore **peri-urban development**) could be theorized or conceptualized in many ways leading to diverse meanings. Many authors have alluded to the intricacy involved in trying to define the term. Nottingham and Liverpool Universities (1998) in Adell (1999) have observed that the peri-urban is not easy to define because it is complex. Marshall et al (2009) have noted that defining the peri-urban is usually fraught with conceptual difficulties. Narain (2010) has further observed that the term is confusing because it has different mental images attached to it and lacks a consensus definition. McGregor et al. (2006) have also alluded to the difficulty involved in defining the term when they assert that the peri-urban is characterized by hybridity rather than distinctiveness and underscore the futility of expecting or searching for uniform processes in different circumstances. Arising from the foregoing, Adell (1999) has suggested that the peri-urban concept should always be used provisionally, each time with a context-specific working definition.

The Foregoing notwithstanding, it appears a common thread runs through much of the peri-urban literature. Whichever way one looks at it, the peri-urban can be seen to relate to one, two or all of three views. It could refer to a place, process or concept of flows and linkages. As a place, it refers to the geographic edge of cities while as a process; it refers

to the transition from rural to urban. As a concept of flows and linkages, it refers to the movement of goods and services and the interface of rural and urban activities, institutions and perspectives.

This work views **peri-urban development** as both place-based and process-oriented. As a place, it is the physical environment surrounding the city/town where rural and urban interests and populations are mixed. As a process, it represents the expansion of urban areas into the surrounding agricultural areas and therefore, the transition from rural to urban. The process is herein visualized as a *spreading pancake* which is largely a function of spontaneous core-driven pressure for land subdivision and land use change. The study therefore postulates that the intensity of peri-urban development is indicated by the intensities of land subdivision, land use change, urban development, as well as the average household land holding in the ring of land surrounding the urban area proper.

- b) As Chambers (1995) argues, the concept of **livelihoods** is wide, multifarious and dynamic. However, a livelihood fundamentally embodies a living as a function of people and assets (both tangible and intangible). Most literature on livelihoods recognizes five categories of livelihood assets. Access to these assets determines the socio-economic well-being of a household. McLeod (2011) summarizes these assets as natural capital (natural resources such as land, water, wildlife, biodiversity, etc); physical capital (basic infrastructure such as water, sanitation, energy, transport, housing, etc); human capital (e.g. health, knowledge, skills etc); social capital (e.g. relationships, membership of groups, networks, access to institutions, etc) and; financial capital (e.g. regular incomes, remittances, savings, supplies, credit, etc).

It is almost scientifically impossible to investigate a livelihood in its totality i.e. as a function of so many variables (assets portfolio). The study could not purport to do so and therefore its focus was how peri-urbanization impinges on one category of livelihood assets of the indigenous households - physical capital- and eventually influences another - financial capital. It is also instructive to note that a further simplification of this focus has been done where physical capital is represented by household access to land and

economic activities thereon. Similarly, financial capital is represented by household incomes accruing from different forms of employment and economic activities.

The definition of a **livelihood** herein is therefore simply the means to a living. It encompasses all lawful and socially-accepted socio-economic activities that individuals and households may engage in for purposes of earning a living. Thus, a livelihood herein represents a range of on-farm and off-farm activities which together provide a variety of procurement strategies for food and income. It includes formal employment in various sectors, informal income generating activities, business, agriculture and non-agricultural activities etc and the income accruing from such activities. **Income** is herein taken to be the main indicator of a livelihood and its measurement is conventional, i.e. cash from the aforesaid employments and activities, quantified annually, in Kenya Shillings.

- c) **Indigenous households** are what can also be referred to as the peri-urban “village” households. They are the households who form the pre-urban development land owners. They consider the study area as their rural/ancestral home environment and to a larger extent, continue to use or regard their land as agricultural. Emphasis here is on the “nativeness” or “originality” and the term does not imply marginalization or backwardness as is sometimes the case. They can also be referred to as the “original” households and are hereby differentiated from the in-migrant peri-urban land owners and other new-comers who may be viewed as the peri-urban “urban” households because they have bought peri-urban land for purposes of urban development or have moved into the peri-urban as a survival strategy to augment their mainly urban-based livelihoods. Last but not least, a **household** refers to a family unit which may be a nuclear unit (whose membership includes a father and/or mother and children) or may be an extended unit that includes other kindred such as grandparents, uncles, aunts, nephews and nieces, etc.

2.0 CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter is a review of previous works relevant to the subject under investigation. It also includes the researcher's own views with respect to the main issues under discussion. The review is intended to provide a conceptual grounding of the main issues that are relevant to the phenomenon of peri-urbanization. It covers the following:

- Urbanization – Causes, consequences, and its effect on land use including some common concepts and theories of land and urban land use, a synopsis of Kenya's urbanization including the planning challenge in small urban areas in Kenya,
- Peri-urbanization – Theorization or conceptualization of the peri-urban including some common characteristics and models of peri-urban development; land use change and contestations in peri-urban contexts; implications of the peri-urban as a policy and planning space and; planning in the peri-urban context including contemporary peri-urbanization trends in Kenya,
- Urban and Peri-urban agriculture (UPA) – definition, benefits and risks of UPA including its practice in Kenya,
- The concept of livelihoods – Sustainable livelihoods; the role of institutions in sustainable livelihoods; how urbanization affects livelihoods and; the nature of peri-urban livelihoods,
- Institutional factors influencing urban and peri-urban development in Kenya and,
- The conceptual framework of the study based on the literature review.

2.2 Urbanization

It is not possible to discuss peri-urban development without looking at the broader issues that pertain to urbanization. As a process, urbanization involves a continuous concentration of populations into towns and cities. The rate of urbanization is its increase between levels over specified time periods. Urbanization results from urban population growth, the change in the size of population living in urban areas between specified time periods. Generally, urban areas are characterized by populations in nucleated spaces; high population densities in defined places compared with surrounding areas; high development density with more built up space than the

surrounding areas and; engagement in non-basic forms of production by a majority (more than 50%) of the population.

The United Nations in its *World Urbanization Prospects* (2007) report observes that cities and urban settlements are the face of the future. Today, more than 50% of the world's population lives in urban areas. Urban areas attract a rising tide of humanity- people seeking good life, opportunities, economies of scale etc. But incidental to these are environmental catastrophes, marginalization of communities, the overall diminishing of the quality of life, deprivation of livelihoods, insecurity etc. According to UN-Habitat and UNEP (2007), over the last 50 years, urban centers have expanded into the land around them at a very rapid rate, eating up valuable farmland and further estimates that within the next three decades or so, if unchecked, this growth will not be sustainable and will be synonymous with slum formation. What this means is that local innovations are required if this growth and expansion is to be sustainable.

With regard to developing countries, urban areas have continued to grow in size and importance. Africa, which is the least urbanized but the most rapidly urbanizing continent (Mabogunje, 1990; Coquery-Vidrovitch, 1991) is unique. Its urbanization has been “perhaps the most dramatic of the social phenomena that marked the end of the colonial era in the continent” (Mabogunje, 1990:122). Urban transition in Africa has been proceeding at a “historically unprecedented rate averaging over 5% per annum over the past two decades” (Kessides, 2006: vii). As the period 1950s-1960s saw the attainment of political independence in many African countries, the new status gave birth to renewed nationalism and enthusiasm with nation-building and modernization. As colonial restrictions on urban in-migration were now lifted, the *push-pull* forces in the interplay of the rural-urban economic systems led to the influx of migrants in African cities and towns. However, lack of sufficient planning and economic growth to match the increases in urban populations was soon to lead to “*shantytown*” (Mabogunje, 1990: 131) developments around major cities and towns.

2.2.1 The Causes and Consequences of Urbanization in Africa

Urbanization in Africa is as a result of two basic sources namely natural increase and rural-urban migration. In some cases, the alteration (expansion) of the boundaries of a city or municipality to include hitherto rural areas may, though minimally, contribute to urbanization. But early

empirical studies in Africa and most of the rest of the developing world by, among others, Todaro, El-Shakhs and Amirahmadi demonstrated that Africa's urbanization is more an effect of rural-urban migration than natural increase (United Nations Economic Council of Africa, UNECA, 1989). And urban in-migration can be seen as a system with both individual/behavioural and structural elements. From an individual perspective, the migrant weighs the costs and benefits of relocation. Costs of relocation could be in terms of the monetary expenses of moving, foregone earnings from farming and other rural activities, and psychic costs associated with change of environment. These are weighed against potential benefits such as improved incomes and better lifestyles. On the other hand, the Structural view focuses on the affected communities and the structural determinism of the broader economic, social, political and other environmental contexts of the movement and it overrides the individual perspective. In both cases, the movement has economic and social motivations.

2.2.1.1 Economic Causes

Mabogunje (1990) emphasizes the need to understand the real causes of rural-urban migration beyond the simplistic explanation offered by the fanciful *bright lights* theory. Coquery-Vidrovitch (1991) and later Kessides (2006) recognize this line of argument when they advance the *push-pull* theory where they hold that city-ward migration is a multi-dimensional phenomenon. Through this lens, migrants are only social and economic actors in a dynamic system of conflicting pressures and interests. This, for instance, explains the movement and especially so in impoverished rural areas where harsh environmental factors and inadequate (or lack of) exploitable natural resources *pushes* migrants from their rural homes and are *pulled* by the attraction of the prevalent urban employment opportunity potential- in pursuit of economic well-being. Even in the areas with better natural-resource endowments, Mabogunje (1990) in Coquery-Vidrovitch (1991:45) underlines the fact that migration and migrancy should be understood by not only why people migrate from certain areas but also in terms of "the propensity to migrate more or less rapidly in response to impulses or stimuli from the environment" and further argues that population pressures eventually diminish the natural abilities of these areas to sustain local communities leading to out-migrations. In the same vein, Ominde (1966) in UNECA (1989: 10) noted that in several rural areas of Kenya, the movement was largely due to the fact that "the available land cannot maintain an adequate standard of living

or even support improved living conditions.” In other African countries such as Sierra Leone, soil degradation and poor agricultural productivity were found to significantly contribute to rural out-migration. UNECA (1989) noted that even with technological changes in agriculture, population pressure often triggers negative effects on the environment such as soil erosion, soil deterioration, land fragmentation, etc beyond the complementation of such technologies.

Todaro (1977) argues that besides the push effect of population pressure, dual economies in Africa imply a direct connection between migration and spatial income differentials. Rural-urban migration in most developing countries is, therefore, due to the existence of distortions and imbalances in social and economic opportunities between rural and urban areas-essentially due to the wage differentials between these areas which make potential urban employment opportunities and wages sufficiently more attractive to induce the movement. Coquery-Vidrovitch (1991) asserts that Todaro’s argument formed the basis for the reinvigoration of the strategies for rural and urban employment (including adjustment of educational systems) in almost all African countries in the early 1980s.

2.2.1.2 Social Causes

Coquery-Vidrovitch (1991) underscores the extra-economic motivations of rural-urban migration. Quoting Parkin (1975), she emphasizes the role of ethnicity and its influence on the influx of migrants to urban areas through the rural mental and social structures. Using the Luo community in Kenya, she points out that there exists significant implications of urban residence and socio-economic change and explains why among the community, “ the recourse to images drawn from the rural sector enables ethnic cohesiveness, and why significant differences in ethnic solidarity result from different attitudes towards and use of rural, traditional images”(p: 46). Looking at residential estates in Nairobi, one would find this observation largely true with respect to members of this community.

Todaro (1977) focuses on the role of education. He argues that the formal schooling system only serves to position the mindset of students and their parents in such a manner that their ultimate goal is to acquire white collar jobs in the city where highly paid urban jobs socially promise security and upward mobility. Coquery-Vidrovitch (1991: 45) vindicates this position when she

observes that the “the more formal education a person in the rural areas possesses, the more likely he or she will be to move to town”. She further argues that migrancy can also be explained in terms of social status advancement with which it is perceived and that in some cases it is a “symbol of boys becoming men”. Perhaps this statement is today debatable! The preoccupation with white collar jobs that characterized the early post-independence years, in the face of prevailing urban hardships, appears to have dissipated and given alternatives, people would simply be interested in sustaining their livelihoods and wellbeing-urban or rural notwithstanding!

2.2.2 The Consequences of Urbanization

“National governments have often tried to influence the pace or location of urbanization. Often these efforts consisted of shifting resources from agriculture to finance the expansion of “modern” economic sectors—usually manufacturing—which were concentrated on cities. Urban workers in the formal sector benefited from food and housing subsidies and government-sponsored unemployment and pension schemes, while rural populations received low prices for their crops and had little access to government support. Such misplaced efforts are part of the reason Africa has seen urbanization with very little economic growth”.

The World Bank (2000) in Spence et al. (eds) (2009: 8)

Kessides (2006) argues that because of lack of sufficient planning and low urban economic growth, urbanization in Africa has been a tragedy. She points out that by the year 2006, Africa’s population was on average one-third urbanized and that Africa “is approaching a demographic inflection point” as the numbers are expected to rise by over 300million between 2000 and 2030 which is more than twice the expected rural population increment (p. xiv). This growth has been taking place within hostile economic environments characterized by vulnerable resource bases. It has, over the years, become synonymous with socio-economic and spatial problems and the phenomenon can be seen as ‘over-urbanization’ where urban population growth far outstrips urban economic growth. As a result, Africa’s cities and other urban areas are associated more with problems and trauma than with the potential comforts of development. The phenomena is characterized by widespread unemployment and underemployment; urban sprawl; poverty; deterioration of social services such as housing, health and transportation, etc. Urban primacy

and its corresponding inequalities in the sharing of resources and urban populations between cities and towns is also a common denominator of urbanization in Africa. A case in point is Nairobi, Kenya's administrative and economic capital city, which, by 2007, held 37.7% of the total Kenyan urban population and was 3.7 times the size of the second largest city, Mombasa with 820,000 people (UN, 2007). To underscore the problem of urbanization in Africa, UNECA (1989) points out that as early as 1977, about 80% of African governments had condemned urbanization to embody social injustice and considered the phenomena "nationally undesirable" and wished to reduce the growth rates of their primate cities. Moreover, Kessides (2006:8) warns that "the real surge in Africa's urbanization is yet to come; it will occur in the next thirty years, when the urban population is projected to nearly triple and become the majority".

Despite the foregoing, it should be noted that cities and urban centers are actually not the cause of the many urban societal problems. Rather, it is lack of foresight and planning that ails society. As Mabogunje (1990) argues, urban areas should just be viewed as scenes of social and economic problems that merely act to draw attention to problems which otherwise remain unnoticed and unobtrusive in the rural areas. Urban and rural economic systems and associated benefits/problems are therefore interdependent. This argument appears to put a strong case for urban planning but within the context of the larger and comprehensive framework of regional planning. With proper planning and management, urbanization is not a problem but a positive phenomenon. It generates a public benefit through urban agglomeration economies as well as private socio-economic benefits to in-migrants.

2.2.3 Urbanization and Economic Development

Urban and rural developments are a "virtuous circle" (Kessides, 2006: xvii). First, access to urban-based activities as part of a household's livelihood portfolio can raise the level of the rural economy by providing knowledge and resource that can be invested in inputs or capital stock for agriculture or for non-farm activities. Secondly, as a virtuous circle, access to urban markets and services for nonfarm production stimulates agricultural productivity and rural incomes which in turn generate demand and labour supply for more such goods and services. Individuals, households and communities benefit wherever market access is eased and diverse economic activities become available, either through physical proximity or through individual mobility.

Urban centers are arenas for productivity, entrepreneurship, and economic modernization. The agglomeration of firms and workers leads to increased efficiency in flows of goods and services. Urban areas, in addition to their functioning in line with traditional growth theories- aggregating larger pools of labour, inputs and capital- epitomize the process of “endogenous growth”(Kessides, 2006: xviii) which is more efficient in terms of resource use and productivity. However, this is dependent on the ability of municipal public agencies to create environments in which economic agents can easily interact, labour is mobile, urban land becomes available for productive uses, and both citizens and firms trust that they can safely invest for the present and the future.

Urban developments are good for poverty reduction. Noting that the poor will naturally be attracted to the greater opportunities that cities and towns will offer, Mabogunje (1990), Coquery-Vidrovitch (1991) and Kessides (2006) argue that poverty in cities is part of a healthy process of economic transition and mobility for a country and households. This is so if greater attention is paid to identifying particular deprivations facing the urban poor and tackling these directly by removing causes of economic and social exclusion. This will inevitably involve some focus on the rural hardships and demands such as modernization of agriculture.

Kessides (2006) argues that urbanization supports the demographic transition. Urban areas, she adds, are often characterized by falling birth rates and swelling labour forces which creates a “dividend” (p. Xviii) for the economy where demographic dynamics are tempered so that cities serve the large youth and working-age cohorts. This, however, will only happen if there is sound management of the urban economy and adequate urban public investment.

Urban settings provide the best environments for the provision of social and infrastructure services more readily in line with the millennium development goals. Nucleated settlements, compared to the dispersed rural settlements, present lower per capita costs of infrastructure and service provision. And related to this is the relative ease with which local governance, institution building and service provision can be exercised when settlements are nucleated as opposed to the dispersed rural pattern.

2.2.4 Urbanization and Land Use

Urbanization means more people moving into and living in urban areas which inevitably leads to urban spatial expansion. Urban expansion means consumption of more land to provide for urban housing, locate industry, build infrastructure and facilities etc. Since the supply of land is fixed, it means that having to avail more land to cater for increasing urban demands will inevitably involve reducing the amount of land under other equally important rural uses, usually agriculture, by a corresponding amount. This basic fact crystallizes the rest of this work.

The demand for urban land has been increasing over the years because of the pressure to accommodate increased human urban activity. Although population pressure as pointed out in the preceding sections is no doubt the main cause of urban spatial expansions, other socio-economic dynamics among the middle and upper class urban citizens can also be seen to be at play. Kivell (1993) underscores the effect of increasing personal affluence which creates a further boost to the consumption of urban land. Rising living standards result in lower residential densities, increased use of motor vehicles, increased recreation activity etc all of which require land near major urban areas.

Again, the fact that land (and property) has traditionally been a “hedge against inflation” (Davison and Wibberley, 1977:112; Kivell, 1993:2) and especially in times of economic uncertainties, coupled with lifestyle preferences, has led to rapid growth in urban home ownership meaning consumption of more land. In addition, medium and long term increases in the value of properties has been a particular attraction when other forms of investment have not been very rewarding. Equally notable is the increasing availability of and accessibility to mortgage finance to urban middle and upper-class citizens.

Perhaps the arguments to follow herein will not be properly grounded if *land* is not defined and understood at this point. This invaluable “commodity” has been perceived and defined in diverse ways. To mention just but two of common perceptions, to the physical geographer, land is synonymous with the landscape while the economist will see it as a resource. Many other perceptions hold depending on different disciplines and perspectives.

As with its diversity in perceptions, land is also defined variously. Dale and McLaughlin (1988), for instance, define land as the surface of the earth, the materials beneath, the air above and all things fixed to the soil. McNeill (1975) defines land as “the air we breathe, the water we drink and use for recreation, the land we cultivate, the cities we flock to in growing numbers and the wilderness we seek to enjoy today and to preserve for future”.

2.3 The Concept of Land

2.3.1 Historical perspective

One of the most enduring debates on land has been whether it should be treated as any other form of private property that may be traded at will or it should indeed be treated as a common property in which the community and succeeding generations have interest (Edward, 1969; Mather, 1986). Historical developments in land ownership and use show that the private vs. public debate on land has been rather cyclic. In the traditional pre-agricultural societies when populations were sparse and land was plenty enough to be treated as a ‘free good’, there was no concept of individual land ownership. However, as populations grew and agriculture began to support livelihoods, land became less and less abundant. And the emerging competition for it necessitated the replacement of the communal system with forms of individual ownership. Early (and rudimentary) forms of these were manifest through trusteeships where kings, chiefs and other leaders would hold and “rent” it to their people in return for protection (Mather, 1986). Land was, therefore, not a freely marketable commodity and was closely associated with territorial administration and socio-political authority.

However, the evolution of the “*mercantilist*” (Mather, 1986: 3) concept saw land become purely the private property of the highest bidder, effectively delinking its ownership from political power and administration. It is this mercantile notion that bred the *laissez-faire* especially in Victorian Britain between the 1830s and 1900. But soon afterwards, its failings became evident and pure private land ownership was now beginning to be seen to “have been at odds with the perceived welfare of the nation” (Mather, 1986: 4). The pendulum was now swinging back in the opposite direction. The state was beginning to appreciate land use and ownership as too important to be seen solely in terms of private property rights. Land use and ownership were soon to begin to be regulated so that the interplay between private interests in land and the

economic forces did not eventually harm society. Because of the realization that land use and development decisions that society made shaped its very character and were often burdensome (Levy, 1988), state intervention was seen necessary to acquire land for public use, guarantee security to tenants, impose curbs on private use and provide general stewardship with respect to land.

2.3.2 Why Land is important

The usefulness of land derives from its diversity and hence the corresponding diversity in its uses which make it more of a “resource base rather than a resource in itself” (Mather, 1986: 5). Land has a number of attributes and uses in both its physical and biological senses. Its ecological potential may be exploited for, say, agriculture; it provides space for settlements; and, as landscape, it has value in the aesthetics that may support tourism and recreation activities. It is noteworthy that these attributes and uses are not mutually exclusive and that land use conflicts arise because often, these uses are mutually discordant and detrimental to one another (Cullingworth, 1988). Further, both human activities and the natural environment are characterized by high degrees of intra and inter- interconnectedness and complexity which put a strong case for land use and development planning (Levy, 1988).

As an ecosystem, land consists of living organisms (biota) and their non-living (abiotic) physical environment in which they live. Since an ecosystem is a system, the biotic and abiotic parts of land must be in constant interaction so that, basically, “everything depends on every other thing” (Khitoriya, 2004). The land ecosystem consists of ecological processes which form the energy or resource “*throughput*” (Mather, 1986: 7; Ngugi, 2007 : 14) through which energy conversions take place. Humanity intervenes as managers to manipulate these processes in order to maximize the productivity of land with respect to production of natural/physical products such as food and timber. In this sense land can be seen as a renewable (or flow) resource because once properly used, these natural products can be produced indefinitely. Again, it is possible to assess the viability of various land use alternatives in terms of their comparative energy efficiencies.

With regard to use of land as space, its ecological properties (and productivity in terms of physical/natural products) become less important. What is more important in this case is the “spatial” (Mather, 1986: 14) attribute of land which is useful for such activities as housing,

manufacturing, commerce, transportation etc. Under this attribute, land can be seen as limited in its extent and resembles a non-renewable (or stock) resource in the context of its being used up. The usefulness of land as landscape stems from the ability of man to appreciate the aesthetic quality of the physical environment. In this case, land (just like the atmosphere) can be seen as an ambient resource that is not used materially but whose value lies in its amenity (pleasantness) rather than its physical material. It is for this reason that aesthetic considerations are increasingly getting prominence in the process of issuing development permissions in many planning jurisdictions because the public has a right to enjoy land as landscape -proposed developments notwithstanding. In England and Wales, for instance, large tracts of land have been designated as Areas of Outstanding Natural Beauty (Mather, 1986).

2.4 The Economic Nature of Land Use

2.4.1 Land Use, Economic Rent and Value

Economic considerations influence land allocation between competing potential land uses. And the most important of these is the concept of economic rent –the net value of the returns arising from the use of land over a given period of time. Since rational land users will always seek to maximize their net incomes from land, they will choose those land uses that present the highest reward in terms of economic rent. Generally, it has been established that commercial uses yield the highest economic rent and there is a downward gradation of rentals through industry, housing, cropland, improved grazing and finally forest and rangeland (Mather, 1986).

With respect to use of land as space, its location (with respect to the core) is an important determinant of economic rent. Land in the city is more rent-yielding than agricultural land in the rural areas because of the premium on accessibility. In effect, different levels of accessibility will give rise to a gradient in economic rent as land users endeavour to locate their activities near the city centre to minimize transportation costs. As concerns agricultural land in the country side, another rent gradient exists between more fertile and less fertile land. High fertility land guarantees higher yields for a given level of input (hence higher economic rent) than less fertile land. Thus, the ability of land to produce economic rent will depend on its location with respect to the core and its physical quality. These two factors are closely interrelated because cities have

always developed in areas of high quality land (Mather, 1986). And this brings us to the issue of land value.

Land that gives higher economic rent is more valuable than that which produces less of it. Based on economic rent, present land value can, simplistically, be arrived at by summing up all its expected future economic rents discounted to the time period, and the prevailing annual interest rate. But the actual market value of land is more realistic and often different from this capitalized value. It will be influenced by, among others, its supply and demand, people's goals of owning land, as well as their emotional attachments to it.

2.4.2 Land Use and Land Price

Mather (1986) argues that if land is to be owned for economic reasons only, land buyers will be guided by the economic rents that can be generated by the actual or potential land uses. For this reason, he further argues, rational land buyers will not pay urban prices for rural land. He adds that even where market circumstances force buyers to obtain land at prices higher than those guaranteed by economic rents from its current uses, subsequent land use change to enhance economic rent to its merited value will be inevitable.

It is important to note that besides land, other ingredients of land use exist. Capital and labour are applied to manipulate natural ecosystems and utilize space for housing, industry etc at varying intensities (levels of inputs) depending on their availability and cost. Thus, the nature of land use and price of land in a locality will be a function of the factors of land production (land quality and location, capital availability and distribution, availability and cost of labour) but in the context of the local socio-political environment.

2.4.3 Land Allocation and Land Use

While land allocation in traditional and socialistic societies was largely based on custom and convention, in modern capitalist societies, it is a function of the prevailing socio-economic systems where market forces and governmental intervention/regulation shape the process. Market economies (whose dominance can be traced back to the industrial revolution in Britain in the early 18th century) emphasize the commoditization of land where the economic wishes of individual buyers and sellers of land are brought into balance via market exchange and price

mechanisms. But land is too important to be left purely in the hands of private individuals (Mather, 1986; Levy, 1988) so that variants in the form of introduction of elements of centralized control (via town planning) become inevitable.

2.4.4 The Nature of Land

Land is different from other economic commodities in a number of ways. For starters, it is fixed in its total supply because the earth has a finite quantity of land. However, the law of supply holds that increasing quantities of any good (including land) will be offered for sale or lease at higher prices. In its literal sense, this would then mean that as land prices increase, increasing quantities would be offered for sale but within the total quantity available since land can neither be created nor destroyed. But it must be emphasized that the fixed supply of land is not actually about the total quantity of land available. Rather, the concern is “the quantity of land available to perform certain functions/services” (Ngugi, 2010). And increased supply of one category of land will depend on the substitutability between various categories since it (e.g. land for housing) results from conversion and reduction in supply of another category (e.g. agricultural land).

Unlike most goods, land has no cost of production and supply per se. When sellers supply land to the market and ask for certain prices, these are not based on costs of production but on the assessment of the worth of ownership to them. It is for this reason that land has often been referred to as a “*gift of nature*” (Kivell, 1993:15) though in reality, there exists other costs related to development, infrastructure provision and other improvements.

Another significant attribute of land is its permanence. Unlike other economic goods, land is generally a durable and indestructible commodity. It may change ownership and use upon purchase but it is not “removed from the market place” (Ngugi, 2010). Land will therefore remain in inventory at all times. And related to this is its uniqueness and irreplaceability. Each piece of land is unique in terms of its physical attributes of size, shape, quality and location so that no one parcel can be exactly replaced by another.

2.5 Theoretical Orientations of Urban Land use

Urban spatial structure is about the ordering and establishment of relationships among physical elements and land uses in urban areas as they evolve from the interactions among the key systems of urban land use and pass through transformations through space and time. These theories range from those which attempt to explain “what is” - i.e. descriptive -to those which extend the “what is” to “why” i.e. explanatory. The understanding of these two schools of thought is important because it is the basis for planners’ normative view and action with respect to land use planning and management.

Theories explaining urban spatial structure have their provenance in the work on agricultural land published by Von Thunen in 1826 and later by Hurd in 1903 (Kivell,1993). It would therefore be instructive to have a brief look at this important model.

2.5.1 Von Thunen’s Model of Agricultural Land Use



Figure 2.5.1: Von Thunen’s Model of Agricultural Land Use. *Source: Rosenberg M. (2011)*

J.H. Von Thunen, a farmer and an amateur economist developed the earliest model of agricultural land use in 1826. Von Thunen developed his model before industrialization and begins his analysis of the spatial patterning of agricultural activity around the city by making a number of limiting assumptions. First, the city is taken to be located centrally within an "isolated state" whose soil quality and climate are consistent throughout its territory and which is self

sufficient and has no external influences. This “isolated state” is surrounded by an unoccupied wilderness. Secondly, the land of the state is assumed to be completely flat so that there are no rivers or mountains to interrupt this terrain. Thirdly, there are no roads in this “isolated state” so that farmers use ox carts to transport their own goods to the market across land and directly to the central city. Finally, the model makes the assumption that rational farmers will always act to maximize profits.

With the above assumptions, Von Thunen proceeds to hypothesize that a pattern of rings of agricultural land uses would develop around the city as depicted in the diagram above. According to the model, four rings of agricultural activity will develop around the city. Dairying and intensive farming will occur in the ring closest to the city. Since vegetables, fruit, milk and other dairy products must get to market quickly; they would be produced close to the city.

Timber and firewood would be produced for fuel and building materials in the second zone. Before industrialization (and coal power), wood was a very important fuel for heating and cooking. Wood is very heavy and difficult to transport so it is located as close to the city as possible.

The third zone consists of extensive fields crops such as grains for bread. Since grains last longer than dairy products and are much lighter than fuel hence reducing transport costs, they can be located further from the city.

Ranching is located in the final ring surrounding the central city. Animals can be raised far from the city because they are self-transporting. Animals can walk to the central city for sale or for butchering. Beyond the fourth ring lies the unoccupied wilderness, which is too great a distance from the central city for any type of agricultural product. Thus, the farmers of the isolated state, according to the model, can balance the cost of transportation, land, and profit and produce the most cost-effective product for market.

Even though the Von Thunen model was created in a time before factories, highways, and even railroads (Rosenberg, 2011), it is still an important model today. It forms an excellent illustration of the balance between land cost and transportation costs so that as one gets closer to a city, the price of land increases.

2.5.2 Descriptive Concepts of Urban Land Use

Three classic concepts form the earliest descriptive frameworks for urban land use and spatial structure, namely the concentric-zone concept, sector concept and multiple-nuclei concept.

2.5.2.1 The Concentric-zone concept

Based on his studies of the rapidly growing North American cities and particularly Chicago (Mather, 1986), Earnest W. Burgess, a sociologist, developed the concentric-zone model in 1925. The concept tries to explain the entire patterning of land uses (through ecological processes) in the city. Burgess saw the city as a series of five concentric zones. The zones represented increasing degrees of cultural assimilation as well as greater economic and social status with each successive residential zone.

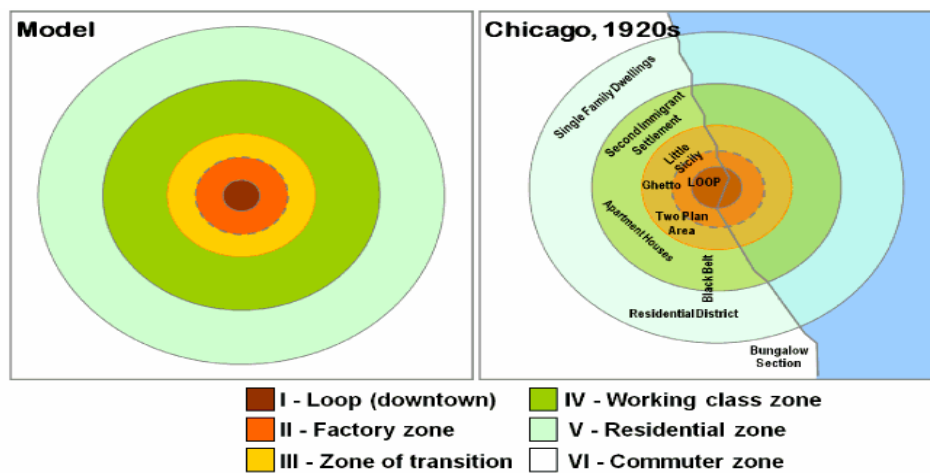


Figure 2.5.2.1: The Concentric Zone Concept.

Source: <http://people.hofstra.edu/geotrans/eng/ch6en/conc6en/burgess.html>.

Accessed 25th August, 2011.

The first zone is the *Central Business District*. It forms the focus of commercial, social and civic life and transportation. At the core of this lies what he referred to as the “loop” comprising of businesses which seek a central location such as shopping areas, theatre districts, hotels, office buildings, banking halls etc which may intermingle in small urban areas but which would normally exist as distinct sub-districts in large cities. Next to these “loop” activities and fanning

out to the next zone would lie the commercial areas of the city comprising of the market districts and the older wholesale districts and warehouses (Burgess adds that for a port city, these commercial functions will usually intersperse its port functions). It is in this part of the Central Business District where light industrial activity which does not require much ground space would normally be found. And cutting across this and the remaining outer zones along railway lines corridors and forming long wedge-like areas are the industrial sections of the city.

The second zone of the city according to Burgess is what he refers to as “*the Zone of Transition*”. It is particularly identifiable by the (mix) variety and changing character of its uses. It is in this zone where residential areas of the city begin albeit deteriorated in character. In some areas of this zone, clustered remnants of barricaded upper- class (first-citizen) homes may be found while in other areas and especially in large cities, these are usually replaced by high-rise apartment houses. In other sections of this zone, the structures for the old homes may still be standing but under new uses such as antique shops, boutiques, rental accommodation etc. And next to the industrial wedges which cut through the zone (like the rest and along rail roads) will be found residential slum areas.

The third *Zone of the Workingmen’s Homes* consists of the homes of factory workers, labourers etc who have escaped from the zone of transition but who have to live within easy access to their work places. The *Zone of Better Residences* is the fourth zone. Here are found the large residential areas of the city which form the homes for the city’s white-collar workers and middle-class families in the form of single-family dwellings, exclusive and restricted neighbourhoods, and high-class apartments. And the fifth zone is what Burgess called the *Commuters’ Zone* consisting of suburban/satellite communities and is characterized by spotty development of high-class residences located along the major transportation lines of the city.

Burgess attributed the above spatial patterning to the social factors of competition and migration (Kivell, 1993). As city growth occurs, each inner zone tends to invade the next outer zone through a series of “invasion- succession” mechanisms. City growth is attributed to economic expansion, population growth, decentralization of the middle-income groups in response to neighbourhood deterioration, the inflow of low-income migrants into the inner city and, the

existence of new housing and employment opportunities in the suburbs. On the other hand, when cities experience decline (and decreasing populations), Burgess argues that the outer zones tend to remain stationary but the inner fringe of the transitional zone tends to recede into the commercial district thus expanding the transitional area through formation of what he calls “permanent commercial and residential slums”.

2.5.2.2 The Sector Concept

Although Burgess’ model is commonly simplified into a purely concentric zonation of activities, it is important to note that the original version as developed from Chicago depicted the importance of specialized sectors (Kivell, 1993). Homer Hoyt took up this sectoral importance and carried out more empirical studies based on residential rent levels in 25 American cities (Mather, 1986) including Chicago and developed his Sector concept in 1939. The model provided new insights into the patterning of land uses by providing a theoretical explanation for the occurrence of residential land uses in terms of wedge-shaped sectors radial to the city’s center and along the spines formed by the major/established lines of transportation. According to Hoyt, the different income classes of a city usually occupy distinct areas which form what can be described as sectors of a circle whose centre is the central business district. He made the following observations with respect to these sectors:

- The high-rent(and high-price) residential areas are found in particular sectors, and there is a downward gradation of rentals from these areas in all directions,
- Intermediate rental areas adjoin each high-rent area on one or more sides and are usually located in the same sectors as the high-rent areas,
- Low-rent areas can be found occupying other entire sectors of the city from the centre to the periphery.



Figure 2.5.2.2: The Sector Concept.

Source: <http://www.google.co.ke/search?q=hoyt+sector+model> - Accessed 25th August, 2011.

To explain the above observations in terms of changes in a city's residential patterning, the sector theory holds that similar types of residential land use that originate near the centre of the city usually migrate within the same sector and away from the centre. It further postulates that high-rent (and high-price) areas usually tend to influence the direction of a city's residential area growth and that these areas will usually exhibit the following growth characteristics:

- Their growth from a given point of origin is usually along established (and fastest) transportation lines or towards another established nucleus (e.g. a trading center) and such growth tends to continue in the same direction for a long period of time,
- High-rent residences usually grow toward high ground and also tend to spread along lake, bay, river and ocean fronts provided such fronts are not used for industrial activities. These are usually the sites for the residences of the leaders of the community,
- High-class residences tend to grow toward open land which is free of natural/artificial limitations. However, real estate agents may at times influence the direction of growth of high-rent residences,
- They tend to grow in the general direction of trends of movements of offices, banks and shopping stores and in the case of old residential areas; they are usually found near the business centers.

With respect to the other classes of residences, the theory holds that where a given sector develops originally as a low-rent or low-price area, the rest of that sector is likely to be occupied by low-rent/low price residences as the city expands outwards. The same is true for intermediate-rent/price sectors.

2.5.2.3 The Multiple-Nuclei Concept

While Earnest Burgess and Homer Hoyt saw the city as having a single central core, Roderick Mackenzie (1933) and later Chauncy Harris and Edward Ullman (1945) argued that cities often have a series of nuclei in the patterning of their land uses. They further observed that in some cases, these “other” nuclei may actually be the initial distinct centers in the original metropolitan area that manage to withstand the effect of the expanding city to emerge as new centers as the urbanization process proceeds. And in their analysis, Harris and Ullman established that while the number of the nuclei and the functions of each of them ordinarily vary from one metropolitan area to another, the central business district will clearly serve as one nucleus. The rest of the nuclei will usually be characterized by varying degrees of functional specialization in similar or complementing activities to become industrial, wholesaling, major retail, university, suburban etc. centers.

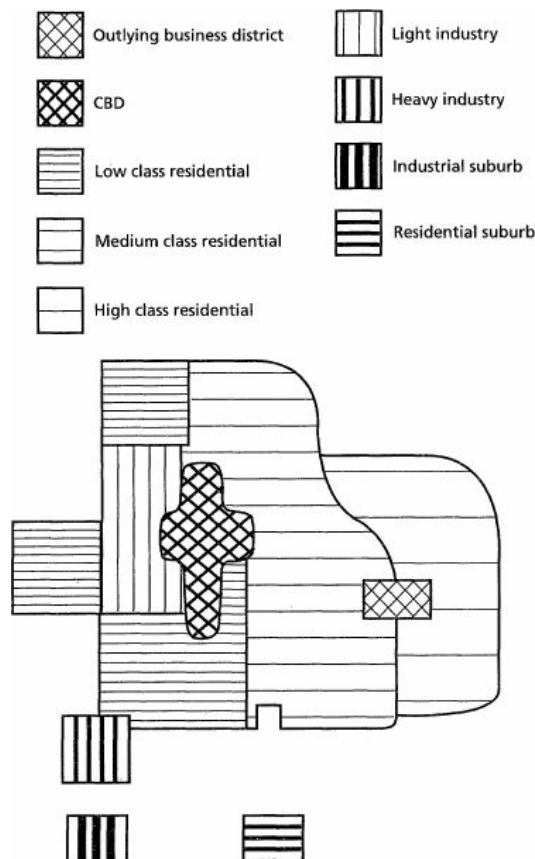


Figure 2.5.2.3: The Multiple Nuclei Concept.

Source: <http://www.answers.com/topic/multiple-nuclei-model> - Accessed 25th August, 2011.

The phenomenon of the emergence of multiple nuclei in urban land use forms is, according to the concept, attributable to four main factors:

- a. the interdependence of certain types of activities that necessitates their locating in close physical proximity (i.e. negative and positive externalities),
- b. the natural clustering tendency among certain types of activities that find it more profitable to locate together (i.e. agglomeration economies) e.g. retail and medical centers,
- c. the need to locate separately those activities that may not necessarily have any particular affinity for one another but are usually considered inimical to other land uses for a variety of reasons (e.g. traffic they generate, terminal facilities they require etc) and,
- d. the high land rent/price factor that attracts or repels land users in the process of nucleation.

2.5.3 Explanatory Concepts of Urban Land Use

Although the descriptive concepts of Burgess, Hoyt and Harris and Ullman have over the years come to be known as the “classical models” (Kivell, 1993:21), it is important to note that they have their limitations. For instance, the three concepts are just descriptions of observed patterns in the city devoid of quantifiable models and explicit analysis (Kivell, 1993) and to this extent, they have no “deductive basis” (Mather, 1986:125). In other words, the theories do not explain how the interplay of the forces of demand and supply impact on urban land uses to produce the city spatial structure.

Moving away from these rather simplistic models of the Chicago school, the seminal work of Alonso, Wingo and later Muth, introduced some necessary theoretical sophistication (Mabogunje, 1990; Kivell, 1993). They used the economics of equilibrium theory and improved on these models to produce more coherent theories for explaining internal urban structure. In their work, Alonso and Wingo treated location as a variable and using the concept of bid-rent/price curves for competitive users of urban land, they related the theoretical work on location to the broader concepts of the urban economy. They showed that despite the fact that land prices are higher at the city centre and that they decrease outwards, the higher-income

residents sought peripheral locations while the poor moved to the central areas of the city and this was purely an economic phenomenon (Mabogunje, 1990). These theories assume that, firstly, with no zoning regulations or other public policy restrictions that affect the land market, the city is highly simplified in its geography and infrastructure and that it has a single employment and shopping centre with equal transportation in all directions. Secondly, it is assumed that the land buyer (i.e. the household or the firm) has perfect knowledge of the price of land and the cost of commuting throughout the city. Finally, the individual is assumed to have a fixed income which can be spent on three things namely land, transportation to the city centre and composite good (i.e. the package of all other goods including savings).

With the above assumptions, the bid-rent models proceed to argue that because of higher transport costs at the city's periphery, disposable incomes become lower but this is compensated by the fact that land prices/rents are lower. As a result, people will consume more land at the outskirts of the city. At the core, however, disposable incomes become higher so that households can consume more composite goods.

Alonso's classic theory of land use is perhaps the most explanatory. Using the classical consumer equilibrium theory, he systematically exploits the interaction between land values and land uses. *First*, he focuses on an individual household wishing to buy or rent land in the city and faced with the double decision of how large the land should be and how close to the city centre it should be. He then proceeds to argue that at a given level of income, the household will achieve its equilibrium by selecting that combination of quantity (size) of land, distance from the city centre and quantity of the composite good which maximizes its satisfaction within the budget constraint. Noting that that the household will choose this combination in the background of land costs that are higher near the city centre and decrease with increasing distance from the centre; commuting costs that increase with increasing distance from the centre and; price per unit composite good that remains constant, looking at these against the household's income constraint will define what he refers to as the "opportunity space" of combinations that are open to it. He further adds that the household's choice will be a function of its preferences. And these preferences will be defined by the trade-offs it will be willing to make between the amounts of land, composite good and distance from the city centre at a fixed level of satisfaction. When the

preferences are mapped as indifference surfaces and joined graphically or mathematically to the mapping of the opportunity space, the household's equilibrium results. This corresponds to the opportunity combination of quantity of land, distance and amount of composite good which results in the highest feasible satisfaction.

The *second stage* of the model involves derivation of bid price curves for the individual household and the firm. These curves represent sets of hypothetical prices for land which the individual household or the firm could pay at various distances from the city centre while deriving a constant level of satisfaction or profit. Alonso further observes that for each household or firm, there exists a large set of such bid price curves (one for each level of satisfaction) so that the preferred location for the household or the firm will be that at which the real price structure touches the lowest of the hypothetical bid price curves with which it comes in contact (i.e. the one associated with the highest level of satisfaction).

The *third stage* of the theory tries to achieve a theoretical equilibrium for the entire aggregated market through a price-determination and space-allocation process that starts from the city centre. According to Alonso, the bid user with the steepest bid price curve (i.e. the one for which price drops off most significantly with unit increase in distance from the city centre) is allocated the most central location in the city. Next, the bidder with the second-steepest bid price curve will locate on the next site outward from the city centre with the corresponding price being determined from the price of the first site. Alonso holds that the price for the second site is usually equal to or slightly higher than that which the first user would have paid to occupy this second site. In the same manner, the prices and locations for the third, fourth and all other successive users are determined step-by-step so that eventually, the last user locates at the edge of the city. But according to Alonso, the price of the last site (at the city edge) must be adjusted to agree with a given price at the city edge-usually the agricultural value for the land. This adjustment is applied backwards through the method of successive interactions so that the price of land at the centre of the city is dependent on the price at the city's edge and its distance from the centre.

Alonso's model therefore tries to simulate a process in which patterns of land uses and patterns of land values become mutually determining through the mediation of the market mechanism. Through this economic determinism, the preferences on the demand side (derived from the activity system) and land and its allocation opportunities on the supply side (derived from the land development system) establish a state of equilibrium. And at the equilibrium, supply and demand quantities of land are equalized in such a manner that:

- The city is just large enough to accommodate the various users' space needs without leaving any vacant land,
- Users of land (households and firms) cannot increase their benefit (satisfaction and profits) by moving to another location or buying more/less land,
- Land lords cannot increase their earnings by changing the price/rent they charge on land.

Wingo (1961) argues more or less like Alonso except that his work is inclined towards a more *transportation-oriented theory of land use*. He directs his attention mainly to residential development and explains the spatial patterning of the city by using the concept of transportation demand where he considers the spatial relationship between home and work.

To understand how the above models work, it is important to note that the phenomena affecting urban land use and spatial structure operate within a systems framework and their functioning can be described in terms of *states and transformations* through which the urban environment is shaped.

2.6 Key Systems Affecting Urban Land Use

A system can be defined as a set of individual interconnected parts but of which each part may be seen as a system itself and the whole system may also be regarded as part of a larger system".

Three systems are of particular relevance to urban spatial structure and land use namely:

- a. Activity system
- b. Land Development system and,
- c. Environmental system.

The Activity system "concerns the way man and his institutions such as households, firms, governments, and other institutional entities organize their affairs on a day-in-and-day-out basis

in the pursuit of human needs and interact with one another in time and space” (Chapin and Kaiser, 1979: 28). The interaction between activity systems is enabled by the communication and transportation sub-systems. The activity system can be taken to embody activities within places and trips between places as complementing behaviours.

The land development system concerns processes that convert or reconvert space and adapt it for human use in the pursuit of activities. The system is composed of a number of development sub-systems and their corresponding agents. *Predevelopment landowners* are responsible for land marketing while *Developers* are involved with land conversion and reconversion. *Consumers*, the users of space, are agents for purchasing or leasing of locations and facilities to accommodate activity systems and space needs. Financial intermediaries facilitate the acquisition- and development- financing transactions. Finally, *public agencies* (e.g. local authorities) are sub-systems whose role is to review and approve land use and development proposals.

The environmental system is about the biotic (living-plant and animal communities) and abiotic (non-living-water, air and matter) states generated by natural processes. It provides the ecological conditions and the resources that enable man to inhabit the earth. The environmental system includes the ecosystem processes that govern energy flows as well as the hydrological, aerological and geological processes.

2.7 A Historical Synopsis of Kenya’s Urbanization

Whereas the process of urbanization in Kenya has been, and still is, an evolving phenomenon, one of its fundamental characteristics, as witnessed in other countries in Africa, is that rapid urbanization began in earnest with the attainment of political independence in 1963. The removal of restrictions on movement from rural to urban areas coupled with a renewed sense of nationalism and nation-building caused the “urbanization boom” (Macharia, 2003) as many people moved from rural to urban areas to look for jobs. However, Spence et al (2009: 6-8) observe that Kenya’s urbanization is “urbanization without growth” because while the level of urbanization in the country grew from 7% in 1960 to 20% in 2009, per capita income stagnated over the same period. Thus, they argue, urbanization in Kenya has “not been pulled by

productive industrialization” but may have been “pushed” by “agricultural stress” in the rural areas. KNBS (2010) tracks Kenya’s population growth as shown in table 2.7 below.

Table 2.7: Urbanization Trends in Kenya, 1948-2009. *Source:* KNBS (2010)

Year	Total Population	No. of Urban Centers	Urban Population	% of Urban to Total Population	Inter-censual Growth Rate (%)
1948	5,407,599	17	285,000	5.3	-
1962	8,636,263	34	747,651	8.7	6.3
1969	10,956,501	47	1,076,908	9.8	7.1
1979	15,327,061	91	2,315,696	15.1	7.7
1989	21,448,774	139	3,878,697	18.1	5.2
1999	28,159,922	180	5,429,790	19.3	3.4
2009	38,412,088	230	12,023,570	31.3	8.3

As shown in the table, there were 17 urban centres with an aggregate population of 285,000 people at the time of Kenya’s first population census in 1948. Compared to the national population, this urban population was proportionately small (i.e. only 5.3% of the total population) with majority of the urban dwellers being non-Africans. Since then, the number of urban centres, the urban population and the proportion of people living in urban centres have been increasing. By 1979, there were 2.3 million people living in 91 urban centres while by 2009, the urban population had risen to 12 million people in 230 urban centres. Thus, the proportion of people living in urban centres had increased to 15.1 percent in 1979 and to 31.3 percent in 2009. It is however noteworthy that the distribution of this urban population is characterized by primacy with disproportionate concentrations in Nairobi and Mombasa.

The above data are indicative that Kenya’s demographic shift will continue. The proportionate share of Kenya’s urban population will continue to rise so that urban areas will keep on expanding in the foreseeable future. Urbanization, therefore, is inevitable and the main challenge today is not to slow down urbanization per se but to learn how to manage rapid urban growth. This calls on all stakeholders “to re-direct their collective energies and meagre resources in devising urban management strategies that are capable of addressing the extant problems and the

utilization of the opportunities created by the inevitable and irreversible phenomenon” (UN-HABITAT, 2007: 1).

2.8 Small Urban Areas in Kenya

The United Nations Centre for Human Settlements and the United Nations Environment Programme (1997) defines small towns or urban centers in Kenya as those with a population of between 5,000 and 80,000 people spread over areas ranging from 5 to 50 square kilometers. They estimate these centers to be growing at between 6-12 % annually due to immigration from rural areas, expansion of town boundaries and natural population growth.

Generally, small urban centers serve three main functions namely administration, commerce and housing. Economically, they serve the residents and the rural hinterland while acting as intermediaries between rural areas and larger cities. Spatially, most of the small urban centers are characterized by a densely built-up core surrounded by a belt of peri-urban settlements. Urban housing is mixed with small-scale agriculture and scattered shopping points. The much outer zone is purely for agricultural purposes.

To date, much of the urban development in the small urban centers, as with the cities and other major nodes, is taking place outside the designated urban space due to population increases and the attendant socio-economic dynamics. It is therefore peri-urban and not planned for. Moreover, such developments are often regulated by small Local Authorities (usually municipal and town councils) under whose jurisdictions such urban centers lie. Majority of these councils are under-capacitated in terms of personnel and financial resources leading to inadequate planning capacity. In addition, these areas are not given much planning attention by the central government because of their relatively lower economic status in the national economy . Under these conditions and at the backdrop of lack of comprehensive national policies on land use and urbanization (Kenya, 2009), the spatial expansion of these urban centers into their surrounding agricultural areas is usually “unnoticed”. This leads to loss of agricultural land, greenery and amenity through haphazard urbanization of the peri-urban environment. Rapid unplanned urbanization also means that local authorities have to meet much higher costs of infrastructure and service provision. But of particular significance is the fact that uncontrolled urbanization in

these small urban centers may not offer sufficient new livelihood support opportunities to compensate for the reduced household land holding and diminished agricultural productivity. This makes it imperative to understand the potential effects of peri-urbanization on the livelihoods of indigenous peri-urban households and communities.

2.9 Urban Growth and Peri-urban Development

2.9.1 The Peri-urban Zone

As pointed out in the preceding discussions, urban growth and spatial expansion implies increased demand for urban land which can only be availed by substituting other rural (agricultural) land uses. Worldwide and especially in Africa, urban centers have been experiencing growth primarily in the peri-urban areas. Basically denoting the mix of rural and urban activities, interests and populations, the peri-urban zone (also known as the fringe, urban fringe, rural-urban fringe, outer fringe, innermost ring of rural land, peri-urban interface, rural-urban interface or simply the peri-urban) has, over time, been defined and described variously by different authors.

Johnson (1972: 148) describes the peri-urban zone as being characterized by “the absence of a clear break between rural and urban conditions measured both in terms of land use and of social organization” where “various rural and urban characteristics are mixed together”. He continues to add that this zone “also attracts various uses which are necessary for the proper functioning of an urban settlement but which would be less desirable within its actual built-up area” (p. 149). He adds that even with strong planning controls, various distinct types of land use will always be found in the urban fringe because “it is very difficult and expensive to remove land uses which were established before planning controls began to operate”. For this reason, old land uses and buildings will be found standing side by side with new permissible land uses (such as schools, hospitals and recreational facilities) which have been “attracted by the fact that land values are kept down by the refusal to permit residential development”.

With respect to countries where planning controls are weak, Johnson (1972) argues that peri-urban areas in economically vibrant cities will further be characterized by rising land values because land use change will be expected sooner or later. In addition, he asserts that “where

compact development is not enforced builders are often tempted away from the immediate vicinity of the city, either because of some intrinsic attraction of the site which they are developing or because the higher costs of land adjacent to the built-up area encourages them to go farther away". Moss (2001:245), describing the growth of the city of Phoenix, USA, observes the same tendency and concludes that "changes in the boundaries between city and country often occur in discontinuous leaps, rather than a smooth and steady process of outward expansion" and refers to this process as "leapfrogging". Gillham (2002: 4-5), still on the American cities, upholds Moss' observation and describes the peri-urban zone in terms of leapfrog development and characterizes it as "a patchwork, widely spread apart and seeming to consume far more land than contiguous developments" and adds that as time progresses, the open spaces will eventually be filled with new development.

Besides the above urban land use effects, Johnson (p. 149-150) notes that peri-urban agricultural activity has characteristics that reflect footprints of urban temporal and spatial growth. This observation is true because the intensity of urban activity impacts directly on the amount of land available for agriculture which, almost invariably, dictates agricultural practices. Arguing that land subdivision, land use change and the new developments that characterize this environment are often inimical to agriculture and agricultural communities, he observes that peri-urban land tends to drop out of cultivation "sometimes because of the presence of non-rural residents, with their tendency to leave gates open and keep troublesome dogs, and partly because of the division of land into uneconomic units as patches are sold off for urban development" (p. 150). Another reason that he advances for the existence of derelict land in the urban fringe is because of speculation where "the possibility of being able to sell a piece of land at the right moment more than compensates for the loss of the agricultural return over a short period".

Davidson and Wibberley (1977:109-110) describe the peri-urban area or the urban fringe as "an area characterized by functional and visual uncertainty about its dominant use. It contains substantial, if discontinuous, areas of urban development mixed with stretches of more extensive and traditionally rural uses like agriculture and forestry. These uses are strongly affected (beneficially as well as to their detriment) by the presence of urban activity... it contains 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 to the population which they serve...it is the inner edge where rurality and urbanity are truly mixed.”

Vindicating much of the views of Johnson (1972) and Davidson and Wilbberley (1977), Mather (1986:132) further focuses on the innermost ring of rural land in terms of its dereliction with respect to agriculture. He observes that the zone is usually characterized by “tall, ungrazed grass and broken-down fences” because the land has “probably been acquired by builders or speculators seeking capital gain rather than annual income and agriculture has simply been discontinued”.

Mandere, Ness and Anderberg (2010:73-74), quoting Adell (1999), Anthrop (2000), Wiggins and Proctor (2001), Busck et al. (2006), Ode and Fry (2006) and Maconachie and Binns (2006) see peri-urban areas as “those areas adjacent to built up areas of high population concentrations (that is, urban)... they are the zones where traditional farming activities come into conflict with alternative economic, residential and recreational interests...the zone engaged in intense interactions with the urban...the area of daily commuting from village to city Central Business Districts (CBDs) for work...significantly pre-urban where the issues of job creation, transport, housing and environmental issues are important...the area with a blurring... between rural and urban...possessing great dynamism with a focus on competition for basic resources”.

The above peri-urban literature dwells more on describing the peri-urban zone as a geographical place, characterized by competition for natural resources. However, McGregor, Simon and Thomson (2006) argue that the peri-urban is characterized by hybridity rather than distinctiveness. They add that “nowhere is there a neat dividing line where the city meets the savanna, bushveld, forest or desert” (p. 4) and that the fringe may vary from city to city in both its nature and width. It can take such forms as relatively uniform sprawl, honeycomb structures or spines of growth along specific corridors. They attribute the spatial differentiation of the processes of spatial expansion of cities to the size and structure of the existing city; composition of urban and migrant populations; the nature of migration; physical terrain and environmental conditions; public transportation efficiency; land tenure systems, land values, and land uses

surrounding the city; and differences between administrative/political and *de facto* urban boundaries.

2.9.2 What is Peri-urban Development?

Perhaps it is necessary to define the term *Development* at this point before venturing into the complexities of the peri-urban. *The Oxford Advanced Learners Dictionary*, among other definitions, says that in its **verb** form, *to develop* is “to use land for the building of houses etc and so increase its value”. It continues to define the **noun** *development* as “a piece of land with new buildings on it”.

In the context of Urban and Regional planning, The Physical planning Act, CAP 286, assigns *development* two meanings, categorized as Classes A and B. Class A development refers to “the making of any material change in the use or density of any buildings or land or the subdivision of any land. It includes such acts as the depositing of refuse, scrap or waste materials on land; conversion of single dwellings into multi-dwelling units; erection of more than one dwelling or shop or both dwelling and shop on one piece of land; display of advertisements as well as the use of any buildings or land within the curtilage of a dwelling for purposes incidental to the enjoyment of the dwelling”.

The above definition is akin to the one given by the British Town and Country Planning Act of 1947 in Cullingworth (1988: 112) where development is seen as “the carrying out of building, engineering, mining or other operation in, on, over or under land, or the making of any material change in the use of any building or other land”. Regarding change in the use of land, it is notable that the change itself has to be material i.e. substantial.

Class B development is defined as the “erection of such buildings or works and the carrying out of such building operations, as the Minister responsible for physical planning may determine from time to time”. However, under the Act, certain activities are exempted and do not qualify as development under this definition. These include such activities as “the maintenance or alteration or addition works to any building that do not exceed 10% of the floor area of the building; works by competent authorities for construction, maintenance or improvement of roads

within land set aside for road reserves; works by Local authorities or statutory bodies meant for inspecting, repairing or renewing public infrastructure such as sewers, mains, pipes and cables including the cutting of streets/roads for the same and installation of such new services” – because the works would be followed by restoration of sites to conditions not injurious to their users and the environment.

Having looked at some of the main features of the peri-urban zone as a geographical entity and what comprises development, then, quite literally, *peri-urban development* would mean “development within the peri-urban zone”. However, much of the current research on the subject asserts that it is indeed difficult to delineate a *peri-urbane zone* when the term *peri-urban* is itself fraught with ambiguity. A lot of this literature suggests there is no single definition of the peri-urban that will fit all circumstances and situations because the peri-urban is a changing conceptual landscape (Aden, 1999). It can only be defined according to contexts and situations. McGregor et al. (2006: 11) hold that it is indeed “unhelpful to expect or to search for uniform processes in different circumstances”. What is undisputed, though, is that there exists a gradient between what can be called *more urban and more rural* within the peri-urban. And more often, this gradient slopes away from the existing city at varying degrees of steepness in all directions.

2.9.3 What is Peri-urban?

“At the end of the day, the peri-urban concept is always used provisionally and is often presented with a working definition....” (Adell, 1999: 36).

A lot of literature on peri-urbanization underscores the difficulty of defining the peri-urban in absolute terms. Nottingham and Liverpool Universities (1998) in Adell (1999: 8) opine that the peri-urban is usually not easy to define because of the “complexities of building a spatial framework around what is essentially an amorphous and mobile site for the interaction of various social, economic and cultural processes and interlinkages between the rural and the urban”. They, nonetheless, observe that “Certainly, the peri-urban is a concept referring to a zone or area where urban and rural development processes meet, mix and inter-react on the edge of the cities.

It is often not a discrete area, but rather a diffuse territory identified by combinations of features and phenomena, generated largely by activities within the urban zone proper... (p.8).

Marshall et al. (2009) concur with the above view and note that defining and theorizing the peri-urban is often fraught with conceptual difficulties. In the same vein, Narain (2010) notes that the peri-urban is a confusing term with many conceptual connotations and several different mental images that may be attached to them. He asserts that it is indeed not possible to come to a consensus on place-based definitions of the term in terms of proximity to or distance of locations from the city. Instead, he argues, the peri-urban should be understood in terms of its characteristics: “a mix of agricultural and non-agricultural land uses flows of goods, services and resources between villages and urban centers and a social profile that is very heterogeneous and in a state of flux” (p. 1).

In an effort to arrive at a consensus on what can be said to constitute the peri-urban, many researchers have advocated for a conceptual shift from the simplicity of the purely geographic peri-urban to the more dynamic notion that embraces a place, process and, concept of flows.

2.9.3.1 The Peri-urban as a Place

The place-based concept, often regarded as the traditional viewpoint of the peri-urban, is perhaps the most widely understood theorization. Two main place-based approaches have been identified (Narain, 2010). The first one views the PUI as a transitional zone surrounding a city while the second one sees it as a zone of intense interactions, flows and linkages between urban and rural areas. When used in this sense, 'peri urban' refers to rural fringe areas surrounding cities that bear the spill-over effect of urban expansion. These areas provide the much needed land and natural resources for urban expansion. Their residents often suffer from inadequate access to basic services and amenities and face exclusion from mainstream economic activity.

Adell (1999) argues that under this approach, the peri-urban is seen in terms of its diversity of land uses that vary in relation with their urban and rural linkages. When viewed from one side, the peri-urban will exhibit a patterned sequence of land uses that tend more and more agricultural away from the core. Conversely, the dominance of agriculture as a land use, its potential for

employment, as well as its sectoral linkages usually give way to urban activity as one approaches the city centre. Another traditional view of the peri-urban is its inhabitants. Fringe areas are seen as populated mainly by poor residents recently arrived from rural areas, engaging in multiple and often informal income-generating activities. As a consequence of these dynamics, Adell argues, the peri-urban will usually be characterized by heterogeneous patterns of growth. Metropolitan growth will engulf existing villages and farmlands. Rural migrants will create a temporary social space or a temporary holding location in the rural-urban migration process. Suburbanization processes will also occur as the middle and upper-class urban citizens move outwards in search of advantages in land rent, land acquisition, speculation and informal enterprise.

Friedberg (2001), Simon et al (2003) and Briggs (1991), in Marshall et al (2009) , have noted that when conceptualized as a heterogeneous mix of urban and rural features the peri-urban is often characterized by high, and often increasing, population density, small land holdings, rich countryside homes, poor slums, diverse sources of income, a lack of regulation, contested land tenure rights, uncoordinated conversion of farmland to housing, pollution, environmental problems, intense resource exploitation, considerable economic dynamism and a severe lack of service provision.

2.9.3.2 The Peri-urban as a Process and Concept

Several criticisms have been laid on the place-based definitions of the peri-urban. Iacuinta and Drescher (2000) in Narain (2010), for instance, argue that proximity to the towns in itself does not define the peri-urban but the very existence of both rural and urban characteristics, rural-urban linkages and the flows of goods and services between them. Bowyer-Bower (2006), also in Narain (2010) notes that a conceptual understanding of what constitutes the peri-urban, the mix of urban and rural characteristics, linkages and flows, whether continuous or fragmented, is a more valid basis for peri-urban analysis than the mere identification of urban peripheries. He argues that rural and urban land uses can be juxtaposed geographically anywhere i.e. in the core of the city, at its periphery or in a village.

Another argument against the place-based view has been that it is much more useful to understand the 'peri-urban' as a process of transition from rural to urban areas, including the

accompanying linkages and flows of labour, natural resources and agricultural products between them (Narain, 2010). This view underpins the fact that linkages and flows between rural and urban areas tend to be mutually supportive and cyclical and maintain the social bonds between migrants and residents in the peri-urban context. This view leads to a theorization of the peri-urban as a concept or an analytic construct for understanding core-periphery relationships or as an interface of rural and urban activities and institutions.

Arising from the criticisms of the place-based concept of the peri-urban, a lot of literature has gone beyond defining the peri-urban context as a place of both urban and rural livelihoods. Emphasis has been given to the peri-urban processes. Peri-urban dynamics are seen to be fundamentally integrated into urban contexts so that the peri-urban is simultaneously sustained and imperiled by the dynamics of the urban economy (Marshall et al., 2009). For this reason, many researchers advocate for a flows-based analysis of the peri-urban. Of greater significance are the flows such as those of produce, finance, labour and services and; the effect of rapid economic, sociological, institutional, and environmental change processes. The basic point of analysis of the peri-urban is, therefore, the co-existence of rural and urban features in environmental, socio-economic and institutional terms.

The foregoing would then suggest that under the flows-based approach, the peri-urban is an area of complementarities because of its enduring interrelationships with the city. For instance, high urban demand for fresh, high value foodstuff encourages peri-urban farmers to engage in very intensive agriculture to serve this demand. The downside is that despite the various opportunities, the complementariness of the peri-urban also gives rise to exclusions and contestation (Marshall et al, 2009). This is because natural resources, agriculture and urban activity in peri-urban areas are both interdependent and competing, suggesting a climate of antagonism say, between low-cost housing for the poor and the preservation of farmland.

How the peri-urban is conceptualized has major implications for peri-urban planning and policy processes. It affects the wellbeing of the residents (especially the poor) and the sustainability of the environment. Arguing it is unhelpful to see the peri-urban from just one viewpoint, Marshall et al (2009: 4) opine that a place-based view of the peri-urban often relegates it to “a site of expulsion” where the poor, often associated with health and environmental problems, are pushed

out of the city to “make way for visions of modernity”. Similarly, they argue, a process conceptualization of the peri-urban would make it a mere transitional zone where rural activities must give way to urbanity and therefore deny it sufficient attention.

Whereas diverse literature has been put forward over the years to explain the phenomenon of peri-urbanization especially in developing countries, four key themes appear to run through much of it (Adell, 1999). The first one is the persistence and continued importance of agriculture and rural linkages such as food supplies from the peri-urbanite’s rural home, cash income remittance to rural villages, consumer goods and information, etc in this “zone of transition”. The second theme concerns the importance of the informal economy in the peri-urban areas as evidenced by the large numbers of petty commodity production systems, multiple job-holdings, self-help housing, unlicensed informal lending, etc. The third theme dwells on conflictive land property ownership issues arising out of pressures from informal settlers, private developers or speculators, large tenants, etc. leading to dual systems (informal and formal) and various property and tenancy arrangements such as rental or customary right systems. The fourth idea embedded in much of peri-urban literature is the demographic processes that underline fringe development. These may include organized land invasions; planned expansions of the fringe to “swallow” existing rural villages; speculative subdivision of farmland near the city; re-settlement of displaced down-town slum inhabitants into public housing projects, etc.

2.9.4 A Synthesis of the Main Characteristics of Peri-urban Areas

Although it may be difficult to define precisely from a spatial perspective, most literature holds that the PUI has some distinct environmental, social and institutional characteristics. It is, however, clear that the intensity of these characteristics varies from one PUI context to another and it is usually difficult to generalise them.

2.9.4.1 Environmental Characteristics

The peri-urban context has been described as a heterogeneous mosaic of natural ecosystems, productive or agro- ecosystems and, urban ecosystems affected by the material and energy flows demanded by both urban and rural systems (Allen, 2003). It represents an interface of natural resources with both agricultural and urban productive sub-systems through mutually constitutive

and cyclical processes where each of these sub-systems conditions and is conditioned by the other two. More often, the use of peri-urban environmental resources and ecological services is driven by local pressures (e.g. competition between residential and agricultural land uses), sub-national and national policies (e.g. industrial dispersal), or by international pressures and global issues such as falling prices of export crops, climate change, etc which reduce agricultural viability of rural areas and increase the migration of impoverished farmers to peri-urban locations in search of alternative livelihoods (Narain, 2010). A number of environmental problems and opportunities arise in relation to environmental change; land use changes and; changes in the use of renewable and non-renewable resources and changes in the generation of waste and the use of the absorptive capacity of the environment.

Much of peri-urban literature indicates that the availability of environmental resources has deteriorated in many peri-urban contexts. Marshall et al (2009) note that peri-urbanization has occasioned destruction of wetlands and other ecologically-sensitive environments; diminished agricultural productivity; diminished open space; increased pressure on natural resources such as water; a lack of hygiene and sanitation infrastructure; industrial effluence; air pollution; inadequate provision of basic services and accumulated solid waste. To the extent that it is the poor who depend most on natural resources for their livelihoods, the peri-urban can be seen as a degenerated environment. Achieving environmental sustainability in the peri-urban has been identified as a challenge because of the complex interrelationship between social-economic and environmental systems (Marshall et al, 2009).

It is perhaps important to highlight that, more often, there is the biased tendency to see the needs of the peri-urban poor as always antagonistic to local environmental quality. As Zerah (2007) in Marshall et al (2009: 7) observes “middle class environmental movements have blamed the poor for environmental destruction, while overlooking the actions of industry, of building developments and of other powerful actors whose actions have environmental impacts”. This failure to integrate ‘brown’ and ‘green’ issues of sustainability, points to the elites’ ability to frame sustainability and development in ways which dis-empower the poor”. This observation is perhaps true. The activities of the low-income groups in the peri-urban are not always associated

with environmental degradation. Peri-urban agriculture, a common activity of the poor, for instance, can have local greening effects.

2.9.4.2 Social Characteristics

Many authors associate the peri-urban with a high degree of social dynamism. Allen (2003) describes it as a locale for heterogeneous and constantly-transiting social groups. Iaquina and Drescher (2000) in Narain (2010) view it as a space where social forms are constantly created, modified and discarded. Narain (2010) underscores this diversity of interests and the resulting social heterogeneity in the zone of transition by noting that small farmers, informal settlers, industrial entrepreneurs and urban middle-class commuters may all co-exist in the PUI even though they harbour different competing interests, practices and perceptions. This foments conflict and resolution.

Another distinctive social attribute of PUIs is their habitation by migrant labour that seeks employment in adjacent towns and cities. In the pursuit of better living conditions, peri-urban areas often become transit points and convenient bases within the ambit of the main city for new inhabitants from rural locations. It has also been observed that decreasing land rents away from the core make the peri-urban the residential choice of many middle-income urban residents who may prefer to incur higher transport costs but enjoy cheaper and often more spacious accommodation than in the main city. Narain (2010) has argued that the resulting mix of the “urban” and “rural” migrants often alters the social composition of the peri-urban and has several implications for both economic activities and demand for local resources.

2.9.4.3 Institutional Characteristics

In the institutional context, the peri-urban represents activities that lie between urban and rural jurisdictions (Narain, 2010). A lot of peri-urban research appears to suggest that peri-urban contexts almost invariably lack effective regulation and municipal service delivery leading to contradictions. Marshall et al (2009), for instance, have observed that the existence of a regulatory void entrenches and perpetuates the many antagonisms. They argue that the peri-urban is often not a public policy priority and in some instances, its residents are not officially recognized, or better still, not entirely legal. For example, while peri-urban food producers often

depend on urban sewerage and solid organic waste to irrigate and fertilize crops, they lack formal recognition as stakeholders and do not participate in formal decision-making in the sector.

It has also been observed that the peri-urban experiences what can be termed institutional “fragmentation” or “pluralism” (Narain, 2010; Marshall et al, 2009) between different central and decentralized, rural and urban governmental authorities and roles. This further jeopardizes the peri-urban because, according to Marshall et al (2009), these authorities rarely collaborate in the peri-urban. Disparate roles by different institutional frameworks cause the peri-urban to experience either more or less of regulatory oversight.

The foregoing notwithstanding, it has been argued that the regulatory void in the peri-urban facilitates economic liberalization and often encourages capitalist entrepreneurs to invest in peri-urban areas. Institutional multiplicity and conflict creates uncertainty which sometimes is good for the capitalist investor. One example of this is the dissonance between various land regulations and the resulting ambiguity which, effectively, renders land tenure and rights in the peri-urban negotiable (Marshall et al, 2009). This explains the phenomenon of mixed developments in most peri-urban contexts.

2.9.5 The Peri-urban in the Globalizing World

Peri-urban contexts, like other socio-economic phenomena, are affected by the broader political and economic processes. Globalization as a process embodies a new form of urbanism which has reshaped and continues to reshape the conventional meanings of urbanism and urbanization, leading to “new geographies of governmentality” (Marshall et al, 2009:7) where relationships between cities and citizenship have changed tremendously. Under the globalized order, cities are increasingly surpassing states with regard to strategic geopolitical and socio-economic significance. Consequently, new hierarchies of centrality have emerged characterized by particular cities becoming closely integrated into the global economy and de-linked from their national economies.

The peri-urban as part of the global world is affected by globalization in intermittent, contradictory, uneven and multidimensional ways. Divergent opinion has been put forth to

theorize the effect of globalization in peri-urban contexts. Some have suggested that the process is an “oppressive force” which has caused “super-induced development” which undermines the core-periphery distinction through “peripheralization of parts of the core”. (Marshall et al, 2009: 8). Others have argued that peri-urban globalization effects (especially global capital) are viewed positively by municipal planning authorities who willingly offer peri-urban areas as sacrifices for privatized and globalised partnership ventures.

As globally-connected cities undergo growth and expansion, simultaneously, they experience poverty. Globalization forces are not able to cure spatial or other inequalities as much as they facilitate the process. Efforts to project a global image of the city in order to attract global capital may spur economic growth in the core but also cause increased polarization in the PUI. It has been observed that globalization, more often, is in conflict with sustainability interests of the poor, crop production, animal husbandry and, the environment. As a result, many poor and marginalized people can be seen to be barely struggling to survive in the peri-urban context because of their exclusion. But it has also been acknowledged that this form of exclusion sometimes does offer new imaginaries and possibilities of better opportunities and livelihoods.

2.9.6 Land Use Change and Contestation in the Peri-urban.

Suggesting that land use change is perhaps the most essential characteristic of the peri-urban, Narain (2010) focuses on the contradictions that arise as cities invade and succeed their peripheral rural lands. With regard to agriculture, he holds that the incursion of urbanity into agricultural lands more often than not destroys the basis of rural livelihoods. And even where farmers are compensated through the process of land acquisition, the landless (often tenants and sharecroppers) will always lose out on their opportunities because they are not recognized by the compensation mechanisms. In general terms, Narain (2010) is of the view that increased urbanization and the corresponding increase in the “urban” importance of the peri-urban interface renders it a performer of a multiplicity of complementary and contradictory socio-economic and ecological functions which make it a contested space.

The understanding of the peri-urban as a contested space is therefore essential for peri-urban policy formulation and planning. It gives an understanding of how and why pressures grow on

land and other natural resources in peri-urban contexts, including identifying the multiple claimants of peri-urban spaces. It gives an appreciation of how land use change occurs over a period of time which is clearly one of the bases of peri-urban intervention policies.

2.9.7 Some Models of Peri-urban Development

Grant and Yankson (2003) argue that although most of the models that attempt to generalise and explain peri-urban expansion especially in the developing world have not been formally evaluated, four models with the allegories the *spreading pancake*, *development node*, *village magnet* and the *ribbon*, have been shown to be applicable in many contexts.

2.9.7.1 The spreading pancake model

The *spreading pancake model* is reminiscent of von Thünen's theoretical model of agricultural land use with the urban fringe spreading outwardly in a more or less concentric pattern (Grant & Yankson, 2003). Save for the fact that it relates to a "rural-urban environment", the model can also be seen to exhibit aspects of the land use ecological processes of invasion-succession as observed by Earnest W. Burgess (1925) in his *concentric zones* theory of urban land use. Here, the dominant core influences the expansion and transformation of its fringe areas. Peri-urban areas bordering the city experience fast population growth, high density and high intensity of urban activity. However, as land diminishes and the carrying capacity of these areas gets exhausted, population and urban activity spill over to the neighbouring outer parts of the peri-urban zone. The theory holds that the closer the city comes, the more pronounced is the transition from rural to urban characteristics. Eventually, these settlements become part of the built-up urban area, which then comprises a "complex mixture of formal houses, shanties, rural huts and other dwellings" (p. 236). It is considered this is the likely model for the average Kenyan town.

2.9.7.2 The development node model

The development node model describes the urban form that emerges when the forces of globalization and economic development attract investments to specific sites in the peri-urban zone, often through the establishment of special economic zones and other policy initiatives. Mabogunje (1990) argues that a preference for import substitution at port cities resulted in "the burgeoning of the population of many port cities as countries engaged in this form of

industrialization immediately after independence”(p. 151). Richards Bay, South Africa, illustrates how this model works. Between 1970 and 1980, it grew from a fishing village of 60 inhabitants to a town of 28,000 people following a government decision to develop it into a port (Wiese, 1981). Grant & Yankson (2003) point out that such public investment decisions in the peri-urban zone become opportunities for profit-savvy capitalists who speculate in land in anticipation of future developments or even build before infrastructure is provided so that eventually, what used to be a survival zone transforms to an investment hub. According to the model, there will be faster growth and a higher population density in and around these economic nodes relative to other areas of the fringe. In Kenya, this effect can be seen in and around Export Processing Zones (EPZs) such as in Athi River. The model is also beginning to take shape with respect to the proposed Lamu Port and the Techno city in Malili, Makueni where land subdivisions, land use change and land values have skyrocketed in anticipation of these proposed developments.

2.9.7.3 The village magnet model

The village magnet theory postulates that peri-urban development is attracted to pre-existing villages that already have basic levels of critical services so that, eventually, these pre-existing villages become the nuclei of fast-growing, densely-populated pockets surrounded by slow growing, sparsely-populated areas. Two examples of this phenomenon can be cited. In the Dakar metropolitan region of Senegal, Grant & Yankson (2003) observe that historical towns and villages acted as magnets for fast residential development. Leaf (2002) in Grant and Yankson (2003) describes the incorporation of Dong Mei village on the outskirts of Guanzhou, China, where the village’s social capital enabled the residents to adapt to rapid socio-economic development. This model can be seen to be reminiscent of the *multiple nuclei* model of urban land use suggested by Roderickie Mackenzie (1933) and later developed further by Chauncy Harris and Edward Ullman (1945).

2.9.7.4 The ribbon model

With its close semblance to what Homer Hoyt(1939) called the *sector model* of urban residential land use, the ribbon theory holds that peri-urban development follows major roads linking the urban area to other cities and surrounding rural areas. Mabogunje (1990) argues that the

construction of highways in “peri-urban and suburban districts has been an important mechanism for bringing more and more land within the ambit of the emerging capitalist mode of production” (p. 145) and suggests that improved roads enable peri-urban communities to commute to work. But Gillham (2002:5) argues that the main problem with this type of peri-urban development is that it is highly “land consumptive and auto dependent”, an observation that Kombe (2005) seems to agree with to argue that the phenomenon is not pro-poor and suggests that improved roads attract middle-class developments and residents, forcing the poor ever further away from highways. Bryceson (2006) vindicates this observation and notes that the long daily trips to work place a burden on the urban poor. Looking at recent developments with respect to Nairobi, Kenya, government efforts to improve major highways and open by-pass roads is giving rise to a discernible pattern of development of middle and upper-class residential neighbourhoods along the major highways- particularly Thika, Mombasa and Kangundo roads.

2.9.8 The Implications of Peri-urban Development

From the above literature definitions of the peri-urban zone, two main issues become apparent. First, the fringe environment is predominantly a place of conflict or competition which exists in between new (urban) and traditional (rural) land uses. This conflict can be seen to have physical and socio-economic dimensions. Secondly, it is implied that the outer limits of the peri-urban zone will be a function of maximum daily commuting distances into CBDs of the urban areas as determined by the means of transportation available for large portions of the population.

Peri-urban development is usually casual, sporadic and haphazard and often results in dysfunctional rural- urban systems. In these areas, one finds chaotic land-use patterns, strip commercial development and inadequate (or lack of) recreational facilities. Some of its land uses and activities (e.g. derelict or grazing land, uneconomic farming lots etc) can at best be described as wasted opportunities and inefficiencies in both use of resources and the practice of activities.

It is particularly notable that both in space and time, the fringe environment is transitory so that sooner or later it will be absorbed within a new urban area. But more often, peri-urban areas are rarely identified and come about as the unplanned by-product of many independent individual actions which result in its varied characteristics. More importantly, even when identified, there

is a tendency to see them as just that, *peri-urban*. They are “neither linked outwards to the activities and resources of the countryside, nor inwards to the demands and needs of the town” (Davidson and Wibberley, 1977:110). Yet to understand its unique problems, the peri-urban zone must be seen in terms of its two “mother” environments which it tries to blend. It is through the understanding of these unique problems that the rural-urban interface that policy and planning can begin to see the environment and its dynamics as a beginning of new urban development or an integral part of an expanding city or urban region.

The urban fringe as an environment experiences a conflict of values due to its potential for rapid change. In socio-economic terms, the transient fringe is neither town nor country. It will normally be considered ideal for living by the middle and upper class citizens whose economic and social lives are firmly linked to the town. It will however, be seen as less desirable for those dependent on local means of living (say agriculture) and without the affluence and mobility to enjoy the dispersed pattern of the city/urban regional living. The urban zone will usually be characterized by social polarization which makes it the main arena for a clash of urban and rural interests. If uncontrolled, the latter will usually be more disadvantaged. Eatwell et al (1989) opine that due to the diminishing of agricultural production as a means of earning living in this “zone of transition”, majority of the indigenous peri-urban residents will own no meaningful means of production except their own labour power. As a result of this, they assert, family structures and patterns have to change. Extended kinship ties will weaken and lineage patterns will dissolve to give rise to a conjugal system where the nuclear family becomes a more independent kinship unit.

2.9.9 Planning in the Peri-urban Context

There is increasing acknowledgement in much of planning and development literature that rural and urban qualities endure both in cities and in the surrounding areas. Arising from this is a further recognition that the rural/urban dichotomy which has informed much of the conventional planning approaches is not adequate in the PUI. Conventional planning systems are inadequate to address the PUI dynamics where agricultural, natural and urban ecosystems constantly interact and inter-react under the influence of both rural and urban flows and demands. Narain (2010)

identifies this as the main challenge of addressing the peri-urban as a policy space and advocates for innovative and context-specific institutional approaches to bridge the rural-urban divide.

Marshall et al (2009) have argued that planning and management in the peri-urban interface “cannot simply be based on the extrapolation of planning approaches and tools applied in rural and urban areas” (p.10). Peri-urban planning, they observe, requires a unique approach that applies the principles of rural, regional and urban planning. At the centre of this approach is the need to create a balance between long-term, cross-sectoral and dynamic strategies and the development of short-term interventions. Planning in the PUI should be inclusive and participatory. It should pay attention to natural ecosystems which transcend rural and urban landscapes with a view to creating new forms of collaboration between rural and urban. To this end, policy and management plans for the peri-urban need to address (and balance against each other) local, environmental, urban and regional planning interests. This will call for an appreciation of power relations, different actors, as well as careful conceptualization of how different ecological processes play out. It also calls for a more dynamic governance model that embraces the concepts of space, time, networks, diversity and multiple institutions.

Marshall et al (2009) suggest that the peri-urban poor experience far worse conditions than other peri-urban residents. They experience higher insecurity, less income, insecure tenure, less access to (but greater dependence on) environmental resources, more dependents, lower education and fewer skills, greater migration and less male labour power. The poor therefore have greater exposure to the shocks and stresses of rapid urbanization. It is, however, important to note that the very fact that urban and rural interests are interlinked in the peri-urban context means that it is not only the poor who suffer from sustainability issues in peri-urban areas. Questions of food production, economic systems, migration, employment and the creation of mega or global cities and, the built environment, are all interwoven into each other.

2.9.10 Land Use planning in the Peri-urban

“The task is not to protect our natural heritage of open space just because it is natural, or a heritage, or open, or because we see ourselves as Galahads defending the good form against the

evils of urban sprawl. This is a mission of evangelists, not planners”... “This is no mean task. And probably the meanest part of the task will be to disabuse ourselves of some deep-seated doctrine that seeks order in simple mappable patterns, when it is really hiding in extremely complex social organization, instead.”

Melvin M. Webber, Associate professor of City Planning at the University of California, Berkeley, in Wingo (1963:54).

The foregoing discussions suggest that peri-urbanization may wreak havoc upon farmlands and the landscape. It may destroy the natural heritage of the “*field and the stream*” (Edward, 1969) and replace “*corn and grass*” with “*bricks and mortar*” (Mather, 1986: 131). But on balance, it is arguable that peri-urban development is an economic phenomenon driven by individuals’ initiatives to transform “their” land into a more useful economic commodity (Edward, 1969). This raises the question, “should urban and peri-urban land, in view of contemporary societal demands in these environments, be treated as a community resource so that radical change is required in the concept of its ownership and use”? Noting that a governmental “chokehold” on land use may be detrimental to capitalist landed innovation, investment and development, the answer to this question lies in how the mediation process between governmental regulation on land use and the forces of the market mechanism works.

In general terms, urban land use planning activities involve the process of identifying and analyzing problems and exploring and assessing options open to an urban community in the pursuit of general goals and specific land development objectives (Chapin and Kaiser, 1979). It involves moving from generalized development policies to generating a long-term (20-25 years) development guide (the land use plan) showing the spatial distribution of interrelating activities in spaces as linked by transportation lines and other communication facilities. This long-range plan is basically a statement of the broad goals and specific objectives of the functional elements of the plan. It also, in both maps and text, details development and redevelopment proposals for the ensuing 20-25 years. Based on the comprehensive land use plan, a land development plan is prepared to give in detail short-range land development targets with respect to projects, programmes and regulations that can be achieved within 5-6 years. The planning process needs to be public and inclusive enough to avoid bottlenecks in plan implementation.

The goal of urban land use planning is not just to produce plans. Rather, the focus is the attainment of a built environment that best approximates the goals of the local community. In this regard, it follows that both the long-term land use and the short-term land development plans serve to form the basis for the formulation of decision guides and action instruments. Decision guides may include policies, plans, programmes etc resulting from planning activities while Action instruments may take the form of regulations, public investments etc which are guided by planning activities and decision guides.

Turning to the peri-urban context, it follows from the preceding discussions that if the economic determinism of the market mechanism alone is left to regulate the relationship between rural and urban land uses, inevitably, agriculture will be displaced by urban activity. This calls for a mediation process through a planning system that, in addition to the economic values of land, introduces the social values of this important commodity. The planning system takes care of the economic self interests of individuals, firms and institutions as well as the political goals of governments to achieve public interest in land use. This is achieved through a land use planning and guidance system that involves the interactive use of land use planning activities (e.g. advance planning and action planning) and a political(decision-making by agents of government and other bodies) system to generate land use decision guides(e.g. policies) and action instruments(e.g. subdivision regulations). These will steer urbanization in town and city regions.

The town, city or metropolitan region has profound significance to the planner. Wingo (1963:9) sees the metropolitan region as “a special social, economic, and spatial entity” whose intra transactions far outweigh the inter-regional ones. Advocating for the systems approach to planning, he adds that “no substantial proportion of these transactions could be isolated without doing violence to the viability of the whole”. There is, therefore, a need for integrated urban planning of whole urban regions rather than merely the built-up or administrative areas of individual cities (McGregor, Simon and Thompson, 2006). Putting forward the same argument, Mather (1986) uses a rather powerful and enlightening statement to illustrate how peri-urban development occurs and underscores the need for advance planning of whole city and urban regions to accommodate the inevitable consequences of peri-urban development. He asserts that “as cities expand, they do not only displace agricultural land at the urban edge, but also cast a

shadow ahead of them. Urban influences, in one form or another, are felt on rural land use long before bricks and mortar displace corn and grass” (p. 131).

Arising from the foregoing, it is immediately discernible that planning controls in the rural-urban interface aim to reduce or completely eliminate this urban shadow. It is for this reason, Mather(1986) argues, that greenbelts came to epitomize peri-urban planning in British cities where concentric planning “stop lines” are used to demarcate the extents to which urban developments are permitted around cities (p.140). In effect, the *stop lines* help to manage the speculative/development value of land. Beyond these planning boundaries, land value is determined by its potential for agriculture with its speculative or development value at minimum or negligible level while between the city’s outer edge and the lines, speculative/development value of land rises as its agricultural value falls.

Lassey (1977) explains that land use planning activities need to proceed hand in hand with political decision-making because:

“The world moves into the future as a result of decisions, not as a result of plans. Plans are significant insofar as they affect decisions. Planning may be defined in such a way that it is part of the total decision making process; but if it is not part of a decision making process, it is a bag of wind, a piece of paper, and worthless diagrams” (p. 94).

Chapin and Kaiser (1979) point out that decision is very important in guiding the process of interaction between the market mechanism and the government in mediating land use. They suggest that two types of decisions are critical namely the “priming” and “secondary” decisions (p. 59). Priming decisions are those which are strategic in importance and set off a chain of reaction of development. Priming decisions lead to priming actions which set the stage for secondary decisions and actions. Thus, it can be argued that peri-urban zoning regulations that restrict land subdivision below agricultural lot sizes are priming decisions that will preserve agricultural land and encourage private investments in agriculture.

It is important to note that police power (e.g. through zoning controls) alone is not enough to regulate land use. Such controls are only checks or curbs on certain land use changes and cannot

ensure good land management by owners. Wingo (1963) underscores this point when he argues that the planner's powers in this regard are only 'negative' because planners can only prevent certain developments in certain places while they cannot order them, however desired. It is therefore imperative that more innovative measures are required to manage land use in the 'zone of transition'. One way of achieving this is through management agreements where land owners are compensated for foregoing certain proposed changes in land use or for managing their land in such a way that certain landscape objectives are met (Mather, 1986). Thus, in addition to the 'stick' of development control powers, there is need to introduce the 'carrot' of compensation.

While the more obvious aim of planning in the peri-urban zone may be to protect the interests of agricultural communities by managing the process of land release to accommodate the ever-increasing demand for space to locate activities, Nadin (1991) emphasizes that it is equally important to ensure that the economic costs arising from decisions and actions to restrict development do not outweigh the benefits that would otherwise have accrued from such developments. Too much restriction, he argues, has the potential to distort the land market leading to economic inefficiencies and opportunity costs. Restrictions on the amount of land available for development will mean that any increase in demand leads principally to increase in price. The principal idea is to focus on supporting and regulating land use and development to reduce inefficient conflicts between different development interests and minimize negative externalities. Wingo (1963: 17), however, notes that this position needs careful attention because the "threat of misallocation of a plenteous resource" (i.e. open land) is indeed real and that there is need to protect "each man from the spillovers of his neighbor's use of his property".

The words of Allen (2003: 135), partly quoted elsewhere in the preceding discussions, are perhaps among the most instructive on how the planning of the peri-urban, including land use, should be approached. Emphasizing the uniqueness of each peri-urban environment, she offers that "planning and management of the peri-urban interface cannot simply be based on the extrapolation of planning approaches and tools applied in rural and urban areas. Instead, it needs to be based on the construction of an approach that responds to the specific environment, social, economic and institutional aspects of the peri-urban interface".

2.9.11 Contemporary Peri-urbanization Trends in Kenya

Many urban areas and their immediate agricultural hinterlands in the country are experiencing unprecedented population increases and associated socio-economic and spatial challenges. The situation is not helped by the fact that Kenya has had neither a clear national policy on urbanization nor a national land use framework since independence. Moreover, institutional problems of low capacity, inadequate resources and gross mismanagement associated with Local Authorities, the public bodies responsible for urban management, and other relevant public agencies serve to exacerbate the urbanization problematic. As a result, the sustainability of urban and peri-urban development has “been inhibited by poor planning, rapid growth of human settlements and activities, unmitigated urban sprawl and inadequate provision of infrastructure” (Kenya, 2009:28).

The unprecedented urban growths in the country with urban population increases and corresponding uncontrolled spatial expansions of urban areas have eaten into the surrounding agricultural land in almost all regions of the country. The problem is compounded by land speculation where brokers are quick to buy land and bank it in anticipation of future developments leading to “unreasonably” high speculative land values not only in and around existing urban areas, but also in and around proposed/anticipated urban nuclei. As a result, urban and peri-urban land values and prices have been on a skyrocket within the last decade or so, triggering massive land subdivision and land use change away from agriculture. Diverse expert opinion now has it that the soaring land values and prices, coupled with the mass development of high-cost apartments within and around many urban areas in the country, may not be sustainable, a situation that is a real threat to the real estate sector and the national economy as a whole.

Ng’etich (2012) observes that “Land prices in Kenya seem to have settled on a permanent vertical course”, a phenomenon which has made “some experts predict the burble will burst with devastating effects”. Others, he adds, opine that “you have not seen anything yet as the economy is on a roll and prices can only go up”. In the same vein, Farhana Hassanali, the property director with a Nairobi real estate development consulting firm, HassConsult, warns of “trouble ahead” because “land prices are moving beyond viability and have created the possibility of a bubble”. She adds that the trend could leave the country’s urban areas with a “dead stock of outer-city

apartments and maisonettes”. This is harmful to the economy because it is an inefficient way of using national capital and agricultural land resources (The Daily Nation, 2011).

In and around the City of Nairobi, Makathimo (2010) underscores the peri-urbanization challenge by observing that along the main highways, it is hardly possible to tell the boundaries between the city and its surrounding urban areas of Ruiru, Thika, Limuru, Kangundo, Mlolongo and Athi River; without the benefit of signboards.

In Kiambu County, the effects of the expansion of Thika road and the proposed Tatu City are being felt. Farms are fast being replaced with concrete jungles as farmers opt to discontinue farming in favour of residential development. Writing about the proposed Tatu City, Ngéthe (2012) points out the potential negative effect of these developments on national food security and laments the dilemma of “feeding a growing population on a shrinking arable land base”.

Another example is the proposed ICT (or Konza techno) City in Malili, Makueni County. Writing in the Daily Nation’s County Edition, Odalo (2011) observes that “recent signals from the Government have rekindled hope and kicked off a rush for land within the centre”. He continues to add that even as the government, through the Permanent Secretary, Ministry of Local Government, tried to bring the problem of land speculation to the attention of concerned local authorities through his letter dated September 24th, 2010 (Odalo, 2011), “the warning came a little late as brokers and land owners took advantage of the Government’s previous silence to subdivide their land into tiny plots”. Ng’etich (2012) agrees with Odalo (2011) and further illustrates the magnitude of land speculation in and around this proposed city. He observes that “Before the government developed an interest in the sub-divided Malili Ranch, an acre fetched Sh 50,000.....When the government approached the ranch’s management in 2007/2008 with a proposal to acquire it, those in the know bought the units from unsuspecting shareholders. Last year, an acre was going for Sh4 million. Now you have to fork out Sh8 million for one” and the trend is likely to continue because every activity, he adds, seems to swing speculators into action.... “It happened when National Youth Service personnel started fencing the site of the proposed techno city”.

In Lamu County at the Coast, Kihara (2012) reports an environment of intense land speculation and how land use and land values have been changing since the government made real the intention to build a new port at Lamu. Quoting Mwenda Thurania, the chairman of Kenya Property Development Association, Mombasa Chapter, he observes:

“An explosion of economic activities is evident in Lamu County following the announcement by the government to start the construction of a port in the area this year. Investors have accelerated the pace of land acquisition before it reaches prohibitive prices... About three years ago, most of the land was acquired by the speculators for as little as Sh 300,000 per acre in areas near the port site such as Magogoni, Mukowe and Hindi. With the construction of the port now a reality, the prices have shot up significantly. The land is now selling at over Sh 1 million per acre and the prices are expected to double shortly after the ground-breaking this week”. This is, of course, at the expense of agriculture.

The Rift valley, considered one of the country’s few bread baskets, is not spared either. Concerns have been voiced that rapid urban development, including demand for land for new universities and colleges, is posing a great challenge to government efforts to fight food shortages in the country. The Daily Nation Newspaper (2012) reports the fears of a farmers’ lobby group, the Kenya Federation of Agricultural Producers, through the utterances of their chairman, William Kimosong, in connection with this development. It observes that “property developers are turning prime land, especially in parts of the North Rift, which is considered the country’s bread basket, into residential properties. This is especially so in areas near major towns, and is made worse by expansion of higher learning institutions. Land for agriculture has been reducing over the years. Unless the government comes up with proper control measures, the country shall continue appealing for relief aid annually”.

It is perhaps interesting to note that even Turkana County, an area that has for long been given a wide berth and always associated with a multitude of maladies such as inaccessibility, drought and hunger, cattle-rustling, death etc is now in the speculators’ telescope. Ng’etich (2012) tells of how speculators have trooped into the area following the discovery of oil, a phenomenon which has caused land prices in the trading centres of Lokichar and Lokori near the Ngamia I well to

more than treble. For a quarter-acre plot in these centers, he reports, the price “shot up from Sh50, 000 to Sh 200,000 within a month” following the announcement of the oil find.

The foregoing notwithstanding, it is hereby underlined that the incursion of urban activity into the surrounding agricultural fringe lands is inevitable. Even with the best of planning practices and controls, urban areas will have to expand to the rural areas to accommodate rising populations and increasing urban activity. In the fullness of time, urban peripheries will always get incorporated into their cores so that what used to be considered rural transits to ‘peri-urban’ and ultimately, ‘urban’. This suggests that the practice of agriculture as a livelihood support activity in the urban fringes is not spared this transition. It is therefore imperative to discuss herein, albeit briefly, the practice of UPA in Kenya.

2.10 Urban and Peri-Urban Agriculture (UPA)

Gundel (2006:5) defines UPA as “agricultural (including livestock) production, processing, and distribution activities within and around cities and towns, whose main motivation is personal consumption and/or income generation, and which compete for scarce urban resources of land, water, energy, and labour that are in demand for other urban activities. UPA includes small- and large-scale activities in horticulture, livestock keeping, fodder and milk production, aquaculture, and forestry - where several activities may be carried out within one enterprise”.

From the complexity and dynamism of the peri-urban, it is instructive that, as opposed to urban agriculture which can be viewed more simplistically in terms of the boundaries of the city, peri-urban agriculture represents the complex and changing processes occurring in the peri-urban interface where the divide between rural and urban is never clear. Gregory (2005) describes the concept of the PUI as representing the meeting of rural and urban activities. It is therefore more of a process than a place (Brook and Davila 2000) and it attempts to categorize linkages and interactions between rural and urban areas.

Depending on local contexts, urbanization may occasion land loss to housing; economic transformation away from agriculture; agricultural intensification and commercialization; environmental degradation; and agricultural decline without replacement by alternative

economic activities. It is noteworthy that urban and peri-urban areas continuously experience pressures for release of land from agricultural use to accommodate urban activity. UPA, on the whole, usually varies. The true farmers may engage in it as a commercial venture or, due to unfavourable environmental factors, uneconomic land sizes and undercapitalization, may practice it for subsistence. Others may be classified as hobby and speculator farmers.

Generally, UPA is characterized by a decline of large farm units. Where some large holdings remain, they are severed by various developments and reduced to scattered holdings. UPA is affected by land speculation and increasing land values and prices. Land speculators have little incentive to farm land well because sooner or later, such land will be released for other uses when the right offers come at the right moment. As a result, farmlands may be derelict-neglected, unkempt, overgrown, and with unmanaged hedges-leading to deterioration in the visual quality of the environment.

Despite the foregoing, peri-urban agriculture has a number of advantages. Proximity to urban areas provides convenient markets for farm produce particularly eggs, milk, vegetables and fruits which can be retailed door-to-door. Peri-urban farmers can benefit substantially if they restructure farming to benefit from these opportunities. Secondly, nearby towns can be beneficial to fringe agriculture because they can be ready sources of seasonal casual farm labour e.g. tilling. Thirdly, proximity to centers means that peri-urban farmers may benefit from access to food processing factories, cooling facilities, better roads to markets, electricity etc which are more accessible in the urban and peri-urban environment. Needless to say are the opportunities for diversification of farm activities including the incorporation of aspects of recreation (e.g. farm restaurants, fishing enterprises, golf courses etc) and education (e.g. demonstration farms) in the practice of farming.

2.10.1 Urban and Peri-Urban Agriculture and the Poor

The significance and recognition of urban and peri-urban agriculture (UPA) and more so with respect to the livelihoods of the vulnerable has been growing over the last decade or so (Gundel, 2006). There has been a deliberate effort to improve urban livelihoods whose focus goes beyond the creation of urban jobs primarily because of the realization that urban and rural livelihoods are

often intertwined. Brook and Davila (2000), for instance, note that in many cities, the majority of urban dwellers depend indirectly on agriculture for their livelihoods, through employment in food transport, retailing, and processing. This, simply, means that policies for improving urban livelihoods must recognize the intricate web of urban–rural linkages through which both the urban and the rural interests are mutually reinforcing.

Urban agriculture makes a contribution to the food security of the poor, particularly in urban slums. Even in large, congested cities, the urban poor often have a home garden or raise small animals as part of a coping strategy. This urban production, often done by women, the sick and unemployed, can complement household incomes and improve the quality of urban diet. Urban planners and local governments should consider how to incorporate environmentally sound urban agriculture in their plans and by-laws.

Chambers (1995) asserts that the urban poor often diversify their livelihoods and income sources through diverse strategies and activities including engaging in urban and peri-urban agriculture. A lot of research work on the effects of urbanization on the available natural resource base has demonstrated that majority of the people living in the peri-urban interfaces (PUI) still have natural resource-based livelihoods (Gundel, 2006) most of which are related to various forms of agriculture (Gregory, 2005). Brook and Davila (2000), however, observe that the importance of agriculture as a means of earning a living often diminishes with increasing proximity to the city. This can perhaps be explained by the fact that as pressure on farmland increases, alternative employment opportunities emerge.

2.10.2 The Main Actors Involved in Urban and Peri-urban Agriculture

Urban and peri-urban agriculture (UPA) is not a new phenomenon. It has been an important source of food for urban dwellers since ancient times (Nelson, 2007). Contemporary research shows that increasing numbers of the urban poor (especially women) engage in UPA as a poverty alleviation strategy (Brook and Davila, 2000). As many as 800 million people in the world are employed in urban and peri-urban farming and related enterprises, and this figure is likely to rise in the future (Gundel, 2006).

UPA is diverse. Its diversity is reflected by the mix of actors and capital inputs available. UPA ranges from large-scale industrial production units such as intensive egg or poultry production plants or large horticultural glasshouses to a few chickens and traditional vegetables grown and kept on public areas (Gundel, 2006). Fuller (2003) has observed that there exists different social groups who are involved in UPA for different reasons and who experience different challenges and opportunities. Among middle-income households, urban livestock keeping is a response to growing urban demand and markets. But for the poor, urban livestock keeping is a survival strategy to meet day-to-day food and income needs. The same can be said to be true for crop-based UPA.

Even within the different urban social groupings engaged in urban agriculture, there are further differences in terms of gender, age and educational status. Gundel (2006) has noted that in East Africa and particularly in Nairobi, it is the middle aged female household heads with low levels of formal education that form most urban livestock keepers. Although livestock keeping is not the only form of urban and peri-urban agriculture among the urban vulnerable households, in some cases its contribution to their incomes has been found to be significant.

Urban farmers often have few tenure rights over the land (and water) they use in farming, and are often pushed out by land development. The legal situation in most cities in terms of urban farming and livestock keeping ranges from illegal to tolerated. Although the general attitude by town/city planners is changing and local councils are recognizing the existence and potential of urban agriculture (Gundel, 2006), the supporting legislation and its implementation is lagging behind. According to Kironde (1992) in Gundel (2006), colonial-era by-laws and regulations which are excessive, unenforceable or even inappropriate, are a major obstacle to UPA.

2.10.3 The Potentials and Risks of UPA

UPA can have both positive and negative impacts. It has the potential for positive impact on the health of urban populations through improved food security, nutrition and psychosocial well-being. Negative impacts come into play through the over-use of pesticides and human exposure to contaminants and pathogens associated with UPA. Zoonotic diseases (disease of animals that can be transmitted to humans and vice versa) can also be a risk of urban livestock-keeping. However, the health benefits and risks of UPA are not equitably distributed within urban

populations. Gundel (2006) has observed that the marginal groups are the ones who use the most contaminated lands for crop production while at the same time using sewage water as a fertilizer source. Women, who form the majority of the vulnerable urban and peri-urban farmers, may be more exposed to the risk of pesticide poisoning.

UPA is good for communal health, a concept closely linked to the notion of sustainable communities and cities. It has the potential to contribute positively to communal health through collaborative agricultural activities, productive utilization of urban waste products, the provision of a common green space and through networks that link producers and consumers through markets.

With respect to the quality of the physical environment, UPA has the potential to provide green spaces and plant trees leading to the enhancement of the “livability” of cities and efficient use of urban resources. Another importance of UPA is its potential to protect the environment through the recycling of organic wastes through composting. This reduces the resource throughput and environmental pollution (Gundel, 2006). Urban and peri-urban forestry could also make a contribution to the quality of the built environment. But UPA can cause the opposite as well. It can contaminate air, soils and water leading to environmental pollution.

The health and resilience of the biotic community in the urban environment can also be strengthened or weakened by UPA, depending on the levels of diversity cultivated and methods of crop management adopted and the kinds of markets that are targeted. UPA also has the capacity to positively affect the health of the natural ecosystems beyond the urban and peri-urban areas by stabilizing or breaking down pollutants, reducing food demands and thus reducing the “ecological footprint” of the city. However, to achieve this, a more favourable environment has to be created to overcome some of the constraints experienced at present by local producers.

Urban and peri-urban farming is usually associated with a high level of trespass and nuisance from the adjoining urban activities. There is high likelihood of theft of crops (especially fruits), disturbance to animals and dangers from refuse and litter which further imply increased costs of fencing of farm boundaries and removing garbage which, when added to the direct financial costs, tends to reduce the profitability of UPA and may discourage the practice. Arising from

lack of security coupled with the likelihood of urban development, urban and fringe farmers may be reluctant to invest in fertilizers and other necessary inputs leading to low productivity and eventual neglect and abandoning of agriculture. Davidson and Wibberley (1977) argue that these are some of the reasons why urban and peri-urban farmers tend to shift to intensive cultivation and livestock keeping. Moreover, restrictions imposed upon farming practices by local authorities, neighbourhood associations and pressure groups may discourage “serious” UPA.

2.10.4 Urban and Peri-urban Agriculture in Kenya

Most of the major urban centers in Kenya accommodate some level of agriculture in their cores and outskirts. Cultivation of food and cash crops; keeping of animals; forestry; horticulture, including the production of flowers and garden plants, are common phenomena in almost all urban areas. Practised by people of all-socio-economic classes but with a higher incidence among the low-income groups, urban and peri-urban agriculture is found along roadsides and railway lines, in power way leaves, along riparian reserves, within backyards of residential plots, in open spaces and parks, in roundabouts and, in some cases, in established farms.

Although the role of UPA as an important and growing sector of the urban space economy in Kenya has been on the rise especially from the 1990s due to rising food prices and widespread unemployment, the sector still remains under-exploited. It has enormous potential which can be tapped at the individual household, community, and national levels. The sector, as discussed earlier, can be developed to harness its full potential to contribute towards urban food security and nutrition; promote local economic development; promote positive social impacts through poverty alleviation and social integration of disadvantaged groups e.g. jobless youth and; promote positive impact on urban environmental management. Nonetheless, UPA in Kenya has for a long time been characterized by a dire lack of conspicuous official recognition which effectively denies it access to land and other resources and ultimately limits its role in the urban space economy.

Much of the official disregard for UPA in Kenya today is rooted in the country’s colonial history. Within the context of the colonial space economy, several urban centers in Kenya were gazetted as townships under the Townships Ordinance of 1903. Basically serving as centers of

British colonial authority, the townships were also perceived as “*islands of health and security*” (Egziabher et al, 1994: 52) where strict sanitary control could be maintained. Arising from this perception, the boundaries of these urban areas were carefully defined in a manner to seclude them from existing subsistence farming and settlements in the native reserves. The garden-city model was used in the salubrious residential neighbourhoods of the upper and middle-class residents especially in Nairobi and Nakuru. Often, these areas would be protected from competing urban uses by buffer zones of public open space. The permanent presence of the indigenous African population in the new urban setting, including their traditional livelihoods, was proscribed and carefully policed (Egziabher et al, 1994).

Despite the above restrictions, Mitullah (1991) reports that some level of UPA had developed in the smaller ‘upcountry towns’ as early as 1899, thanks to the immigrant Indian railway workers. The Indians would cultivate at the backyards of their residences mainly for their consumption but would also sell any surplus to the Europeans. Their African employees would later start their own cultivation and become hawkers. But it was not until the 1950s when the African population started to reside permanently in the urban areas in Kenya leading to the development and expansion of informal and farming activities. There has since been an increasing “urbanization of rural areas” and also “ruralisation of urban areas” with the boundaries between the city and the countryside becoming more and more blurred. Two groups of urban and peri-urban farmers have emerged as a consequence.

The first group encompasses the traditional farmers who have been engulfed by urban development. Egziabher et al (1994) observe that due to land use changes in the urban fringe as well as local political pressures, the last four decades or so have seen relatively large areas of peri-urban land annexed from contiguous rural Local Authorities and incorporated within urban municipalities. Many urban areas today include territory characterized by a mixture of predominantly low-income residential and agricultural land uses. The indigenous households in these areas may continue to grow crops and keep animals for personal consumption as well as for sale. But it has been observed that this group is increasingly finding it more profitable to build cheap rental housing on their former farmlands. And although they are usually small in number, these farmers are often quite prosperous and politically-influential persons.

The other group of urban farmers comprises the urban migrants and their families. Although they may come from all income groups, it is the poor households who usually dominate this group. They are driven by the fact that their regular earnings are inadequate to feed themselves so that they resort to cultivating land in the backyards of their dwellings and any public vacant land such as road verges, as an economic imperative to augment the regular earnings. Their motivation is the satisfaction of basic needs as opposed to profit-making and capital accumulation. This group is estimated to form about 30% of Kenya's urban population (Egziabher et al, 1994).

Kenya today lacks deliberate policy and legal frameworks devoted to UPA despite it being an important component of the urban space economy. Western traditional concepts continue to dominate the field of urban planning leading to dense residential areas with little space left for food production activities. Most regulations regarding crop cultivation still remain forbidding even in derelict urban land. It is worth noting the Agriculture Act (Cap 318) and the Physical Planning Act (Cap 286) are silent on urban agriculture despite its predominance especially in the urban fringe. The Public Health Act (Cap 242) and a majority of LA by-laws expressly prohibit UPA. It is only those areas recently annexed from rural hinterlands following urban boundary expansions that are recognised as agricultural land. And the planning fraternity has not done much to move away from this paradigm.

Many traditional urban planners are inclined to think that planning for agriculture is not their core business. They see food systems as only indirectly linked to the built environment so that in their view, urban agriculture and food security issues affect planning only as land use, zoning and location decisions i.e. spatial planning. To them agriculture is a rural issue, an economically less-efficient way of using urban land, which would be best tackled by rural development policies. Moreover, environmental and public health considerations are more often skewed in the direction of the potential risks such as contamination, destruction of vegetation and loss of visual amenity, depletion of water bodies, etc. associated with UPA.

The foregoing suggests there is need for a paradigm shift to look at UPA afresh. As Gitonga (2010) observes, the practice is "*increasingly taking root in most developing economies*" where it is becoming more and more fashionable and no longer a preserve of the urban poor. Needless

to say is the convenience and efficiency with which it can be practiced. Urban and peri-urban agricultural ventures have potential to generate income from small areas of land using little capital. For instance, small-scale farming in dairy cows, poultry and vegetables is viable (and indeed common) in peri-urban areas with manure and organic domestic wastes being used in the place of fertilizers to grow vegetables. Moreover, market proximity and regular market intelligence (for milk, eggs and vegetables) are additional pros to the practice.

Kenya needs deliberate policy, legal and institutional frameworks to improve and integrate UPA into mainstream city planning. A system of mutually-reinforcing policies and strategies applicable at the levels of the individual households, communities, LAs and the central government would be most ideal. A good starting point would be to amend LA by-laws, enabling legislations, as well as various Acts of Parliament such as the Physical Planning Act (Cap 286), Local Government Act (Cap 265) and Public Health Act (Cap 242) to facilitate and enhance UPA and reduce urban resource poverty. One notable good step in this direction has been the Sessional Paper No.3 of 2009 on National Land Policy. It recognizes the fact that “urban agriculture has not been properly regulated and facilitated” and advocates for “promotion of multi-functional urban land use” and “an appropriate legal framework to facilitate and regulate urban agriculture and forestry” (Kenya, 2009:28).

2.11 Peri-urban Recreation

Recreational land use is common in many urban fringes. This is partly explained by the fact that the peri-urban zone is optimally located close to the centre of urban demand leading to minimal transport costs. Mather (1986) suggests that recreational land uses are compatible with agriculture and agricultural policies used to contain urban sprawl. Moreover, he argues that recreational land use does offer a way of deriving social benefits from land which may be unused or underused. Davidson and Wibberley (1977) appear to agree with this observation by arguing that like with agriculture, the fringe environment should be considered an important locale for recreation. They point out that recreational land use in the fringe can form a buffer zone between town and country and reduce the shadow that urban development casts on the farms. They add that imaginative recreation (say golf courses and parks) can transform the ugly and unkempt landscapes associated with derelict agricultural land. However, as a rider, they observe that

casual recreation may be problematic to agriculture due to its potential to cause farm trespass and theft of crops.

2.12 The Concept of Livelihoods

The term *livelihood* is multifarious and dynamic. Chambers (1995:174) defines a *livelihood* as “the means of gaining a living, including livelihood capabilities, tangible assets and intangible assets”. Thus, central to a livelihood is a living as a function of people, tangible assets and intangible assets. The tangible assets commanded by a household will include *stores* such as food stocks, stores of value such as gold, cash savings in banks and credit schemes etc; and *resources* such as land, water, trees, livestock, farm equipment, tools and domestic utensils. The intangible assets are *claims* which can be made for material, moral or other practical support, and *access*, meaning the opportunity in practice to use a resource, store or service, or to obtain information, material, technology, employment, food or income (Chambers, 1995).

Frankenberger and McCaston (1998:31) define *livelihoods* as “a range of on-farm and off-farm activities which together provide a variety of procurement strategies for food and cash so that each household can have several possible sources of entitlement.” These entitlements are based on the household’s endowments and its position in the legal, political and social fabric of society.

Chambers (1995) argues that while employment can provide a livelihood, most livelihoods, especially for the poor, comprise of “multiple activities and sources of food, income and security” as individuals and households strive to diversify and complicate their livelihood strategies, increase their income, reduce vulnerability and improve the quality of their lives. Chambers (1995) allegorically uses hedgehogs and foxes to draw a parallel between the livelihoods of the poor and those of the mainstream formal employees. He observes that “the fox has many ideas but the hedgehog has one big idea” (p.192). Thus, full-time employees in the industrial world and industrial sectors, according to Chambers (1995), are hedgehogs with one big idea i.e. a single source of support. On the other hand, most poor people especially in the global south are “foxes with a portfolio of activities, with different members of the family seeking and finding different sources of food, fuel, animal fodder, cash and support in different ways in different places at different times of the year” (p.192). The poor, thus, improvise and

sustain their living through their livelihood capabilities, tangible assets in the form of stores and resources, intangible assets in the form of claims and access. And the ingenuity and opportunism of poor people, and the diversity and complexity of their strategies, can be attested by the fact that even within the same village, different social groups of the landless can have completely different strategies for sources of food, income, support and survival (Chambers, 1995). In the overall though, these livelihoods remain improvised adaptive performances whose versatility is meant to cope with adverse conditions, sudden shocks and unpredictable change.

With regard to rural settings, it is important to note that many aspects of rural livelihoods such as fuel wood and herbal medicine are not captured in either income or consumption-based survey data because they are neither commoditized nor noticeable enough. Similarly, a significant element of the safety net for many rural people, in times of stress, consists of ‘famine foods’ which can be gathered from bush and fallow lands (Chambers, 1995).

2.12.1 Sustainable Livelihoods (SL)

Sustainable livelihood refers to “a living which is adequate for the satisfaction of basic needs and secure against anticipated shocks and stresses” (Chambers, 1995:175). *Sustainable* here would then refer to the longer-term while *livelihood* would refer to the many activities which make up a living. As Frankenberger and McCaston (1998) observe, not all households are equal in their ability to cope with stress and repeated shocks.

The absence of livelihood sustainability implies livelihood vulnerability. Chambers (1995) points out that, in this sense, *vulnerability* does not actually mean *lack* or *want*. Rather, it refers to the degree of *exposure* and *defencelessness*. Vulnerability therefore has two sides: the external side of exposure to shocks, stress and risk; and the internal side of defencelessness i.e. a lack of means to cope without undergoing significant damage and loss. Upholding Chamber’s (1995) observation, Frankenberger and McCaston (1998), with an inclination towards food security, argue that the risk of livelihood failure determines the level of vulnerability of a household to income, food, health and nutritional insecurity. The foregoing would therefore suggest that livelihoods are sustainable (and therefore not vulnerable) when individuals and households have

secure ownership of, or access to, resources and income earning activities, including reserves and assets, to offset risks, ease shocks and meet contingencies.

McLeod (2001) summarizes the livelihood assets that are generally recognized under the SL theory as:

- Natural (Environmental) Capital: Natural resources (land, water, wildlife, biodiversity, environmental resources).
- Physical Capital: Basic infrastructure (water, sanitation, energy, transport, communications), housing and the means and equipment of production.
- Human Capital: Health, knowledge, skills, information, ability to labour.
- Social Capital: Social resources (relationships of trust, membership of groups, networks, access to wider institutions).
- Financial Capital: financial resources available (regular remittances or pensions, savings, supplies of credit).

2.12.1.1 The Sustainable Livelihood Framework (SLF)

Basically, the sustainable livelihood framework (SLF) views people as operating in a context of vulnerability where access to various assets is only meaningful through the prevailing social, institutional and organizational environment. This environment is also seen to influence the livelihood strategies of people. Majale (2001:5) defines livelihood strategies as “the ways in which people combine and use assets in pursuit of beneficial livelihood outcomes that meet their own livelihood objectives”. Chambers (1995) notes that these strategies are influenced by the availability and accessibility of assets, services and opportunities. And these can be positively enhanced or adversely undermined by ecological factors, social structures or institutional processes (Majale, 2001). The SLF is therefore a tool for analysis meant to manage the interrelationships, complexities and the dynamism of local realities, livelihood strategies and livelihood outcomes.

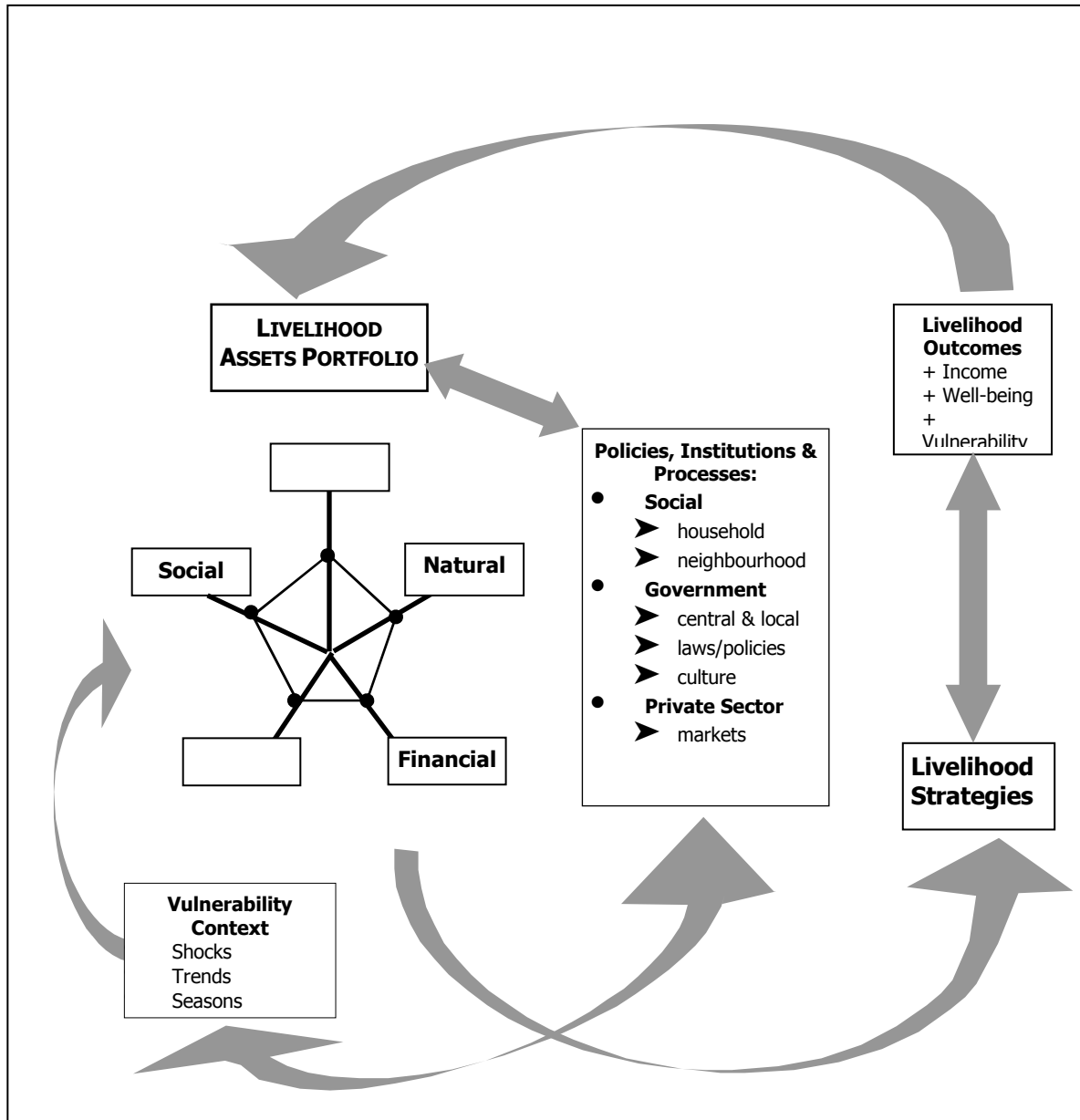


Figure 2.12.1.1: A Sustainable Livelihoods Framework *Source: Majale, M. (2001)*

Many researchers acknowledge that the SLF is indeed a useful conceptual base and an effective tool for analyzing the impact of regulations on livelihoods (Majale, 2001). It can be used to analyze the coping and adaptive strategies pursued by individuals and communities as a response to external shocks and stresses such as drought, civil strife and failed policies and anti-poor regulatory frameworks. But its utility as a theoretical approach has also been questioned.

McLeod (2001), for instance, is skeptical about the value the theory can add ‘at the front line’ i.e. its direct impact on the vulnerable. She opines that “the definitional process and the determination of definitional legitimacy requires further recognition and exploration within SL theory if the conceptual framework on which it is based is to become useful” to the vulnerable groups.

2.12.1.2 Policies, Institutions and Processes in Sustainable Livelihoods

Livelihoods are shaped by policies, institutions and processes (PIPs) at all levels. These determine not only access to the various types of capital (natural, physical, human, social and financial), but also the substitutability of these capitals (Majale, 2001). They determine options for livelihood strategies, as well as access to decision-making bodies and external sources of influence. Organizations, in both the public and private sectors, decide and implement policies, legislation and regulations, and undertake activities, that affect livelihoods. Processes determine the way in which institutions, and individuals, operate and interact.

PIPs operate at all levels and in all spheres, both public and private, and they influence significantly the conditions that promote the achievement of multiple livelihood strategies and sustainable livelihoods. They determine the degree to which an enabling or facilitating environment for livelihoods is in place, compared to an inhibiting or restrictive one.

2.12.2 Urbanization and Household Livelihoods

Based on their observations in Accra, Ghana, Maxwell et al. (1998) and later Gough and Yankson (2006), in McGregor, Simon and Thompson (2006), hold that urbanization has a direct effect on household livelihood assets, strategies, and outcomes. They add that the nature and extent to which this process affects household livelihoods, however, depends on the rate of urbanization in the neighbourhood within which a household is located. Thus, it can be argued that the intensity of the impacts of urban development on livelihoods is not uniform across space and peoples. Such an impact, therefore, can be seen to vary from location to location depending on the dominant economic activity engaged in, and the ability of households to adjust to any changes in the urban environment. And the intensity of this impact will determine how different places and people will respond to such changes (Adom, 2011).

Acknowledging that urbanization is undeniably the driving force for modernization, economic growth and development, Adom (2011) argues that in the developing world, the phenomenon presents many challenges. She argues that one area that requires special focus is the livelihoods of urban inhabitants because while providing new livelihood sources, expanding cities and towns at the same time destroy other livelihood sources such as agriculture. This, therefore, affects the wellbeing of the concerned people/households. Naturally, households will develop the most appropriate livelihood strategies based on the livelihood assets available to them.

2.12.2.1 Urbanization and Gendered Livelihoods

Aberra and King (2006) argue that men and women use and experience the urban environment in different ways. The UN-Habitat (2004) appears to agree with this argument and adds that cities are spaces where women are the most marginalized. This can perhaps be explained by the fact that women typically spend more time in the home than men as they perform their reproductive and household roles. Another gender perspective that the UN-Habitat (2004) emphasizes is the structure of the family unit which has drastically changed as more women assume the role of household heads in the urban environment. This affects their access to productive resources in general, and inhibits them from taking advantage of new opportunities that accompany urbanization. Likewise, Aberra and King (2006) opine, gender stereotyped roles underpin livelihood choices in the urban environment.

With regard to the socio-economic position of males and females, the foregoing would suggest that their differential access to assets and engagement in livelihood strategies would almost invariably mean that any change, such as increasing urbanization, that affects their livelihood base will result in differential impacts on the genders (Aberra and King, 2006).

2.12.2.2 Urbanization and Differentiated Livelihoods

Adom (2011) uses her observations in Accra, Ghana, to point out that urbanization and its resultant effects on land use change, household livelihoods and gender are indeed important issues that require attention in any urban setting and more so in the developing world. Maxwell et al. (2000) appear to agree with this observation and underscore the particular importance of the peri-urban interface in this regard. They argue that more often, several peri-urban households

have poor and unsustainable livelihoods, especially for women. But while urbanization has the potential to disrupt the already vulnerable livelihoods of peri-urbanites, it also does provide new opportunities for improved wellbeing. Based on this observation, Adom (2011) asserts that what matters, essentially, is how differential urbanization affects the livelihoods of different people in different places.

The foregoing puts a strong case for a neighbourhood-differentiated analysis of the impacts of urbanization on peri-urban livelihoods. It suggests the need to consider how urbanization and related space and locational factors impinge on the livelihood strategies and outcomes at the neighbourhood level. And to emphasize this point, Adom (2011) asserts that the conventional hypothesis that presupposes a direct chain of causation from livelihood assets to strategies and outcomes and which also presupposes that rapid urbanization is bad for livelihoods should not always be the basis for this analysis.

2.12.3 Peri-urban Livelihoods

Like with the PUI itself, many researchers hold that peri-urban livelihoods are indeed complex. The complexity arises from the fact that these livelihoods are constructed across both rural and urban domains which gives them two essential characteristics. First, both rural and urban assets and opportunities play a role in peri-urban livelihoods. Second, these livelihoods are sustained largely through links with cities and adjacent urban centres which, in turn, are sustained by transportation means and networks.

One of the unique features of the peri-urban interface is the role of both rural and urban resources in household livelihoods (Narain, 2010). Peri-urban livelihoods are characterized by a dependency on both primary production (mainly agricultural) activities as well as casual or regular employment in the neighbouring cities. They are also characterized by inequalities where the elite usually have a wide access to and pre-empt assets and opportunities in both urban and rural resources for accumulation. On the other hand, a majority of the average and poor peri-urban households usually struggle and devise strategies to survive. One common survival strategy is to spread risk through livelihood diversification and engagement in multiple activities.

Baker (2006) has observed that peri-urban “village” (indigenous and agricultural) households often diversify their livelihood strategies by having a second foothold in urban activities. While land and agriculture usually form their main livelihood support, non-farm and off-farm economic activities are also integral components of a household livelihood portfolio. Similarly, peri-urban “urban” households (in-migrants often in non-farm employment) endeavour to have a second foothold in agricultural land which then becomes an essential component of their livelihood diversification strategies. Thus, risk aversion, income diversification and multiple activities enable peri-urban households to accumulate financial capital for purposes of acquiring/buying more land, more assets or improving the value of existing assets. Narain (2010) has however noted that in the long run, peri-urban households in a particular geographical locale tend to increasingly diversify away from agriculture as more and more non-farm activities, sustained or created by urbanization processes, emerge. In this process, poor households will diversify to survive, middle-class households will diversify to consolidate and rich households will diversify to accumulate.

Another important feature of peri-urban livelihoods is the tendency by the migrant households to preserve rural attitudes in the cities and maintain mental links with their rural homes. Quite often, rural asset bases are sources of income for the peri-urban migrant households leading to what has been referred to as “*ruralisation of cities*” (Narain, 2010: 5). In the same vein, it has been noted that sending remittances is an essential aspect of peri-urban livelihood strategies for the migrants. It is both a moral obligation as well as a means to entitlement over assets in rural homes.

Peri-urban livelihoods exhibit a high degree of inter and intra-household variance even within the same location of the PUI. As Narain (2010:5) notes, “The livelihood story of one household can be very different from that of its neighbours in terms of the diversity of the livelihoods portfolio. There can even be much greater variation at the household level itself. A household can derive its income from a mix of agriculture, petty trade, urban employment, real estate, transport and travel services.... in a sense, and paradoxically, the household is defined by dissonance.”

With regard to vulnerability and resilience therefore, the foregoing suggests that peri-urban households with a good asset base in the cities and a more diverse livelihoods portfolio will be less vulnerable to losses of income that may accrue as a result of shocks and stresses affecting agriculture. Their urban assets cushion them against shocks and stresses affecting agriculture. Similarly, households who depend almost entirely on urban assets may suffer shocks and stresses that affect urban activities. Any peri-urban household livelihoods vulnerability analysis must, therefore, recognize the relative role of both rural and urban activities and livelihoods opportunities in the livelihood mix of different households.

2.13 Institutional Factors Influencing Urban and Peri-urban Development in Kenya

Douglass North (1990) provides one of the most edifying definitions of what institutions are. He offers that they are “the rules of the game in a societythe humanly-devised constraints that shape human interaction” (p.3). This definition is instructive because it gives three main features of institutions. First, they are “humanly-devised” and therefore are within human control, explaining why they differ from other potential fundamental factors of development (e.g. physiographic) which are outside human control. Secondly, the fact that they are “the rules of the game” means that institutions set “constraints” on human behaviour. Finally, it is implied that institutions set constraints on human behaviour through a system of incentives and disincentives.

The foregoing would therefore suggest that institutions are simply the formal rules and informal constraints, together with their enforcement mechanisms. Formal rules comprise the laws, constitutions, regulations, policies, etc which are specific and explicit. Informal norms or constraints of behaviour are not provided in formal terms, but are important ways of doing things and are as important as the formal rules. Enforcement mechanisms are the different people in and organs of society (professionals, politicians, governmental agencies, family units etc) tasked with ensuring compliance with the rules and norms.

North (2003) asserts that institutions as incentive systems structure human interaction and therefore have the ability to “make predictable our dealings with each other every day in all kinds of forms and shapes” (p.1). He adds that institutions structure human interactions by reducing uncertainties in the world and providing mechanisms to solve problems effectively.

And by providing incentives and disincentives for people to behave in certain ways, institutions end up structuring economic, political and social activity (Palmer, 2004) which further structure livelihoods. Acemoglu and Robinson (2008) have further observed that specific institutional characteristics are responsible for economic outcomes under specific situations, explaining why same institutions often achieve different developmental results, say, in different political jurisdictions.

With regard to peri-urbanization, a number of formal institutions including laws, policies, and governmental agencies, which structure human activity and urban development, are discussed in the ensuing sections.

2.13.1 Legal Frameworks

The Constitution of Kenya is the supreme law of the Republic from which all laws and statutes derive their powers and legality (Kenya, 2010). Regarding land use, land use planning and development, article 66 (1) of the constitution states that “The state may regulate the use of any land, or any interest in or right over any land, in the interest of defence, public safety, public order, public morality, public health, or land use planning”.

A number of laws are applicable in the regulation of the socio-economic and spatial dynamics of peri-urban environments in Kenya. This work looks at some of the commonly used ones and especially those relating to physical planning and land use. These include the Physical Planning Act, Local Government Act, Local Authority By-laws, Land Control Act, Public Health Act, Agriculture Act, Registered Land Act and, the Building Code.

2.13.1.1 The Physical Planning Act, Cap 286

The Physical Planning Act (PPA) CAP 286 is the main legislation that guides spatial planning in Kenya today. It provides the legal basis for the preparation and enforcement of physical development plans in the country. Under the Act, the office of the Director of Physical Planning is the chief government advisor on all matters physical planning in the country. The Act stipulates that the responsibility of approving physical development plans rests with the Minister of Lands and Settlement for development plans while LAs are tasked with approval of sub-

division/amalgamation plans, building plans, changes/extensions of use of land and, extensions of terms of leases.

Section 29 of the Act gives LAs development control powers with respect to use and development of land and buildings; subdivision of land; approval of development applications; enforcement of approved physical development plans; formulation of zoning by-laws and; preservation of public spaces and other public utilities. Sections 31, 32, 33 and 34 of the PPA further specify the procedures and requirements for: making development applications by proponents; considerations and consultations by LAs; granting approvals for /refusing proposals and; deferring proposals respectively.

2.13.1.2 The Local Government Act, Cap 265 and LA By-laws

All Local Authorities in Kenya derive their mandate from the Local Government Act, CAP 265. The Act establishes three categories of Local Authorities in the country: municipalities, county councils and, town councils. Section 5(1) of the Act gives the minister in charge of the Ministry of Local Government powers to create or abolish Local Authorities. It also gives the minister powers to assign names to Local Authorities, alter their boundaries, names, etc. The Act gives Local Authorities a wide range of powers and duties. But at the same time, it is worth noting that out of these many powers and duties, very few of them are mandatory.

Section 166 of the Act gives municipal councils, county councils and town councils powers to control the manner in which land is used. It states that “every municipal council, county council or town council may subject to any other written law relating thereto, prohibit and control the development and use of land and buildings in the interest of the proper and orderly development of its area” (p.108). Section 162(g) dwells specifically on land subdivisions and states clearly that subdivision of land and buildings requires approval certificates from respective Local Authorities.

In addition to the above express powers, the Act gives Local Authorities powers to make by-laws covering all matters, including those relating to land use, which a Local Authority may consider

necessary for purposes of maintaining health, safety, and well-being of the residents within its geographical jurisdiction.

2.13.1.3 The Land Control Act, Cap 302

The Land Control Act (LCA) provides a regulatory framework for transactions relating to agricultural land i.e. controlled transactions. Controlled transactions under the Act include subdivisions, amalgamations and transfers of land parcels of sizes not less than 20 acres. It creates the Land Control Boards (LCBs) for the purpose of granting consents for controlled transactions. Under this Act, all controlled transactions that are not backed by consents of the respective LCBs are deemed null and void.

Section 9 of the LCA provides that in deciding if to grant or refuse consent in respect of an application for a controlled transaction, a LCB shall consider the “*effect it is likely to have on the economic development of the land concerned or on the maintenance of standards of good husbandry within the area*”. The Act is also express on some of the grounds for refusal of consent. It states that consent for a controlled transaction may be denied if the terms of the transaction, including price, are considered unfair; subdivisions are deemed unproductive and uneconomical; prospective land owners are unlikely to farm it well, develop it adequately or are considered to hold sufficient agricultural land. It is perhaps very important to underline the fact that despite the foregoing, continued subdivision of agricultural land to lots way below 20 acres, coupled with blatant disregard for other requirements under the Act, is one of the major causes of loss of agricultural land in this country.

2.13.1.4 The Public Health Act, Cap 242

Although the Public Health Act (PHA) does not provide for planning standards per se, it still remains one of the most powerful pieces of legislation relating to urban and peri-urban environments. Emphasizing quality of shelters, and hence the safety and health of the dwellers, the PHA provides for standards and quality of structures and associated facilities that must be put in place to ensure safety and health of people. It also gives LAs powers to make by-laws relating to public health issues. Section 126(a) of the Act states:

“Every municipal council, and every urban area and council, may, and shall if so required by the Minister of Health, make by-laws for controlling the space about building; the lighting and ventilation of buildings, and the dimensions of rooms suitable for human habitation”.

2.13.1.5 The Agriculture Act, cap 318

The agriculture Act aims at maintaining a stable agricultural environment. In addition to providing for conservation of soil and soil fertility, the Act also advocates for stimulation of good land management and husbandry. Moreover, section 184(1) of the Act empowers the Minister of Agriculture to take necessary steps to prevent actions that may be detrimental to the productivity of agricultural land. Such actions may include prevention of erection of buildings for urban use.

2.13.1.6 The Building Code

Although the Kenya Building Code is mainly devoted to the quality of housing and building materials, its contribution to the attainment of planning standards cannot be overlooked. The code, with respect to residential development, specifies site and space requirements for buildings as well as minimum areas of plots and buildings. Thus, through these standards, the Building Code is inevitably one of the instruments deployed for planning, design, regulation and control of the residential environment. It sets what are commonly referred to as Grade I and Grade II by-laws (dealing with standards for sites and spaces for buildings, and minimum areas of plots and buildings, respectively) which LAs may adopt and enforce through council resolutions.

2.13.1.7 The Registered Land Act, Cap 300

Enacted on the 16th of September 1963, the Registered Land Act (RLA) is another statutory instrument that regulates the manner in which both rural and urban land is held and used. It preambles thus: *“An Act of parliament to make further and better provision for the registration of title to land and for regulations of dealings in land so registered, and for purposes connected therewith”*. The RLA regulates dealings in land by specifying special land use and development conditions i.e. the restrictive covenants (for leases), and easements and encumbrances (for freehold titles).

2.13.2 Governmental Agencies

There exists a multiplicity of multi-level public planning institutions in Kenya. They include those at the national level (e.g. Ministry of Lands, Ministry of Planning, Director of Physical Planning, etc), Regional level (e.g. regional development authorities), District level (e.g. District Development Committees, government District departments, etc) and the Local Authority levels (i.e. city, municipal, town and, county councils). However, for purposes of the theme and scope of this study, it is hereby considered sufficient to summarize the roles of those institutions that are directly involved in the process of urban development. These include the: Local Authorities, Divisional Land Control Boards, District Physical planning Departments, Public Health Departments and, Municipality Physical Planning Liaison Committees.

2.13.2.1 Local Authorities (LAs)

LAs are a creature of the LGA. They have two wings: the political wing (consisting of committees) whose head is the Mayor or the Chairman and; the administrative wing (consisting of departments) headed by the Town Clerk or the Clerk to the Council (for cities and municipalities and, other LAs, respectively). Even though statutory bodies, LAs are semi-autonomous entities of the central government, responsible for planning, development and provision of municipal services at their local areas of jurisdiction. Under section 166 of the LGA, the LAs have powers to “*prohibit and control the development and use of land and buildings in the interest of the proper and orderly development*” (p.108). In addition, LAs use by-laws under this Act for purposes of maintaining health, safety and well-being of the residents/visitors of their areas. It is important to note that most LAs have limited planning capacity.

Regarding processing of land use and land development applications made under the LGA and PPA frameworks discussed in 2.13.1.1 above, most LAs liaise with physical planning departments and any other relevant government departments (in view of the application at hand) before such applications are approved/refused/deferred by relevant Committees.

2.13.2.2 Divisional Land Control Boards

Divisional Land Control Boards are responsible for implementing the stipulations of the LCA. Under the LCA, the boards control the following landed dealings:

- Sale, lease, transfer ,mortgage, exchange, partition, or other disposal or dealing with any agricultural land or shares in a private company or co-operative society that owns agricultural land,
- Subdivision of agricultural land into two or more parcels,

2.13.2.3 District Physical Planning Departments

District Physical Planning Departments represent the Director, Physical Planning Department, at District levels. They perform the following, among other functions, on behalf of the Director of Physical Planning:

- Spearhead formulation of local physical development policies, guidelines and strategies within Districts;
- Spearhead preparation of District Local Physical Development Plans;
- Advise District Land Officers and LAs within their areas of jurisdiction on the best use of land including change of user, extension of user, subdivisions, extension of leases, amalgamation, etc;
- Ensure LAs within Districts properly execute physical development control and preservation orders.

2.13.2.4 District Public Health Departments

District Public Health Departments are mainly concerned with inspections of shelters to ensure their quality meets minimum standards to safeguard the safety and health of the dwellers, based on the PHA. The departments also supervise/advise LAs with regard to enforcement of their own by-laws relating to public health issues.

2.13.2.5 Municipality Physical Planning Liaison Committees

These are established under section 7 of the PPA (1996) which states that *“There shall be established the Physical Planning Liaison Committees in accordance with the provisions of the*

Act” (p.69). Each committee is composed of the District Commissioner as the chairman; the District Physical planning Officer as the secretary; the District Land Officer and, other District level public officials as provided under sections 8(4) and 9 of the PPA.

The work of the Committee is arbitration or conflict resolution in matters pertaining to physical planning within a municipality. Among other functions, the committee resolves complaints/hears appeals made by the public or any other bodies against the Director of Physical Planning (or his/her representatives) or the municipal council in matters pertaining to physical planning; resolves conflicting claims made in respect of applications for development permission.

2.14 Summary

Whereas cities and other urban settlements remain the face of the future and urbanization, inevitably, remains the engine of economic growth, the process of urbanization in the third world (especially in Africa) has been associated with problems and trauma. Africa’s urbanization is unique in the sense that while it is the least urbanized continent, it is the most rapidly-urbanizing often with detrimental effects because urban spatial growth often precedes planning and urban economic growth. Much of Africa’s urbanization is attributable to rural-urban migration and is motivated by both social and economic factors at both the individual and structural levels.

One of the obvious consequences of urbanization and the expansion of cities and other urban areas has been demand and consumption of more hitherto rural land meaning substitution of rural land use with new urban-based activity. A number of theories, both descriptive (i.e concentric zones, sector and multiple nuclei concepts) and explanatory (e.g. the works of Wingo and Alonso), originating from the seminal work of Von Thunen on agricultural land uses around cities, have been considered as classical postulations of how urban growth and the spatial patterning of land uses and activities occur. More recent models of spatial urban growth have also attempted to explain the occurrence of the peri-urban zone around the urban area proper. Four such models have been allegorically referred to as the *spreading pancake* (spontaneous outward growth in all directions), *village magnet* (around existing villages with basic infrastructure and services), *development node* (around new specific sites identified by policy as

new development nodes e.g. EPZs and Ports) and *ribbon development* (corridor development along major arterials of the city).

Much of the literature about peri-urban contexts suggests the definition of the term ‘peri-urban’ is dynamic and fraught with difficulties. The peri-urban can refer to a place, a process as well as a concept of flows and linkages between rural and urban interests. To this extent, the term peri-urban is usually used provisionally and often presented with a working definition. However, one of the common, and perhaps most important, dynamics of the peri-urban is land use change and the inherent contestation. The peri-urban is a performer of a multiplicity of complimentary and contradictory socio-economic and ecological functions which make it a contested space. An understanding of this characteristic is an imperative for urban planning and more so in respect of livelihoods.

While peri-urban spaces are usually characterized by a mix of urban and rural interests, there is general consensus that peri-urban household livelihood portfolios often tend to diversify away from traditional agricultural activities and strategies to new means of earning living as land holdings diminish. They are also characterized by a high degree of inter-household and intra-household diversification even in the same locality of the peri-urban interface (PUI). As one writer so aptly puts it, the livelihood story of one household may be completely different from that of their neighbours. And the same applies between members of the same household. Notwithstanding the diminishing significance of agriculture as a livelihood support activity in the PUI, there is also the divergent view that it still persists as an integral component of a household livelihoods portfolio. It is also instructive to underline that as rural contexts transit through peri-urban and ultimately to urban, so does agriculture. Thus, traditional agriculture gives way to Urban and Peri-urban Agriculture (UPA) under the pressures exerted by the forces of modernization.

Regarding planning in the peri-urban, there is growing recognition that the rural-urban dichotomy that has for a long time characterized much of the conventional planning approaches is not adequate to address the PUI dynamics. The complexities presented by the interaction and inter-reaction of agricultural, natural and urban ecosystems make it a complex policy space that

requires innovative and pragmatic planning approaches and not a mere extrapolation of urban and rural planning techniques. Land use planning which ought to be a fundamental component of peri-urban planning must also be deployed to reduce inefficient conflicts between different development interests and minimize negative externalities.

Turning to the local context, urbanization in Kenya, like with rest of Africa, began in earnest after the attainment of political independence in 1963 and has since been an evolving phenomenon which has been bedeviled by policy, legal, institutional and management/administrative deficiencies. Many urban areas in Kenya are symptomatic of the evils of urbanization. Current trends indicate that urban areas will keep on expanding as the national population increases and increasingly more people seek opportunities for urban-based activities and livelihoods.

Peri-urbanization is an inevitable phenomenon and contemporary trends point in this direction. Examples of these trends include Nairobi city metropolitan expansion, proposed new cities (e.g. Konza, Tatu), effects of new projects in otherwise dormant regions (e.g. Lamu Port), discovery of minerals in otherwise remote areas (e.g. oil in Turkana) and the organic growths in all existing urban areas: all of which have roused land speculation and urban development in otherwise rural/agricultural environments. Small urban centers in Kenya are likely to bear the brunt of much of the challenges of peri-urbanization. These towns are often managed by LAs with low planning capacities, are given little attention by the central government and, their weak economic bases often do not support sufficient non-agricultural pursuits and livelihoods to compensate for the losses occasioned on their traditional livelihood support activities (usually agriculture).

Regarding UPA in Kenya, all towns and cities accommodate some level of agriculture in their cores and peripheries. While UPA has potential to support urban livelihoods and contribute to the national economy, this form of agriculture lacks conspicuous official recognition which limits its access to land and ultimately restricts its role in the urban space economy. There is need for a policy shift to integrate food production activities in mainstream city planning. The new Land Policy (2009) appears to be a good step in this direction.

2.15 The Conceptual Framework

Literature review suggests that urban population growth creates pressure for urban spatial growth which, ultimately, spills into the hitherto rural urban peripheries to create demand for more land to locate new urban-based activities and infrastructural services. As a result, there is an increase in the speculative value of land, with a corresponding decrease in its agricultural value, triggering a general propensity among the rural communities to sub-divide and change use of their land from agriculture to urban uses. Because of this change, populations and activities in the peri-urban will be mixed, hence lifestyles and livelihoods will be highly diverse and dynamic, but often characterized by a general trend of diversification away from agriculture which, potentially, presents both threats and opportunities, especially among the hitherto rural households.

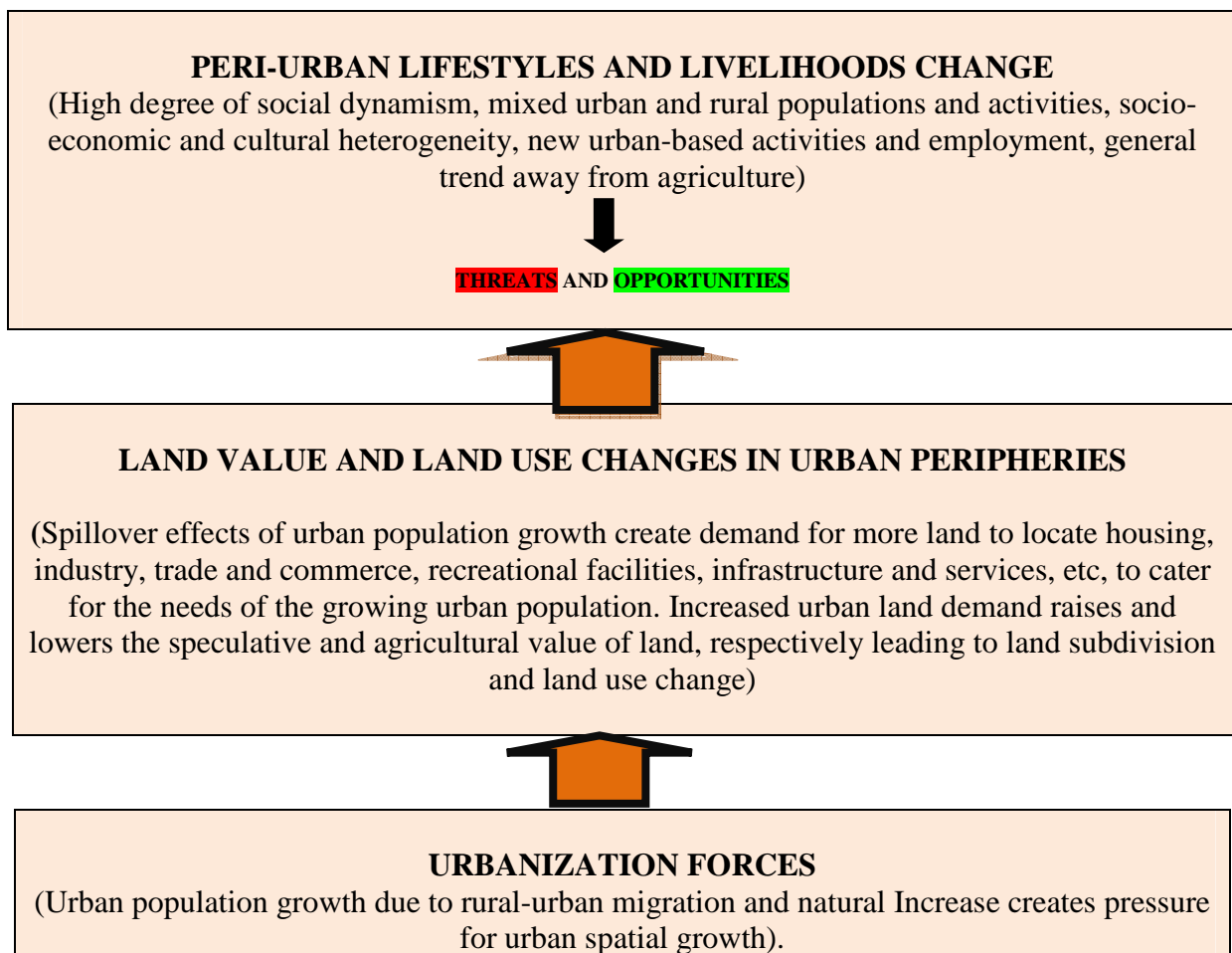


Figure 2.15: Urbanization and Peri-urban Socio-economic Change *Source: Author*

3.0 CHAPTER THREE: THE STUDY AREA

3.1 Introduction

This chapter is a synoptic description of the study area. It gives the situational analysis of the area in the context of the Machakos municipality regional setting and Machakos town itself. Factors addressed include location and size; historical background; physiographic and environmental characteristics; demographics; economic factors and land use; human settlements and; infrastructure and service facilities. A brief description of some of the factors that are specific to Lower Kiandani and are relevant to the theme of the study is also presented.

3.2 The General Setting of Machakos Town within Machakos Municipality

3.2.1 Location and Size

Machakos town is located in Eastern Province, Sixty-four kilometres South East of the City of Nairobi on Latitude $01^{\circ} 32'$ South and Longitude $37^{\circ} 14'$ East. It lies at the edge of Kapiti Plains, sixteen kilometres off the main Nairobi-Mombasa trunk road. The town is the headquarters of Machakos County and lies in the North-west section of the County. In terms of local government geographical and administrative jurisdiction, Machakos town is within Machakos Municipality and under the Municipal Council of Machakos. The municipality covers an area of 519 Km^2 (ECK, 2007) and is within the recently established Nairobi City Metropolitan Region.

3.2.2 Historical Background

Machakos town dates back to 1889 when the Imperial British East Africa Company (IBEAC), the predecessor of the British Colonial Authority in Kenya established their first upcountry capital and centre of operation in Machakos town. The town's name was a corruption of *Masaku* – the name of the local leader who welcomed the British to Machakos. However, the town's status and significance to the British colonial administration and economy was soon to diminish when the IBEAC Company shifted her base from Mombasa to Nairobi, a development that caused the Mombasa-Nairobi- Kisumu Railway, the then lifeline of the British colonial economy in the country, to by-pass the town.

In terms of the elevation of its urban administrative status, council records show that the colonial authorities declared Machakos a *township* in 1906 and elevated it to an *urban council* in 1954. It served in this status until 1973 when it became a *town council*. It was not until 1980 when it was elevated to a *municipality*. And its national importance was further enhanced when Kenya's 1984–1988 development plan identified Machakos as one of the medium towns targeted for national regional development strategies in order to offset the pressure of rural-urban migration to, and the primacy of, the capital city, Nairobi.

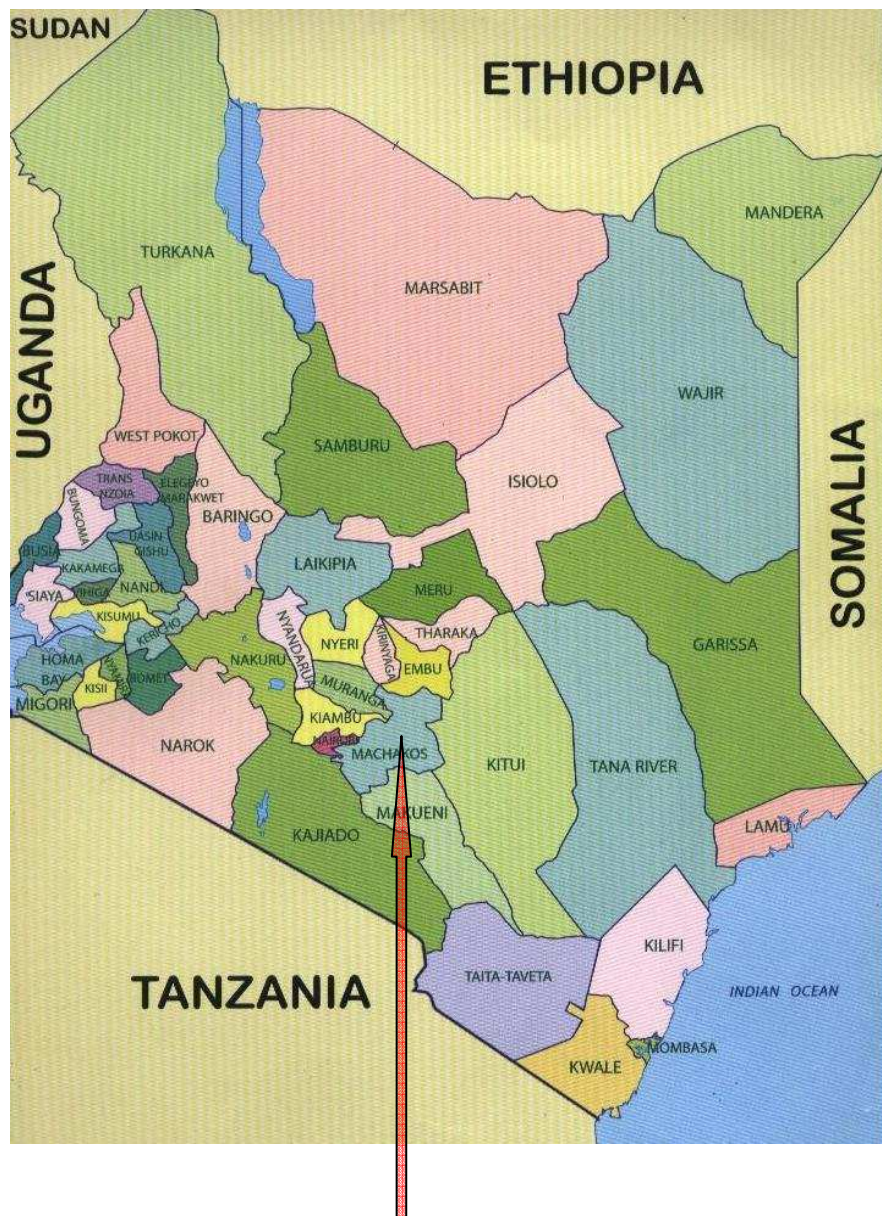


Figure 3.2.1(a): Machakos County in Kenya *Source: Survey of Kenya, 2013*

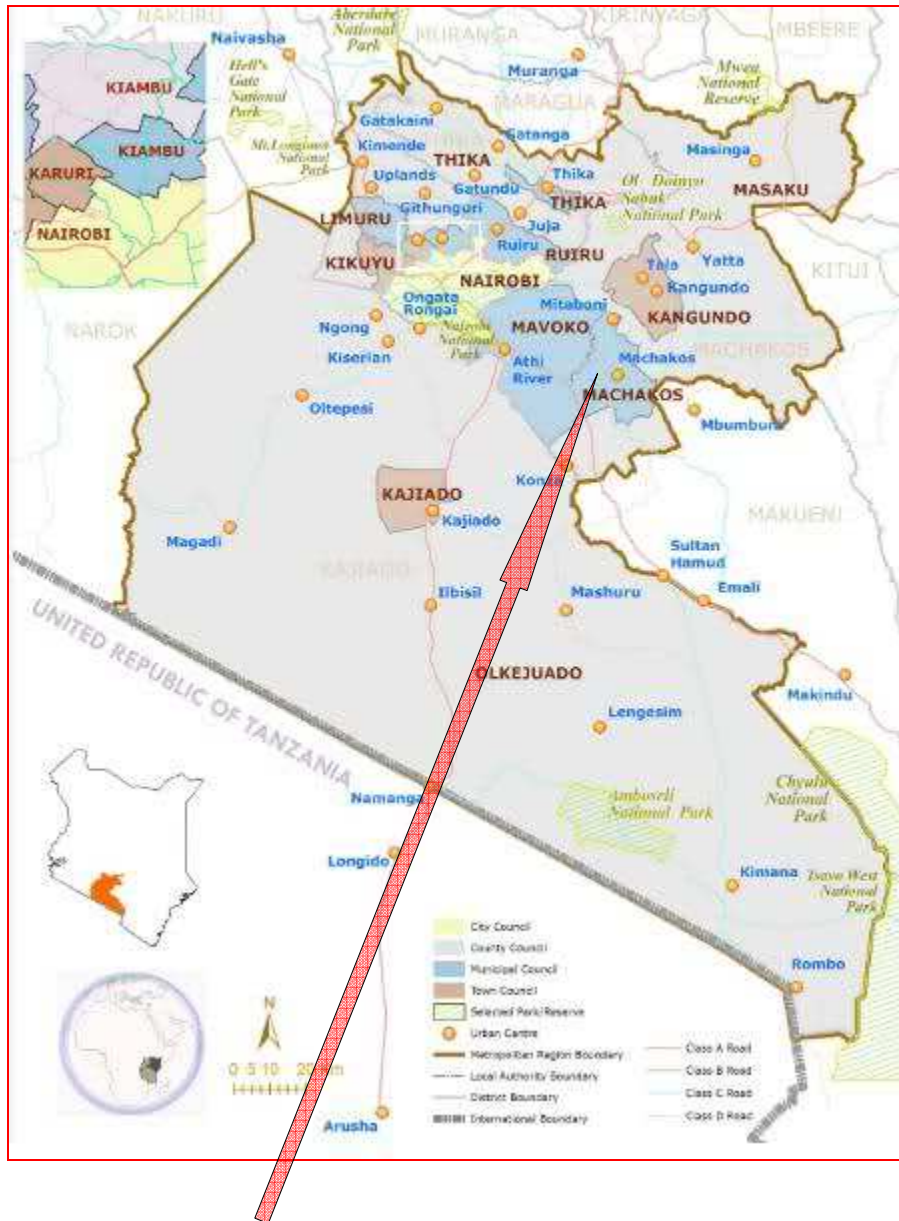


Figure 3.2.1(b): Machakos Municipality within Nairobi City Metropolitan Region
 Source: Ministry of Nairobi Metropolitan Development, 2012

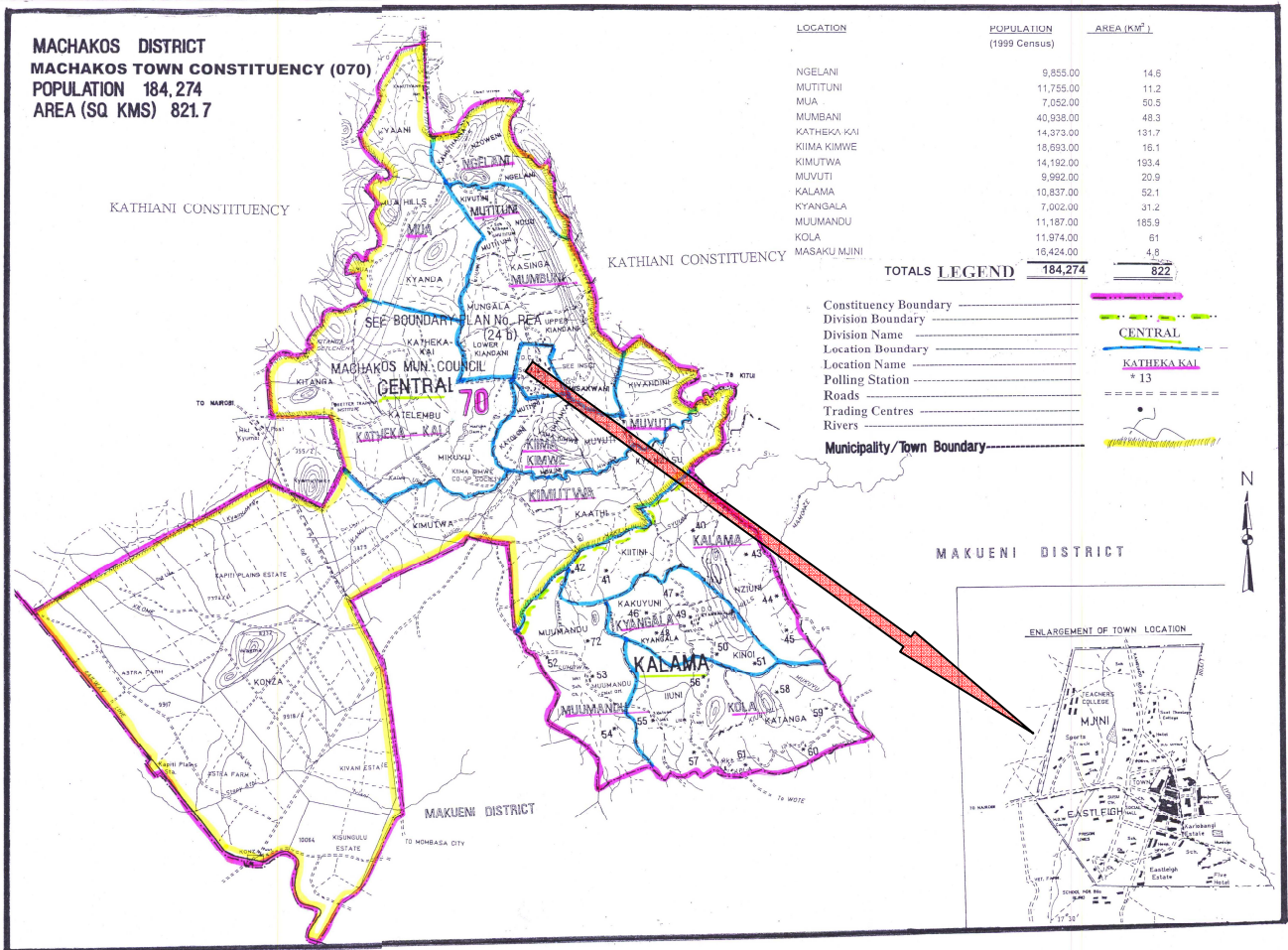


Figure 3.2.1(c): Machakos Town within Machakos Municipality Source: IEBC, 2013

3.2.3 Physiographic and Physical Factors

The quality of the natural environment is a significant determinant of the directions of socio-economic and spatial development at any given moment in time (Toman, 2003) because economic development involves extraction, processing and consumption of natural resources to satisfy human needs and wants. Mierzejewska (2004) observes that based on how communities perceive nature and how their life as a people depends on the properties of the natural environment, a culture-determined situational context, among other factors, will influence what would reasonably be viewed as a viable development strategy. Cleveland (2003) agrees with this observation and advocates for an “ecological-economic view of the economy” (p.6) in which natural capital is central to economic development.

The foregoing would therefore mean that the quality of the natural environment and its services impacts, both positively and negatively, on human socio-economic activity and development. It is therefore imperative to understand the environmental setting of the study area. Consequently, this section discusses Machakos municipality, Machakos town and Lower Kiandani with respect to the natural factors of topography, drainage, geology, soils, climate and vegetation.

3.2.3.1 Topography and Drainage

Lying on a plain and at an altitude of about 1600m above sea level, Machakos town is surrounded by a horse-shoe shaped ridge of hills namely *Iveti, Mua, Kyamwilu, Kyemutheke and Kiima-Kimwe*. *Mua* hills, located to the north of the town, rise to about 2080 metres above sea level. To the north-east, the town is bounded by *Iveti* hills which rise to about 2100 metres above sea level. And between these two ridges are rolling agricultural plains cut by shallow river vallies. These two hill ridges have very fertile soils. Generally the soils in the area are sandy clay mixed with red soils.

Kiima-Kimwe, a large partially-granitized metamorphic rock outcrop, is another notable topographical feature of the town. Standing on its own on the south-eastern side of the town, this truncated cone-shaped hill rises to about 1920 metres above sea level and about 300 metres above the low-lying plain. Its steep slopes are cut by gullies resulting from years of pressure from poor subsistence farming methods and soil erosion. Its rocky surface makes it less suitable for farming compared to the other two hills. The hilltop, called *Iluvya*, has a traditional shrine for the local indigenous community. To the south-east, the hill's base is bounded by *Ikiwe* river valley.

Machakos municipality is drained by several seasonal rivers and streams. The main ones, namely *Manza, Iiyini, Miwongoni* and *Mitheu*, originate from the surrounding hills. These and other numerous smaller streams run almost parallel from the hills down through the plains and join at the south-western side of *Kiima- Kimwe*, about 14 kilometres to the south of the town, to flow eastwards as *Ikiwe River* which, further eastwards, joins the River Athi which carries the waters to the Indian Ocean. Lower Kiandani area is drained by *Manza* and *Miwongoni* rivers.

3.2.3.2 Geology and Soils

Howard Humphreys and Professional Consultants (2009: 8) describe the rock system in the town and the municipality as a whole as consisting largely of ‘intensely folded Basement Rocks of gneiss and schist which include limestone, amphibolites and quartzites as well as the predominating biotite granitoid gneisses’ which have been “metamorphosed and granitized to a considerable degree”. The western part of the municipality has the Kapiti Phonolite rocks consisting of lava of Miocene age and much of this area is covered by black cotton soils. The eastern part of the municipality has sandy and brown earths, murrum and lateritic soils which overlay the folded basement rocks. The study area is covered by black cotton soils.

3.2.3.3 Climate

Machakos has a pleasant climate similar to that of Nairobi but relatively warmer. From the hill summits to the plains, it varies from highland equatorial to semi-arid. The municipality, like the rest of the Ukambani region, has two distinct rainy seasons. The long rains (locally referred to as *mbua ya Uua*) fall between March and May while the short rains (locally referred to as *mbua ya nthwa*) occur between October and December. The rains are often unreliable and erratic. The annual average rainfall varies from 500-1300mm with high altitude areas receiving more than low-lying areas. Temperatures vary with altitude as well with the mean monthly temperatures ranging from 12.2⁰C between the coldest months of July and August to 25.1⁰C between the hottest months of October and March.

3.2.3.4 Vegetation

Vegetation in the municipality varies with altitude. The plains to the west of the town that receive less rainfall are characterized by open grassland with scattered acacia trees in the ranches while the settled and agriculturally active areas have exotic trees such as gravellea and blue gum. The high altitude areas of Iveti and Mua ridges have forests of many exotic trees such as blue gum. These have been developed over the years as an attempt to conserve soil in these sloppy areas. Vegetation in the study area has been affected by urban development (mainly housing) but traces of original vegetation (mainly acacia species and grass) can be seen interspersed by exotic species (mainly blue gum and gravellea).

3.2.4 Demographic Factors

Demographic and related data play a significant role in planning and development across nearly all sectors of society. Their importance lies in the simple fact that “*development is about improving the lives of people*” which in essence implies that “*policy and fiscal decisions should rely on data that answer who these people are, where and how they live, and how their lives are changing*”(Akol et al, 2009:2). Therefore, policymakers and development planners in all sectors of society must rely on accurate demographic and other social public sector data as an evidence base for public planning and development policies. Such data, therefore, will function as a public good that benefits citizens, governments, and the private sector (The Population Council, 2010). The foregoing means that it is important to understand the demographic factors of Machakos municipality in general and Lower Kiandani in particular.

According to the KNBS (2010), machakos municipality had a population of 199,211 persons by 2009 as shown in table 3.2.4 below.

Table 3.2.4(a): Population of Machakos Municipality Source: KNBS (2010)

Male	Female	Total	Households	Area(km ²)	Density
97,449	101,762	199,211	48,979	925.3	215

The KNBS (2010) also indicates that the population of Machakos town has been growing over the last four decades as shown in table 3.2.4 (b) below

Table 3.2.4(b): Population of Machakos Town, 1969 - 2009 Source: The KNBS (2010)

1969	1999	2009
6,312	28,891	41,917

3.2.5 Economic Factors and Land Use

3.2.5.1 Agriculture

About 97% of the total land area covered by the municipality is largely rural and under agricultural use (MCM, 2001) which makes agriculture, subsistence and commercial, the widespread economic activity in the municipality. Constituting about 70% of the municipality’s

farming activities, subsistence farming is the most prevalent (MCM, 2001). Main subsistence crops include maize, beans, vegetables, cowpeas, pigeon peas and green grams. Cash crops include coffee, French beans and fruits.

3.2.5.1.1 Cash Crops

Coffee is the main cash crop. It is grown under both large and small-scale holdings by cooperative societies and individual farmers respectively

3.2.5.1.2 Horticultural Production

Horticultural crops are found in the high potential areas of Iveti, Mua and Mutituni. Main crops are bananas, citrus fruits, mangoes, pawpaw, cabbages, flowers, French beans, tomatoes, avocados etc. While horticultural production is mainly for the local market, neighbouring areas, including the city of Nairobi, also provide external market for these products. It is noteworthy that there is high potential for horticultural production in the municipality if alternative sources of water for irrigation are explored. In addition, improved marketing and the elimination of the usually overly exploitative middlemen would enhance the profitability of horticulture in the municipality and boost production. As a boost to this sub-sector, it is notable that the government, through the Horticultural Crops Development Authority (HCDA), has established a cooling facility in Machakos town. Many farmers are embracing green house technology which can further enhance production if farmers have increased access to credit facilities and relevant training.

3.2.5.1.3 Subsistence Agriculture

Main crops include maize, beans, cowpeas, arrowroots, sweet potatoes etc and their production is usually on small land holdings. Unfavourable weather, poor farming practices and subdivision of land into small uneconomic units have been responsible for food deficiency and insecurity in the municipality. There is, however, potential for improved production and food self-sufficiency if farmers shift to the cultivation of drought resistant crops (especially the orphaned crops) under modern intensive farming techniques.

3.2.5.1.4 Livestock Production

Livestock keeping is widespread in the municipality with virtually every household keeping some cattle, goats, sheep and poultry. Other livestock, though not very common, include donkeys, pigs and rabbits. Large-scale livestock keeping is done in several ranches such as Lisa, Astra, Konza, Malili and Kapiti. The veterinary farm adjacent to Machakos town is owned by the Government. Small scale livestock keeping is under the traditional practices and breeding methods and production is mainly for domestic consumption of products (milk, eggs) while ultimately the animals are sold as a source of income for other uses. However farmers are now embracing modern practices and exotic breeds for improved and income-oriented production. The municipality has potential for livestock production if farmers are enabled especially with respect to training and credit facilities. Poultry keeping is also common among all households in the rural municipality including the peri-urban areas. Pig keeping, despite its high potential in the municipality (MCM, 2001), is not widely practiced.

In the overall, agricultural production in the municipality has been on a decline owing to population pressure, urban development and land fragmentation, of course at the backdrop of unreliable rainfall, droughts, poor farming methods, lack of capital for farm inputs and diseases. Over-reliance on rain-fed agriculture in a region with unpredictable and unreliable rainfall patterns has been causing repeated crop failures in the municipality. In addition, there have been concerns over the decline of agricultural productivity due to environmental degradation arising from population increase and related pressure on land. One such factor is increased soil erosion due to human settlement and farming activities on the hilly slopes of Kiima Kimwe, Iveti and Mua hills

In spite of the foregoing, there exists potential for improved productivity through intensification of agricultural extension services, increased access to credit facilities and control of land subdivisions. There also exists potential to overcome the vulgarities of weather and realize increased productivity by embracing irrigation agriculture particularly with respect to horticultural production (MCM, 2001).

3.2.5.2 Industry, Commerce and Employment

3.2.5.2.1 Industry

Machakos town has few industries. These include flour milling, soap manufacturing, leather tanning, bakeries and coffee processing by co-operative societies. Small-scale informal sector manufacturing is also found in the KIE sheds and go-downs in the form of metal fabrication furniture works, tiles manufacture and small-scale food- processing. These are a major source of employment especially for the youth. Despite the fact that Machakos town has a well planned industrial zone, there is little manufacturing activity. The main reason for this is perennial water shortages that are associated with the town. The town's water supply is barely enough to sustain domestic needs let alone industrial activities. There is however potential for increased industrial activity following recent rehabilitation of earth dams [e.g. Maruba dam] in the municipality.

3.2.5.2.2 Commerce and Trade

Machakos town is the commercial hub of Machakos municipality. Other extended (satellite) market centers include Mutituni, Kimutwa, Kaseve, Kithaayoni Katoloni, Miwani and Kenya – Israel. Commercial activities include among others, catering, garage works, wholesale/retail shops/stores, gas stations, hawking etc.

3.2.5.3 Mining

Machakos municipality has no major mining activities save for sand harvesting and stone quarrying. Sand-harvesting can be regarded as the main mining activity in the municipality. The region is a major source of building sand for Machakos town, Nairobi, Athi River, Thika and other areas. Sand harvesting is carried out on all major rivers and streams in the municipality. Because it is not sufficiently controlled, sand harvesting has been a major cause of environmental degradation and the drying up of rivers in the region. It is notable however, that the District Environment Management Committee (DEMC) has been mandated to facilitate and oversee formation and management of local sand harvesting societies to regulate sand harvesting and minimize environmental degradation in the region. But for some reason, this appears not to have worked.

There is also limited quarrying (for building stone) in Kimutwa area mainly for the local construction industry.

3.2.6 Human Settlement Patterns

The United Nations (1976) in the *Vancouver Declaration on Human Settlements* defines human settlements as “the totality of the human community - whether city, town or village - with all the social, material, organizational, spiritual and cultural elements that sustain it”. Closer home, Kenya (1978:31) defines human settlements as “concentrations of activities and people, whether they are the smallest village or the largest metropolis”.

Human settlements consist of physical elements and services. Physical elements comprise shelter (for security, privacy and protection from the elements and for singularity within a community) and infrastructure (i.e. the complex networks for the flow of people, goods, energy or information from shelter). Services are the support required by a community to fulfil its functions as a social body e.g. education, health, culture, welfare, recreation, nutrition, etc.

Human settlements are essential for economic growth and development. Concentrations of activities and people provide opportunities for achieving sufficient levels of economic and technical efficiencies regarding resource utilization in productive investment. Human settlements transform traditional societies into modern nation states and their degrees of concentration and function vary from place to place depending on the ability of respective environments to support human habitation and activity. Kenya (1978) has identified three basic functions of human settlements namely *service* provision (e.g. educational, health, security, administrative, public utilities, etc); *economic* function in employment creation in various sectors and; a basic *residential* function for people involved in non-agricultural employment. The three functions make human settlements critical in stimulating the process of conversion from subsistence to a cash economy and in promoting material advancement both in urban and rural areas.

Within Machakos municipality, three distinct settlement patterns are identifiable as described hereunder.

3.2.6.1 Clustered or Nucleated Settlement

A *clustered* or *nucleated* pattern of settlement is evident within Machakos town and its peri-urban environment. This pattern has resulted from initial concentration (by planning) of commercial, industrial, administrative, health, educational, recreational and other services that have over the years attract population in and around the town. There exist reasonably satisfactory

levels of municipal infrastructure and service delivery within the planned town. But notably, the peri-urban areas which house a majority of the urban labour force are not adequately serviced. The main challenge for the municipal authorities with respect to these new areas of Machakos town has been how to guide development and provide services in an unplanned environment.

Other nucleated settlements are found in the smaller satellite centres of the municipality which provide basic services (such as markets for farm produce, sources of domestic and farm supplies, etc) to their hinterlands. These centres are also important as points of collection of produce for onward transmission to Machakos town as well as points of “breaking bulk” with respect to goods from Machakos town destined for rural consumption. The main satellite centres include Mutituni, Kaseve, Konza and Kimutwa. One notable challenge in these satellite centres is the fact that due to lack of physical planning, their growth is organic and unregulated. As a consequence, they are characterized by low level of municipal infrastructure and service delivery.

3.2.6.2 Linear Settlement

Looking at the peri-urban settlements described above from a different perspective, a *linear* settlement pattern is also discernible along the main transit corridors of machakos town i.e. along the Machakos – Nairobi, Machakos – Kangundo, Machakos –Konza/Wote and Machakos – Kitui roads. Along these main roads are found such centres as Kenya-Israel, Miwani; Mumbuni/St. Valentine; Katoloni and; California, respectively. Accessibility to Machakos town is the main factor that has influenced the rise of these settlements. As highlighted above, the main challenge in these areas is their organic spatial growth and low level of municipal infrastructure and service delivery.

3.2.6.3 Dispersed Rural Settlement

About 97% of the geographical area covered by Machakos municipality is rural (MCM, 2001) with the main economic activity being agriculture. Settlement pattern in the rural hinterlands is *dispersed* with the degree of dispersal (i.e. settlement density) depending on the agricultural suitability of local soil, climatic characteristics and land ownership. High-density settlement is found on the horse-shoe ring of Iveti and Mua hills where agricultural potential is high and land ownership is by private individuals. Sparse settlements are found in the areas of Katelembu and

Konza “ranchlands” which, in addition to their lower agricultural potentials, have had land held under co-operative ownership until around 1996 (MCM, 2001). Government land (to the west of the town) is also sparsely populated.

3.2.7 Physical Infrastructure and Service Facilities

“Infrastructure is the capital stock that provides public goods and services. It produces various effects, including those on production activities and quality of life for the households, which thus permeate the entire society”. (Yoshino and Nakahigashi, 2000: 1).

According to Wikipedia (2012), infrastructure refers to “the basic physical and organizational structures needed for the operation of a society or enterprise, or the services and facilities necessary for an economy to function”. Infrastructure, it adds, “typically refers to the technical structures that support a society, such as roads, water supply, sewers, power grids, and telecommunications” and that from a functional perspective, it “facilitates the production of goods and services”.

Infrastructural services form an integral ingredient for economic growth and development of any country, region or locality. Infrastructure and related services determine the types of economic activities or sectors that can thrive in an economy as well as their locations within the space economy. The World Bank (2008) observes that extensive and efficient infrastructure is critical for effective functioning of any given economy. It reduces the effect of distance between regions and integrates local, regional and national economies. A well-developed infrastructure has a significant positive multiplier effect on economic growth, incomes, poverty alleviation and livelihoods. It has been shown that a public investment equivalent to 100% of the public capital stock can lead to a private production growth of about 300% in the medium and long term horizons (Puerto Rico Public-Private Partnerships Authority, 2011).

Poor infrastructure on the other hand is an impediment to economic growth and competitiveness (The World Bank, 2006). It is also a major cause of loss of quality of life, illness and death implying that infrastructure services are not only a good investment but also a moral and

economic imperative. The foregoing means that investing in infrastructure is one of the main strategies to increase income, employment, productivity and the competitiveness of an economy.

3.2.7.1 Transportation

Machakos Municipality has about 300 km of road network out of which about 15 km is part of the four main classified/tarmacked roads linking the town to the neighbouring destinations/regions of Nairobi, Kangundo, Kitui and Wote. Aside from these four main roads and the road network in the CBD, the rest of the road network in the municipality is either gravel, loose surface or even unopened.

Accessibility in the peri-urban and rural municipality is a challenge especially in wet weather because of the local geology and topography. The flat areas (including lower Kiandani) are covered mainly by black cotton soils which make the earth roads “sticky” in rainy weather while roads in the hill slopes are prone to erosion and pose problems even in dry weather. The problem is exacerbated by the fact that there are few bridges/drifts across the main seasonal rivers (Miwongoni, Iiyini, Mwanja, Ikiwe, and Manza) which cut-off road links in some areas during rains. It is also notable that courtesy of the land adjudication and registration process, most of the existing roads are only 6m wide and generally too narrow especially in view of the high development densities in the peri-urban areas.

3.2.7.2 Water Supply

Like the rest of the semi-arid Ukambani region, Machakos municipality is generally a water-stressed area. Main sources of water include dams/pans, rivers/streams, boreholes, springs and roof catchment (MCM, 2001). Machakos Water and Sewerage Company is the public body mandated with water supply within Machakos town and its municipality hinterland. The main sources of water for the municipality are *Maruba dam* and *Nul-Turesh* water project.

Located about 5km to the west of Machakos town, Maruba dam was commissioned in 1961 with a design capacity of 3,500,000 litres per day (MCM, 2001). Although it was intended to supply enough water to meet the local urban demand, population pressure coupled with the silting of the dam has over the years caused the facility to under-perform.

The Nul-Turesh water project was constructed in 1995 to supply water to Athi River, Kajiado and Machakos towns from the slopes of Mt. Kilimanjaro. But like the Maruba dam, Nul-Turesh has not been able to solve the water problems of Machakos town. First, by design, the project was meant to supply water to Athi River and Kajiado towns first before supplying Machakos town. This meant reduced capacity for Machakos. Secondly, when the project was conceived, the dry pipeline corridor and its environs were ignored and did not get water from the project, an omission which led to proliferation of illegal connections and subsequent redesigns to cater for these overlooked areas. This, effectively, reduced the capacity and performance of the project.

Other sources of water for the municipality include permanent springs and boreholes in the more rural areas of the municipality. Most of these sources have been constructed by non-governmental organizations, the MCM through LATF and the Constituency Development Fund. They are managed by local community committees. Only a small part of the study area is serviced with piped water from the Maruba dam and Nul-Turesh projects. The rest relies on private individual shallow water wells.

3.2.7.3 Energy

Energy sources for Machakos town and environs include electricity, kerosene, cooking gas, charcoal, solar and firewood. The household choice of the use of one type of energy over another depends on the physical availability (or lack of it) of the energy source (e.g. for electricity and wood fuel) or the economic status of the household (e.g. for cooking gas and solar). However, the majority of the urban households use electricity for lighting while relying on kerosene and charcoal for cooking. The majority of peri-urban and rural residents of the municipality rely on firewood for cooking. Lower Kiandani, the study area, is characterized by socio-economic diversity and a mix of urban and rural populations and lifestyles. Consequently, it relies on all of the above energy sources with the inner peri-urban depending more on electricity and cooking gas while the outer areas rely more wood fuel and kerosene (MCM, 2001).

3.2.7.4 Waste Disposal

3.2.7.4.1 Liquid Waste Management

Although the “old” Machakos town is serviced by a sewerage network that covers an area of about 5km² and a length of 18km (MCM, 2001), it is worth noting that the entire rural municipality, including all the peri-urban areas, have no sewerage facilities. Human waste management in these areas is by the use of pit latrines, soak pits, conservancy pits or septic tanks. The sewerage treatment plant for the town is located in Mitheu River, some 3km to the south-west of the town. Maintenance of the sewerage system is a challenge to the MCM because the town’s population has outgrown its design capacity, the infrastructure is old and the town experiences constant water shortages. This leads to constant blockages and sewer spillages which are a public health hazard. Lower Kiandani area, like the rest of the municipality outside the old town, has no sewerage infrastructure and households here use septic tanks and pit latrines.

3.2.7.4.2 Solid Waste Management

Solid waste in Machakos town and environs includes household garbage and rubbish, commercial refuse, institutional refuse, street sweepings, construction and demolition debris, sanitation residues and industrial wastes. The MCM collects solid waste from the town, parts of the built- up peri-urban areas and the outlying satellite markets and, transports the same to the final disposal site, the Mitheu /Katoloni open dump, some 3 km from the CBD. Part of Lower Kiandani (Miwani and Kenya Israel along Nairobi – Machakos road; Mumbuni along Kangundo road) falls within the council collection reach while the rest is not catered for. Residents manage their own domestic waste by burning and burying.

3.2.7.5 Community facilities and services

Virtually all community facilities and associated services in Machakos municipality are concentrated in Machakos town proper because the growth of the peri-urban and rural hinterlands has been organic and unplanned for. Like with the rest of peri-urban Machakos, Lower Kiandani exhibits a conspicuous absence of almost all community facilities – health, educational, public housing, sports and recreational, security installations, administrative services, etc.

3.3 Main Land Uses within Machakos Town

The 1978 Machakos Town Physical Development Plan provides the land use/zoning standards for the town. The plan covers an area of about 5km². It gives the main land use categories as residential, industrial, educational, open space/recreational, public purpose, commercial and transportation activities as shown in Figure 3.3 below.

While the 1978 physical Development Plan provides a zoning frame work for the desired patterning of human activities in spaces within “old” town as shown in Figure 3.3 below, the expansion of urban activity has led to new land uses in hitherto “undesigned places”. Over the years, there has been considerable urban-driven pressure for land subdivision and land use change from what were designated as the freehold agricultural “native reserves” to new uses associated with modernity and urban activity. To date, peri-urbanization of these hitherto “native reserves” has made them an important part of Machakos town and, for all practical purposes, the town and the unplanned peripheries must be viewed together.

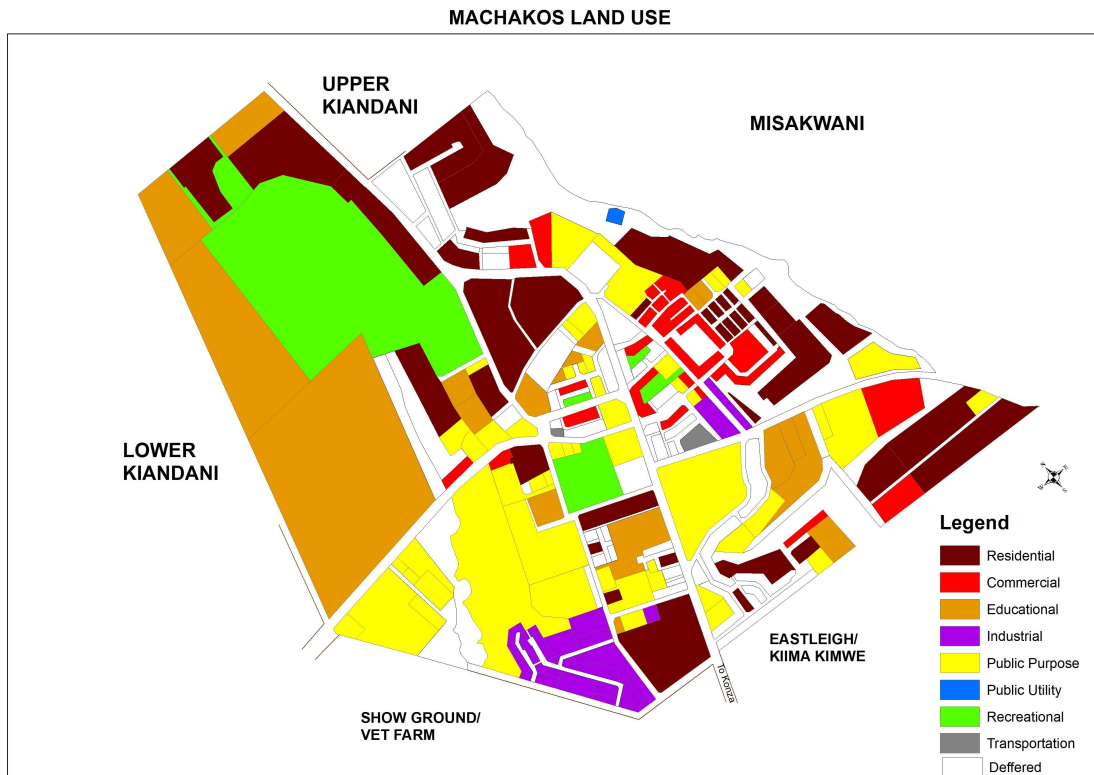


Figure 3.3: Land Use Map of Machakos Town *Source:* Adapted from Machakos Town Land Use Map by Ministry of Lands, Department of Physical Planning (1978)

3.3.1 Residential Land Use

As aforesaid, urban expansion in Machakos town has largely been driven by demand for land for housing. While the “old” town provided for a number of residential estates such as Muthini (SSS) St. Mary’s (TPS), Eastleigh, Kariobangi (TPS), Mjini/Swahili village, Ngei and the Civil Servants quarters, increased demand for housing has over the years led to development of new residential areas by private developers along the main transit corridors of the town as shown in Figure 3.3.1 below. These areas form what can be referred to as the peri-urban machakos and include such areas as Kenya-Israel and Miwani along Machakos-Nairobi road; Kwanthanze (St. Valentine) and Mumbuni along Machakos-Kangundo road and; Eastleigh and Katoloni along Machakos-Konza/Wote road. These areas indeed accommodate the bulk of the town’s resident population. It is noteworthy that agricultural activities are also found in these areas.

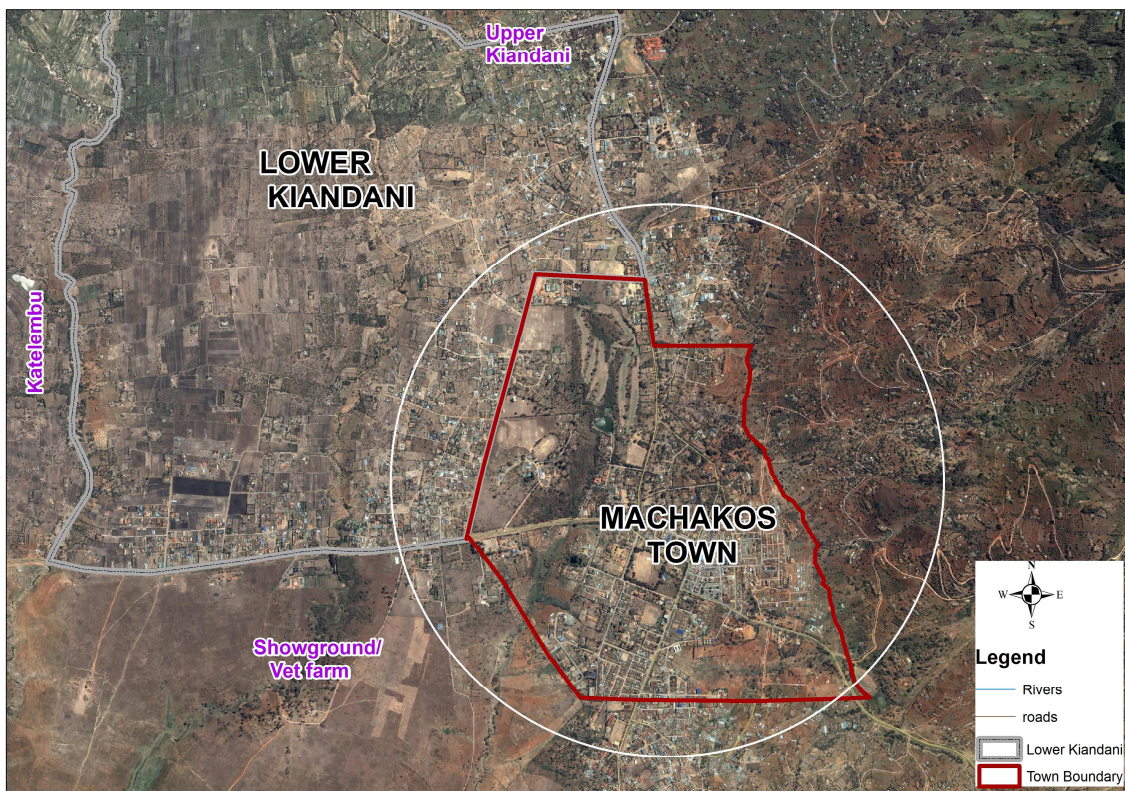


Figure 3.3.1: A Satellite Imagery of Machakos Town and its Peri-urban Neighbourhood
Source: Google Earth (2013)

3.3.2 Commercial Land Use

While the Machakos CBD as zoned in Figure 3.3 above accommodates most of the commercial activities of the town, new residential development as discussed above has generated demand for commercial retail services. There are therefore commercial services such as shops, hotels, kiosks and even petrol service/filing stations (especially along the highways) at the new residential areas of Kenya-Israel, Miwani, Katoloni, Mumbuni, Eastleigh and Kwanthanze.

3.3.3 Industrial Activities

There are few industries in Machakos town. Indeed the main industrial district to the west of the CBD is currently under-utilized thanks to the perennial water shortage in the town. There is however demand for more land for the more vibrant *Jua Kali* sector especially in the middle of the town where the area designated for the activity is heavily congested.

3.4 Lower Kiandani Area

Much of the baseline information and other relevant factors for Lower Kiandani area have been covered under the preceding sections relating to the broader municipality setting. Consequently, it is hereby considered that only three aspects of the study area merit special (albeit brief) discussion herein namely: location and size, population and demographics and, existing land uses.

3.4.1 Location and Size

Adjoining the old town to the south, Lower Kiandani area forms an administrative sub-location within Mumbuni location. It is bound by Machakos – Nairobi road to the west and Machakos – Kangundo road to the east. To the north, it is partly bounded by Manza River with the rest of the boundary defined by a straight line between the river and Machakos – Kangundo road as shown in Figure 3.4.1 below. It covers Kenya-Israel, Miwani, Miwongoni and Mumbuni areas. While land in the area is freehold and agricultural by registration, there has been a dominant pattern of land subdivision and land use change to serve new urban functions, mainly residential uses. MCM records and officials attest that Lower Kiandani is the most rapidly expanding area of peri-urban Machakos. Geographically, the study area covers an estimated 9.72 km² or 972 hectares.

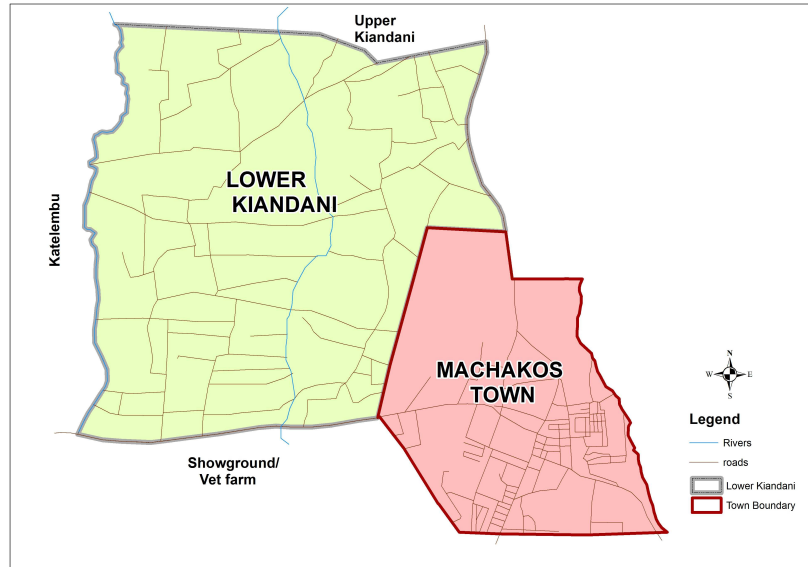


Figure 3.4.1: Lower Kiandani in Relation to Machakos Town

Source: Compiled from Satellite Imagery

3.4.2 Population and Demographics

Table 3.4.2: Population of Lower Kiandani, 1999-2009. Source: KNBS (2000, 2010)

Year	Male	Female	Total	Households	Density (Persons Per Km ²)
1999	4,328	4,359	8,687	2,420	893.72
2009	5,939	6,020	11,659	3,418	1,199.42

Table 3.4.2 above gives population data for lower Kiandani for the censal years 1999 and 2009. The data shows that within the inter-censal period 1999-2009, the total population of Lower Kiandani increased from 8,687 persons to 11,659 persons i.e. an increase of 34.2%. The number of households also increased from 2,420 to 3,418 i.e. an increase of 41.2%.

3.4.3 Existing Land Uses

As afore-mentioned, land in Lower Kiandani is agricultural by registration. However, population pressure has over the years caused massive land subdivision and land use change in the area leading to a mix of uses. In addition to agriculture, new uses include housing, commerce and infrastructure and services

4.0 CHAPTER FOUR: STUDY METHODOLOGY

This chapter describes the nature of the study and how it was carried out. It comprises of the research design, population and sampling, data types and sources, data collection and analysis methods and, tools used to present the results of data analysis.

4.1 Research Design

The study was conceptualized to investigate the effect of peri-urbanization on the livelihoods of indigenous households by analyzing the location-based differential effect of the phenomenon on the livelihood activities and incomes of these households, using three concentric sub-zones of the study area, defined on the basis of their average radial distances from the Machakos town urban core. This logic was informed by the simple and common-place observation that there exists a downward gradation of urban activity away from the urban core. Thus, fringe areas closer to the urban core have more urban activity, and are therefore more “*peri-urbanized*”, than the outer fringe areas. Therefore, by comparing the endogenous homogeneity and heterogeneity of the study area with respect to selected key variables relating to urbanization and livelihoods in the three sub-zones, the study indicated how peri-urban development impacts on the livelihoods of the indigenous peri-urban households.

Being broadly a survey, the study was designed in a manner that it would have both qualitative and quantitative aspects, where results would largely be obtained by applying descriptive as well as inferential /correlational methods.

4.2 Population and Sample

The indigenous households of Lower Kiandani, one of the peri-urban areas of Machakos town, were the survey population. However, to ensure unbiased random selection of these households on the ground, the original land parcels in Lower Kiandani, as registered under the land adjudication process in 1989, were used as the sampling units. A purposive stratified systematic random sampling procedure was used to select the study sample as described hereunder.

The first step of the field work was a familiarization visit to the area under study. Thereafter, a visit was made to the Machakos District Land Registry offices from where data relating to the total number of land parcels and their identifiers registered in the study area in 1989, were obtained. This total number of the original land parcels so registered was treated as an estimate of the population of the original indigenous households in the study area. This number was determined as 363. Also relevant registry index maps in the form of Preliminary Index Diagrams covering Lower Kiandani area were obtained from the Municipal Council of Machakos Registry. Nine map sheets were found to cover the whole of Lower Kiandani. The maps were then scanned and digitized and joined together to produce one mosaic diagram (base map) of the whole of the study area. The base map was then divided into three, approximately equal, concentric sub-zones (rings) radial to the approximate core of machakos town, designated as the *Inner*, *Middle* and *Outer zones* (also referred to as **peri-urbans**) as shown in figure 4.2(a) below.

The original land parcels falling within each of the three sub-zones were then identified from the base map. Land parcels through which boundaries of the sub-zones passed were deemed to belong to the sub-zones bearing their bigger fractions. This gave the sampling units in each of the rings as shown as shown in table 4.2(a) below.

Table 4.2(a): Original Land Parcels in the Peri-urban Sub-zones. *Source:* Author

Sub-zone (i)	Population (P_R)
Inner	180
Middle	104
Outer	79
Total	363

Bearing in mind that the study was largely descriptive and inferential/correlational, it was estimated that a sample size of at least 10% of the study population would be sufficient draw conclusions about the study population (Mugenda and Mugenda, 2003). Hence, **50 households** were estimated to be far adequate for the desired analysis. To enhance external validity and therefore obtain a representative sample of the study population, the desired number of proportionate sample members for each of the three sub-zones were computed as $S_R = (P_R / 363)$

*50 where, S_R = proportionate number of sample members in the ring, P_R = population of sampling units in the ring and P = Total population of sampling units in the study area. Using P_R values in Table 4.2 (a) above gave the proportionate number of sample members S_R in each of the rings as shown in Table 4.2(b) below.

Table 4.2(b): Sample Sizes by Sub-zones. *Source: Author*

Sub-zone (i)	Sample (S_R)
Inner (1)	25
Middle (2)	14
Outer (3)	11
Total	50

The next step involved selecting the actual sample members (individual land parcels) for each of the three sub-zones that would be used to access the desired households. To achieve this, the population members (land parcels) in each of the three sub-zones were listed down and serialized from 1 to N_i (with $N = P_R$) to form three sets of corresponding sampling frames. Using the systematic random sampling method, the sampling interval for sub-zone i was determined as $K_i = P_{Ri}/S_{Ri}$ with $i = 1, 2, 3$ as coded above. Using a table of random numbers, the first member for each of the three samples was then picked at random (by blind picking) and every k_i^{th} member picked at random until S_{Ri} was achieved. The above sampling operation gave the following information.

Table 4.2(c): Sampling Information. *Source: Author*

Sub- zone (i)	Sample Size (S_{Ri})	Sampling Interval (k_i)	Sample Members i. e Title Numbers (Machakos /Kiandani.....)
Inner (1)	25	7	140, 183, 195, 199, 200, 204, 215, 225, 251, 263, 283, 287, 293, 294, 295, 301, 307, 318, 323, 324, 325, 344, 361, 362, 406
Middle (2)	14	7	53, 56, 78, 109, 115, 137, 139, 162, 166, 168, 233, 332, 334, 599
Outer (3)	11	7	9, 16, 20, 29, 65, 66, 67, 92, 94, 98, 100
Total	50		

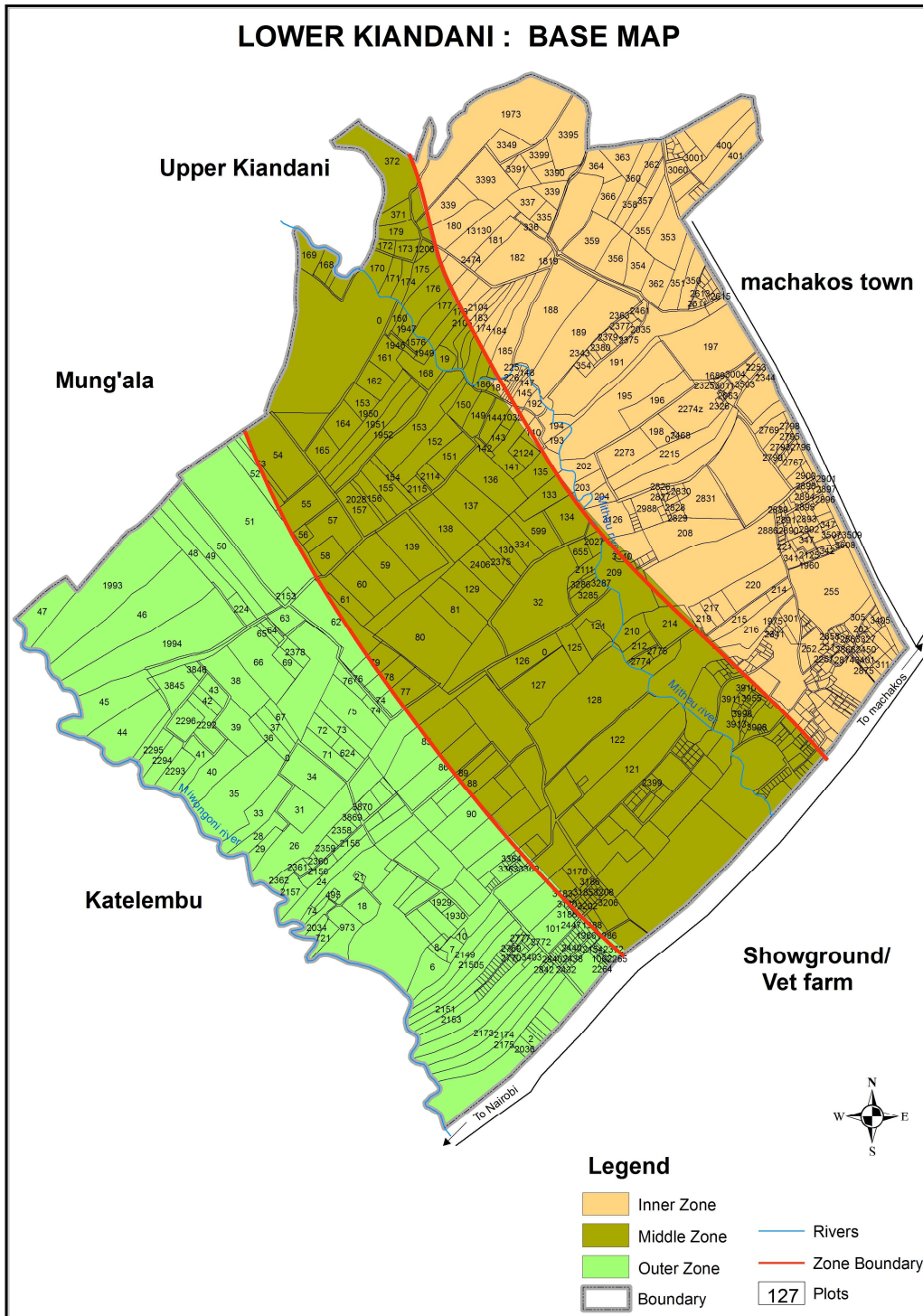


Figure 4.2(a): Map of Lower Kiandani Showing the Three Sampling sub-zones
 Source: Compiled from Preliminary Index Diagrams

Lastly, the base map was used to identify the selected land parcels on the ground so as to finally access the desired households and collect the desired information regarding the land parcels themselves and their respective resident indigenous households. In many instances however, the sampled land parcels were found to have been subdivided and assigned new title numbers and acreages whereupon the new information was obtained either from the respondents, current maps or ground observations (rapid measurements). In other instances, the selected land parcels were not inhabited by indigenous households in which cases the nearest land parcels (and households) not selected were incorporated in the study. In other cases the opposite was encountered where some of the original land parcels were found to be occupied by multiple indigenous households upon which one of the households was selected at random. Where possible in this case, preference was given to those households who were estimated to be the oldest, either by inquiring or visual appearance of the homes. Figure 4.2(b) below shows the spatial distribution of the sample households within the study area.

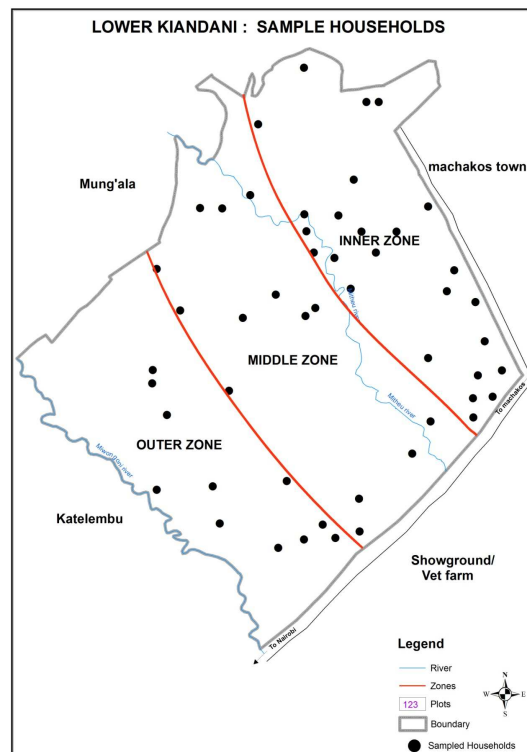


Figure 4.2(b): Spatial Distribution of the Sample Households within the Study Area. *Source: Author*

4.3 Data Collection and Analysis

4.3.1 Overview

The preliminaries to data collection included review of existing literature and a reconnaissance survey. Literature review involved identification and evaluation of existing literature on the broad dimensions of the subject under investigation (e.g. urbanization, rural and urban land uses, peri-urbanization, urban agriculture, rural and urban livelihoods, relevant institutional and legal frameworks, urbanization in Kenya, Machakos Municipality etc). Sources of literature included published works in the library, internet, news papers, etc. This armed the research with relevant background information pertaining to the subject under investigation. Reconnaissance survey involved a familiarization visit to the geographical area of study and its immediate regional setting (i.e. Lower Kiandani area, Machakos Town, Machakos Municipality). The idea was to attain a general appreciation of what the actual fieldwork would entail.

After the preliminaries, the next activity was to prepare research instruments in the form of semi-structured interview schedules. The effectiveness and reliability of the interview schedules was then assessed using the *test-retest* technique by interviewing four (4) randomly-picked indigenous households, over a two-week time interval. Correlating the two sets of data gave a correlation coefficient of 0.9 meaning the interview schedules and the data were highly reliable. Upon so doing, the research team proceeded to identify the research subjects and key informants to collect relevant data. The collected data were then prepared, analyzed and conclusions drawn in view of the research objectives. Finally, the research report was prepared and findings presented using different methods.

4.3.2 Data Collection

4.3.2.1 Data Types and Sources

Household Primary data were information on, among others, (i) household land holding where estimated in the field directly (ii) dominant land use activity (iii) type of farming and farming practices- main farming activity, crops grown, animals kept, etc (iv) Formal and informal non-farm employment (v) Business activities (vi) Income from agricultural activities and non-farm employment/business activities (vii) Total household income from various economic activities (viii) land subdivision information (ix) Field measurement of parcel areas (x) Field photographs

(xi) Field Measurement of distances using Hand-held GPS equipment (xii) Respondents' general perceptions of peri-urbanization and their suggestions on possible interventions (xiii) Direct information from interviews with key informants.

Secondary data included (i) Land parcel information – land title numbers, sizes, total numbers registered in 1989 (ii) Preliminary Index Diagrams/ survey maps from Survey of Kenya (iii) Ready data from key informants and, (iv) socio-economic data from statistical abstracts etc.

A number of public officers in Machakos County were **Key Informants** for the study. These included: Town Clerk, Municipal Council of Machakos; District Physical Planning Officer ; The Secretary, Machakos Central Division Land Control Board, District Development Officer and; District Agricultural Officer. They provided useful information for the study based on their professional views and local experiences regarding planning, service delivery, development mandates, programmed activities, potential interventions, etc. concerning the study area.

4.3.2.2 Data Collection Methods

Most of the data for the study were collected through **oral interviews** where **semi-structured questionnaires** were used as **interview schedules** to record responses from respondents (household representatives). This method of data collection was preferred for a number of reasons. First, it was considered that interviews would allow for a face-to-face contact between the research team and the respondents so that the research team would elaborate the purpose of the study and convince respondents about its importance. As a result, the research subjects were indeed sufficiently honest and informative in their responses. Secondly, it was viewed that since the study was basically about household land, livelihoods/employment and incomes, many respondents would otherwise be guarded in their answers because they would find this information sensitive and personal. An honest and personal interaction between them and the research team was the answer. Thirdly, interviews gave the research team field opportunities to clarify issues in the interview schedules. As a result, interviewees gave sufficiently relevant responses. Moreover, the research team was able to exploit the flexibility offered by the face-to-face interaction with the interviewees and adapt to each case to extract as much relevant information as possible. Finally, interviews were preferred because of their high response rate

which, obviously, was a good thing for this research. **Key informants** were interviewed using open-ended questionnaires as interview schedules. **Direct observations** included field measurements and photography.

4.3.3 Data Analysis

The collected data were first prepared for analysis through the activities/processes of editing, coding, input and validation. Editing was done to check and correct the data for errors, omissions, completeness and reliability. After editing, a coding scheme (both inductive and deductive) and code book were developed after which coding the data were entered into the computer and validated to identify and eliminate possible outliers.

Regarding the various actual data analyses, the Statistical Package for Social Science (SPSS) and EXCEL computer softwares were deployed for the various analyses with both qualitative and quantitative techniques being used. Quantitative methods employed both descriptive and inferential tools. Descriptive indices included the *mean* (of household land holding, incomes), *variability* (range, standard deviation) of household land holding, incomes etc, *graphical methods* (graphs, pie-charts, histograms, etc).

To derive relationships between samples and populations, inferential statistics were used. More specifically, *correlation coefficients* were used to show the magnitudes of relationships between, say, household income and household space and locational factors (i.e. land holding and distance from the town centre) in the sub-zones of Lower Kiandani. As for the hypothesis, this was tested using the One-way *Analysis of Variances (ANOVA)* technique for the three zones of the study area.

5.0 CHAPTER FIVE: RESEARCH FINDINGS AND DISCUSSION

5.1 Introduction

As pointed out in section 1.5, the primary objective of the study was to investigate how peri-urbanization affects the livelihoods of indigenous peri-urban households. Arising from this broad objective, specific objectives were derived as:

- a. To investigate the factors responsible for land sub-division and land use change in the study area,
- b. To identify and describe existing household livelihood activities and sources of income in the peri-urban area,
- c. To analyze how household location influences household livelihood activities among the indigenous peri-urban households,
- d. To determine the relationship between household income and household space and locational factors among the indigenous peri-urban households,
- e. To use the findings of the study to propose suitable policy and planning interventions for sustainable peri-urban livelihoods.

The study was conceptualized on the theoretical postulation that peri-urban development has a significant influence on the livelihoods of indigenous peri-urban households. The intensity of peri-urban development – which naturally increases with distance towards the urban core - was taken to be a function of location with respect to the core. It was also postulated that income is a significant indicator of a livelihood. Consequently, it was hypothesized that among the indigenous peri-urban households, ***“household income depends on the household location in the peri-urban zone”***.

A number of data analysis methods/ procedures were used. The collected data were first edited, coded, input and validated using the Statistical Package for Social Science (SPSS) and EXCEL computer softwares. The softwares were also deployed for both qualitative and quantitative analyses. Quantitative methods employed both descriptive and inferential tools. Descriptive indices included the sample *means, standard deviations* and *coefficients of variation* with respect

household land size holdings and incomes. Inferential statistics involved the derivation of *correlation coefficients* while hypothesis-testing was by the *Analysis of Variances (ANOVA)* technique for the three zones of the study area.

5.2 Research Findings and Discussion

The results of the study are presented and discussed in the following order: land sub-division and land use change; livelihood activities and livelihoods diversification; household location, household land holding and household income and; proposed/ preferred interventions for improvement of household livelihoods.

5.2.1 Land Sub-division and Land Use Change

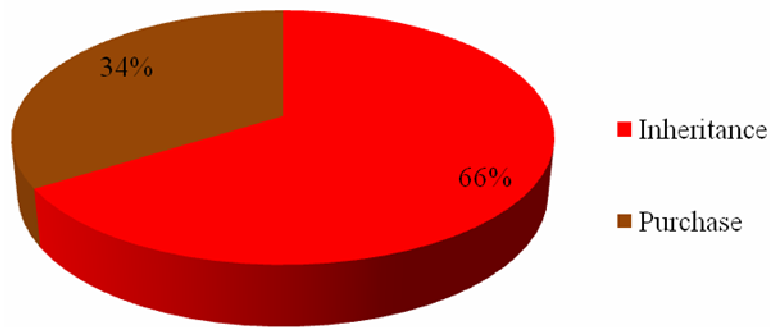


Figure 5.2.1(a) : Households by Mode of Land Acquisition *Source* : Author

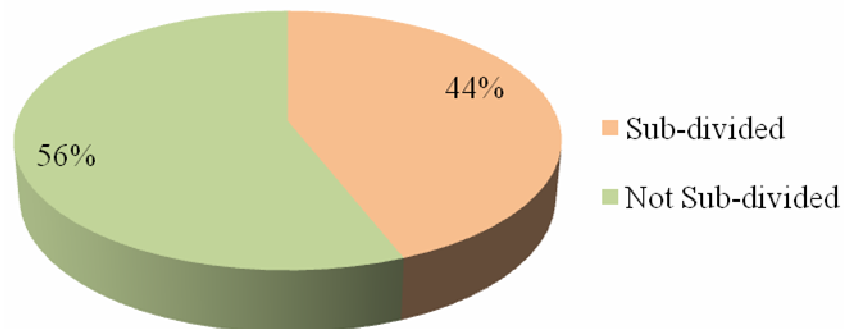


Figure 5.2.1(b): Incidence of Land Sub-division among Households *Source* : Author

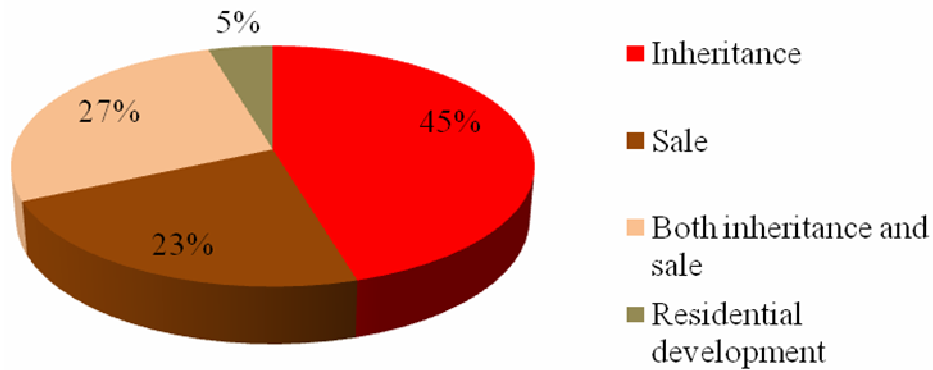


Figure 5.2.1(c) : Reasons for Land Sub-division by Households *Source* : Author

Secondary data from KNBS (2010) as shown in tables 3.2.4(b) and 3.4.2 indicate the population of Machakos town and that of lower Kiandani have been growing. Like with the rest of Kenya, this growth can be attributed to migrations of people from the surrounding Ukambani region into the town, in search employment opportunities and; natural increase. As pointed out earlier in this report, Machakos town is the economic hub of Ukambani region which makes it attractive to in-migrants. Again, Machakos is situated only 68 kilometres from Nairobi city and with the on-going road infrastructure improvement, the town is increasingly falling within the physical ambit of Nairobi city's daily commuting. Indeed, to date, Machakos can be seen as part of peri-urban Nairobi.

The growing population of Machakos town has had a spill-over effect on surrounding areas which constitute what can be called the peri-urban Machakos. These areas, which include Lower Kiandani, the study area, offer cheaper land for housing development for the increasing urban population and for other complementary urban activity as well. From a general viewpoint, urban population growth, the corresponding growth in urban activity, and the demand for space to accommodate these activities, can be regarded as the underlying drivers of land-subdivision and land use change in the study area.

However, upon interviews of the research households and discussions with key informants, four (albeit more or less intertwined) more direct categories of causes of land sub-division and land use change in Lower Kiandani were identified. These are economic reasons, commoditization of land, cultural factors and, institutional factors. On average, 44% of the households, for various

reasons, were found to have sub-divided their family land as shown in figure 5.2.1(b) above. There was, however, an interesting finding that whereas the majority of the households in the inner and outer locations of the study area had carried out land sub-division (with corresponding percentages more or less the same at 52% and 55% respectively), there was a marked reduction of cases of land sub-division in the middle peri-urban. Only 21% of the households were found to have sub-divided their land, suggesting the relationship between the rate of land sub-division and the distance from the urban core may not always be linear {see table 5.2.1(a) below}. Noting that the middle zone is the most “grey” location of the study area in terms of rural - urban identity, it follows that much of the land in this zone may be currently held “in waiting”, experiencing the least of the pressures for land sub-division emanating from urban and rural forces.

Table 5.2.1(a): Locational Variation of the Incidence of Land Sub-division among Households

Source: Author

	Inner zone	Middle zone	Outer zone
Observation	Total No. of HHs = 25	Total No. of HHs = 14	Total No. of HHs = 11
No. of HHs	13	3	6
Percentage	52	21	55

As figure 5.2.1(d) below shows, 30% of the households were found to have substantially changed the manner in which they use their land, either by introducing new uses (residential, commercial) altogether, or by extension of user to include these new uses. The incidence of land use change away from agriculture was, however, found to vary significantly depending on location (distance) with respect to the city centre, as shown in table 5.2.1(b) below. Whereas 56 % and 14% of the households in inner and middle peri-urban respectively reported to have introduced new uses on their family land, none of the households in the outer peri-urban were found to have carried out any significant land use change.

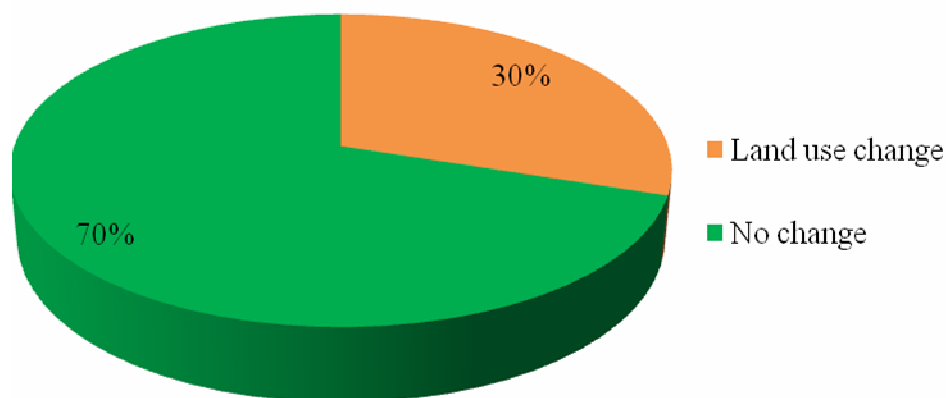


Figure 5.2.1(d): Incidence of Land use change among Households *Source: Author*

Table 5.2.1(b): Locational Variation of Incidence of Land Use Change by HHs *Source: Author*

	Inner zone	Middle zone	Outer zone
Observation	Total No. of HHs = 25	Total No. of HHs = 14	Total No. of HHs = 11
No. of HHs	14	2	0
Percentage	56	14	0

5.2.1.1 Economic Factors

Economic factors were found to have contributed to land sub-division and land use change in Lower Kiandani. As depicted by figures 5.2.1(a) and 5.2.1(b) above, the investigation revealed that 34% of the households acquired their land by purchase while 50% of the households who had carried out land sub-division cited land sale as one of their reasons for doing so. They had sub-divided and sold part of their land to new developers who were seeking affordable land, mainly for housing development. In return, these households got money for varied uses, including basic household needs. All the households who had changed use of their land were found to have done it in a bid to “earn extra income”, meaning land use change was economically motivated to increase returns there from, by enhancing economic rent.

A location-differentiated analysis of the study area further indicated that the household economic motivation for land sub-division and land use change away from agriculture is largely a function of distance from the city centre, ostensibly because of increasing land values and land prices. In the inner peri-urban, 69% of the cases of land sub-division were found to have been carried out

for the purpose of selling to newcomers compared to 17% in the outer peri-urban. There were, however, no cases of sale-driven land sub-division in the middle zone, again underscoring a further “no-man’s land” peculiarity of this sub-zone of the study area. This observation, partly, appears to be in agreement with established peri-urban literature that increasing demand for space to locate new urban-based activity obviously gives rise to a burgeoning peri-urban land market where rising land prices often cause land subdivision and land use conversion. It is also instructive to note that 48%, 29% and 27% of the households in the inner, middle and outer locations of the study area respectively, were found to have acquired their land through purchase.

Table 5.2.1.1: Locational Variation of Incidence of Land acquisition by Purchase and land subdivision for sale among the Households *Source: Author*

Observation	Inner zone		Middle zone		Outer zone	
	No. of HHs	Percent	No. of HHs	Percent	No. of HHs	Percent
Land Acquisition by purchase	12	48	4	29	3	27
Land sub-division for sale	9	69	0	0	1	17

5.2.1.2 Commoditization of Land

Related to economic factors, the commoditization of land and the consequential speculative effects were also found to be responsible for land sub-division and land use change in Lower Kiandani. The majority of the respondents appeared to indicate that land is an economic commodity that could be traded at will so that, ultimately, it belonged to the highest bidder. As a result, 44% of the respondents were of the view that land sub-division and land use change is a good thing while another 38% indicated the phenomenon, though largely positive, could also have negative effects on the study households. Only 18% of the interviewees were categorical that peri-urbanization was bad for Lower Kiandani. As a result, 32% of those interviewed were of the view that land sub-division and land use change in the study area should be allowed to continue unfettered. Another 56% indicated the phenomenon should be permitted, albeit with some official regulation.

In the intra-locational context, the study found that there was no significant departure from the above views with the majority of the respondents (84%, 64% and 73% in the inner, middle and outer peri-urban respectively) indicating land sub-division and land use change was generally a positive phenomenon for Lower Kiandani. The majority of the respondents in each of the three sub-zones (92%, 86% and 91%) also held that the government should, albeit with some regulation, permit land sub-division and land use change in the study area. Therefore, the general inclination to view land as any other private economic good that should be used in the manner owners wished has served to catalyze the economic motivation for land sub-division and land use change in Lower Kiandani.

The foregoing should also be viewed in the backdrop of two things. Firstly, the freehold land tenure obtaining in the study area that allocates absolute rights to land use and, secondly, the obtaining land speculation in the country as a whole where brokers usually influence land sub-division so they may buy the same and keep it, sometimes unused, in anticipation of a price boon in future. The District Physical Planning Officer identified land speculation as a major cause for land sub-division and land use change in the area. Based on the same observation in the city of London, Mather (1986) questioned the rationale for absolute rights in urban land ownership and use in view of the larger public interest.

5.2.1.3 Cultural Factors

Local cultural values and the consequential emotiveness with which family land is held and viewed were also found to be another cause of land sub-division and land use change in the study area. Among the Kamba community in general, culture requires parents to sub-divide and distribute their land to children for inheritance and individual private ownership. As a result, the study revealed that land bequests were one major reason for land sub-division in Lower Kiandani. The majority (66%) of the respondents said they acquired their household land as a birthright from their parents and predecessors. Again, 72 % of those who were found to have sub-divided family land (representing 32% of all the households interviewed) cited inheritance as a reason for doing so {see figures 5.2.1(a) and 5.2.1(b)}.

Unlike in the case of land sales whose tendency to influence land subdivision and land use change appeared to have a down-ward gradation away from the urban core, the study indicated that the motivation to sub-divide family land for inheritance increases with distance away from the city centre. The study revealed that in the innermost ring of the study area, 52% of the households owned land as entitlements from parents and predecessors while 61% of the incidences of land sub-division were inheritance-driven. In the middle zone, land bequests were found to account for 71% and 100% of household land ownerships and cases of sub-divisions respectively. Bequests-driven pressure for land sub-division was found to be highest in the outer zone where 73% of the households indicated they had acquired their land by inheritance, while all those who had sub-divided land cited inheritance as the reason for the same (see Table 5.2.1.3 below). This observation appears to reinforce the fact that, naturally, cultural values are more enduring and prominent in a predominantly rural environment, than in a more urban setup. Therefore, the need to split and distribute land to family heirs in line with cultural dictates would be more compelling as one moved away from the city centre.

Table 5.2.1.3: Locational Variation of Incidence of Land Acquisition by and Land Subdivision for Inheritance *Source: Author*

Observation	Inner zone		Middle zone		Outer zone	
	No. of HHs	Percent	No. of HHs	Percent	No. of HHs	Percent
Land Acquisition by Inheritance	13	52	10	71	8	73
Land sub-division for Inheritance	8	61	3	100	6	100

According to the Machakos Central Division Land Control Board Secretary, the ownership of family land, locally called *ng'undu* in Kamba, is an emotive issue among these people and often surrounds much of the legal land contestations among siblings and other heirs that, often, end up being matters before arbitration boards and courts. According to him, it is not uncommon for family members to even oppose the burial of a deceased member on family land on grounds of entitlement. To avoid these contestations of entitlement and ownership, many parents subdivide and distribute their land to children in their lifetime. In support of this view, some of the

respondents indicated that they had indeed set aside part of their family land for use as burial sites.

5.2.1.4 Institutional Factors

Lastly, the study suggested that poor official regulation of land use was another reason for land subdivision and land use change in Lower Kiandani. Arising mainly due to the fact that the study area falls between town and country, the area is a geographical jurisdiction of a multiplicity of conflictive laws, regulations, policies and public agencies disjointedly dealing with both urban and rural land use activities which, effectively, make it an institutional “no man’s land”. The fragmentation of the various land laws, often at cross-purposes, ultimately renders such laws ineffective leading to a regulatory void.

According to the investigation, there was divergent opinion and action among the key public actors with regard to urban development in Lower Kiandani. The Machakos District Agricultural Officer was of the view that Lower Kiandani is an agricultural area and therefore land dealings thereon need to be *controlled transactions* in the sense of the Land Control Act, Cap 302 and the Agriculture Act, Cap 318. This, according to him, was however not the case as the Municipal Council of Machakos continued to approve building plans for urban development without paying due attention to the nature of the registered land use. The Municipal Council of Machakos officials on the other hand opined that the town needed more land for urban expansion and such land could only come from the peri-urban areas, Lower Kiandani being one of these areas. Thus the council could permit urban development in Lower Kiandani subject to the provisions of the Physical Planning Act and the Public Health Act. The District Physical Planning Officer argued that despite the study area lacking Zoning Plans and/or Area Development Plans etc, the Physical Planning Act (Cap 286) is still a useful guidance tool for issuance of development permissions in the area. The Act enables individual proposals to be considered for land use change based on a planner’s site appraisal through planning briefs and, where necessary, Environmental Impact Assessments. This finding is not unique for the study area since many authors have also observed the same elsewhere. Adell (1999) and Marshal et al (2009) argue that public agencies rarely collaborate in the peri-urban, an argument supported by Brook and Davila (2000: 22) when they observed that the Hubli-Dharwad peri-urban interface of India was characterized by “an absence

of communication and co-operation between the planning authorities in spite of the fact that their realms overlap to a certain degree”.

The respondents also appeared to allude to the aforesaid convulsion of institutional jurisdictions. A sizeable number of them (66%) were found to be aware several public agencies played different roles in matters of land use in the study area as shown in Tables 5.2.1.4(a) and 5.2.1.4(b) below.

Table 5.2.1.4(a): Respondents by Awareness of Public Agencies Regulating Land Use

Public Agency	No. of Respondents	Percent
Municipal Council of Machakos	24	72
Ministry of Lands	10	30
Ministry of Agriculture	6	18
Ministry of Medical Services and Sanitation	6	18
Ministry of Water and Irrigation	1	3
Ministry of Environment and Mineral Resources	1	3
Provincial Administration	2	6

Table 5.2.1.4(b): Respondents by Roles of Public Agencies involved in Land Use

Roles	No. of Respondents	Percent
Development Control	30	91
Water and Sanitation Services	8	24
Land Administration	3	9
Agricultural Extension Services	4	12
Environmental Protection	1	3
Others (Issuance of Trade Licences, Public Education)	2	6

However, the above data also suggest that despite the institutional multiplicity in the study area, much of the official land use regulatory oversight could be concerned with only the promotion of

new urban land uses. The majority of the respondents appeared to be too well aware that the Municipal Council of Machakos is, in their own words, responsible for “approval of development” in the study area. This, by itself, can only be viewed as fanning land subdivision and land use change. Again, it is instructive to note that over 60% of those households who had either subdivided their land and/or introduced new urban uses were found not to have sought any official planning/ development permission, further suggesting the efficacy of the relevant existing institutional frameworks applicable in Lower Kiandani may be wanting.

The foregoing suggests that under the prevailing circumstances, land sub-division and land use change (and therefore peri-urbanization) in Lower Kiandani is bound to continue in the foreseeable future, necessitating suitable public interventions to manage the process with a view to promoting sustainable livelihoods – especially among the indigenous households.



Figure 5.2.1.4(a): Survey Beacons Denoting Land Sub-division in the Middle Peri-urban

Figure 5.2.1.4(b): A New Block of Flats Denoting Land Use Change in the Middle Peri-urban

5.2.2 Livelihood Strategies and Livelihoods Diversification`

Under livelihood activities and livelihoods diversification, the study looked at agriculture; non-agricultural land use activities and; formal and informal employment, including incomes accruing from these, for the indigenous households of Lower Kiandani. As has been observed in other peri-urban environments{Baker(2006) and Rigg(2006) in Northwestern Tanzania and Southeast Asian cities respectively; in Narain(2010)}, the study, as Table 5.2.2(a) below shows, revealed that the majority (64%) of the study households are engaged in multiple livelihood activities for procurement of food and income. However, the study suggests that the level of

diversification and intensification of activities varies from one household to another and that, generally, there is a downward gradation of the number of households with multiple livelihoods as one moves away from the urban core as exhibited by Table 5.2.2(b) below.

Table 5.2.2(a): Households by Sources of Income *Source: Author*

Income Sources	No. of HHs	Percentage
Single	18	36
Multiple	32	64

Table 5.2.2(b): Locational Variation of HHs by No. of Income Sources *Source: Author*

Income Sources	Inner zone		Middle zone		Outer zone	
	No. of HHs	Percent	No. of HHs	Percent	No. of HHs	Percent
Single	7	28	5	36	4	36
Multiple	18	72	9	64	7	64

5.2.2.1 Agriculture



Figure 5.2.2.1(a): Some of the Agricultural Activities in the Study Area *Source: Author*

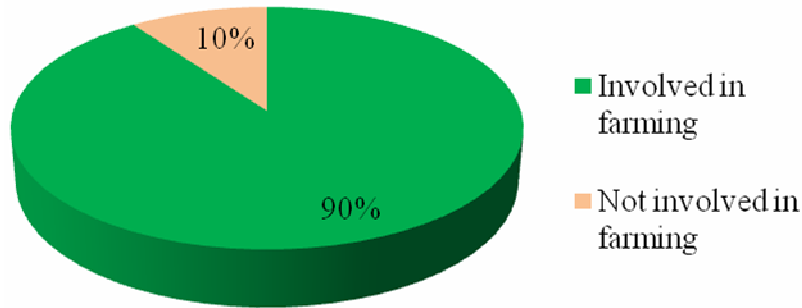


Figure 5.2.2.1(b): Involvement in Agriculture among the Sample Households *Source: Author*

Agriculture remains an important component of the household livelihood portfolio among the indigenous households of Lower Kiandani. As shown in Figure 5.2.2.1(b) above, the study found that the majority (90%) of the sample households practiced agriculture. In addition, 92% of the farming households, including those with multiple land uses, viewed agriculture as a significant activity on their land. Even among the farming households with multiple land uses, agriculture, in terms of land consumption, was found to be the main land use activity for 53% of them.

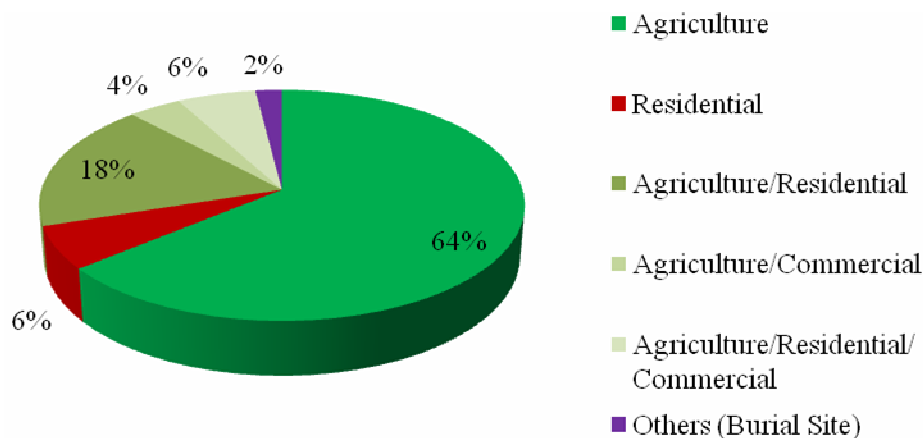


Figure 5.2.2.1(c): Main Land Uses among the Sample Households *Source: Author*

In order to diversify and spread risk, 87% of the farming households were found to engage in both crop and animal husbandry, often on the same piece of land, compared to only 13% who engage in crop husbandry alone (see Table 5.2.2.1 below). None of the households were found to be involved in animal husbandry alone. Generally, agricultural production among the study households was found to be subsistence in nature, with 84% of the households undertaking farming for household food supply and another 16% for both food supply and income.



Figure 5.2.2.1(d): A Cow Tethered Just at the Edge of a Maize Crop in the Outer Peri-urban

Table 5.2.2.1(a): Households by Husbandry Practices *Source: Author*

Husbandry	No. of HHs (Total No. of HHs =45)	Percentage
Crop Husbandry	6	13
Both Crop and Animal Husbandry	39	87

The study also revealed a further intra-husbandry diversification strategy with respect to crops grown and animals kept as shown in Figures 5.2.2.1(e) and 5.2.2.1(f) below. Regularly cultivated crops were found to be maize, pulses (mainly beans and peas), vegetables (kales and cowpeas), fruits (mangoes, watermelons, avocados, bananas and passion fruits) and tubers (cassava and sweet potatoes). Other crops, grown on a relatively smaller scale, include pumpkins and sugarcane. Animals kept include cattle, goats, sheep and poultry (chicken).

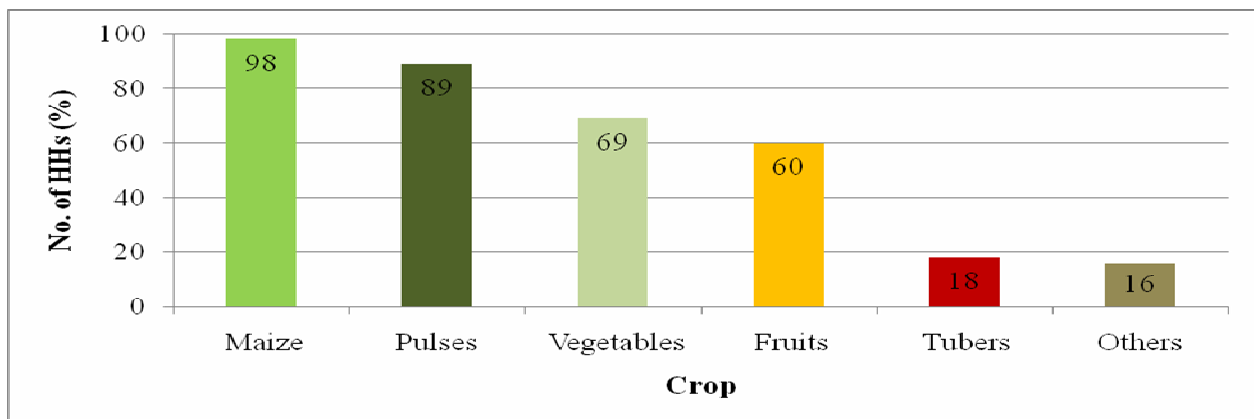


Figure 5.2.2.1(e): Crops Grown by Households

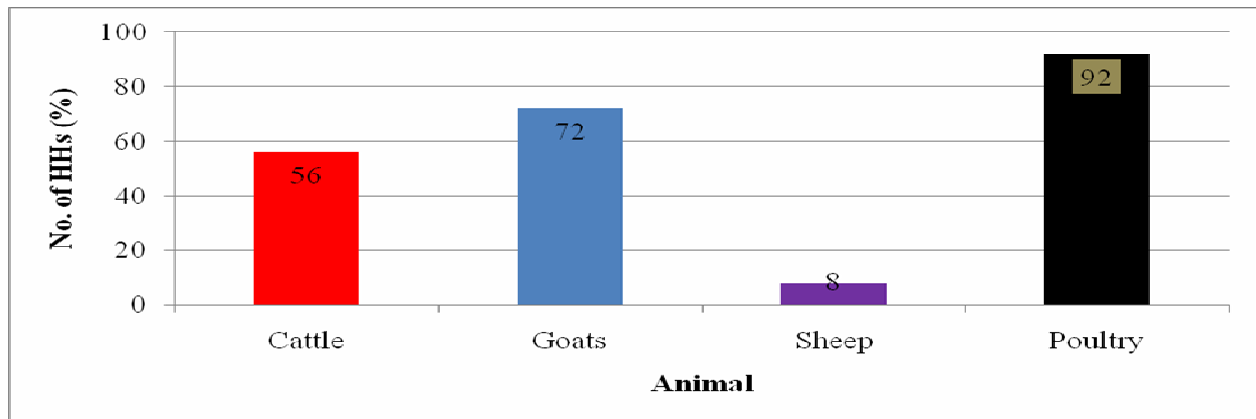


Figure 5.2.2.1(f): Animals Kept by Households

Maize and pulses, as shown above, were found to be the most dominant crops. They are cultivated by 98% and 89% of the farming households respectively, partly because they are the staple diet for most people living in the study area and the surrounding region. They are also easy to grow under the traditional husbandry practices, and sell (although by few households), for income. Vegetables and fruits were found to be the second dominant set of crops, grown by 69% and 60% of these households respectively, ostensibly to supplement the staple diet and also because they can be grown on small land parcels which characterize much of the study area. Fruits and vegetables also have a ready urban market and this, albeit marginally, appears to be another reason for their popularity among the indigenous households of Lower Kiandani. Tubers and other crops are only grown by a minority.

Cattle, goats, sheep and poultry were found to be the animals of choice among the study households. As depicted in Figure 5.2.2.1(f) above, chicken rearing, mainly on the traditional free range system, was found to be practiced by 92% of the mixed farming households, followed by goats, cattle and sheep, respectively kept by 72%, 56% and 8% of the households. The main considerations in the household choice of the animals to keep are, presumably, the size of the household land holding and, the subsistence value of the animal in question. Thus, chicken rearing is the most common among these households because it can be undertaken, relatively more economically, on small pieces of land and, in many cases as the study revealed, without having to set aside any land for its exclusive use. Again, chicken have a high subsistence value because chicken products (meat and eggs) can provide regular protein diet for the household and,

as the study revealed, can also be sold more regularly for income, however paltry. Whereas goats and cattle can both provide milk for the household and have more or less the same commercial value (for meat), it appears space constraints (for pasture) make keeping the former more economical and popular among the study households. Goats, like chicken, can also be sold more regularly for income. Sheep have the lowest subsistence value because they are not considered a source of milk and have the lowest value for meat, locally. These findings appear to vindicate much of what Egziabher et al. (1994) observed regarding urban and peri-urban livestock agriculture in many urban areas in Kenya.

In terms of the division of household land between the husbandry practices, 69% of the mixed farmers were found to have allocated more than 50% of their farmland for crop cultivation, compared to 23% who were found to use more than 50% of the same for animal shelters and pastures. Another 8% had the land split equally between crops and animals. In the overall, crop cultivation was found to consume 50% of the total household farm land compared to 43% under animal keeping. Seven percent of the land was considered derelict.

Despite the widespread prevalence of agriculture among the study households, some four findings of this study call into question its economic significance, dependability and sustainability as currently practiced. The findings indicate that, as a source of livelihood, agricultural production in the study area is not sufficient to meet sustenance and income needs of the majority of the farming households. First, as represented in Figure 5.2.2.1(g) below, farming was found to be the main occupation for only 18% of the respondents, meaning it is not reliable as a livelihood activity. Secondly, the majority of the agricultural households (84%) were found to engage in agriculture for the purpose of household food supply only, with no income element at all. Out of these, 67% reported that they had to augment their daily sustenance with cash from other sources. Thirdly, agriculture was found to be a source of income for only 26% of the sample households {see Figure 5.2.2.1(h) below} and the main source of income for a measly 2% of the households {see Figure 5.2.2.1(i) below}. Finally, income from farming was found to constitute only 5% of the aggregate income of all the study households as shown in Figure 5.2.2.1(j) below.

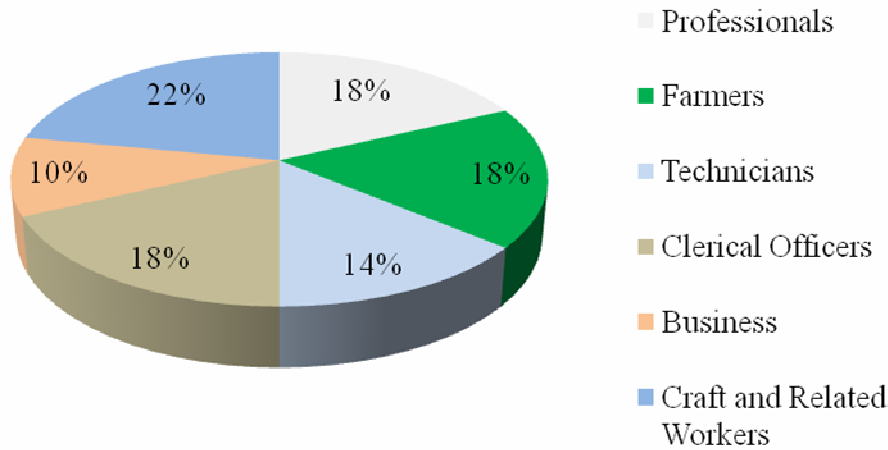


Figure 5.2.2.1(g): Respondents by Occupations *Source: Author*

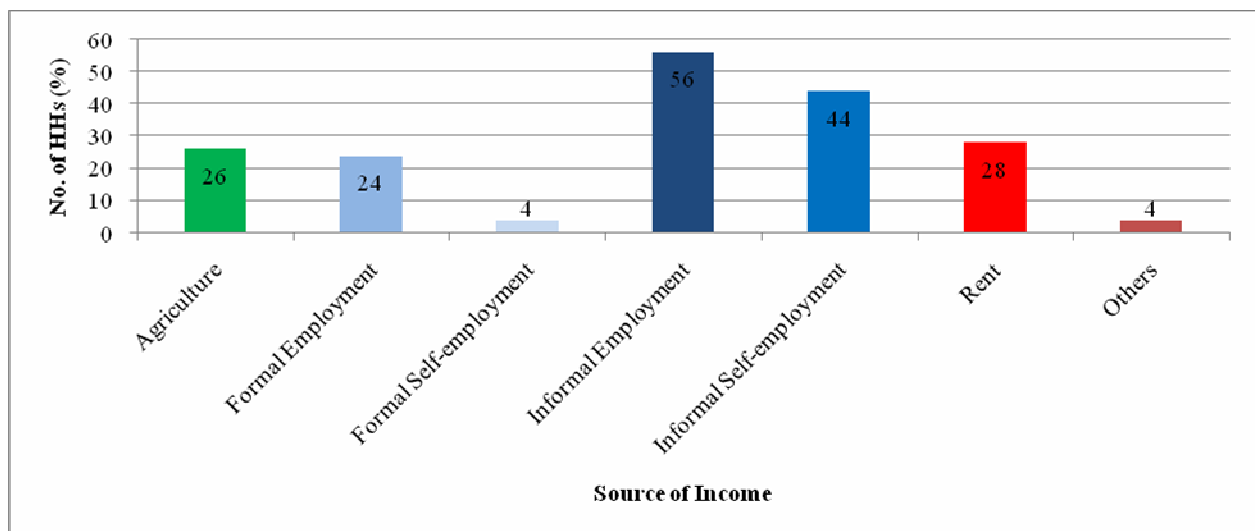


Figure 5.2.2.1(h): Sources of Income by Households *Source: Author*

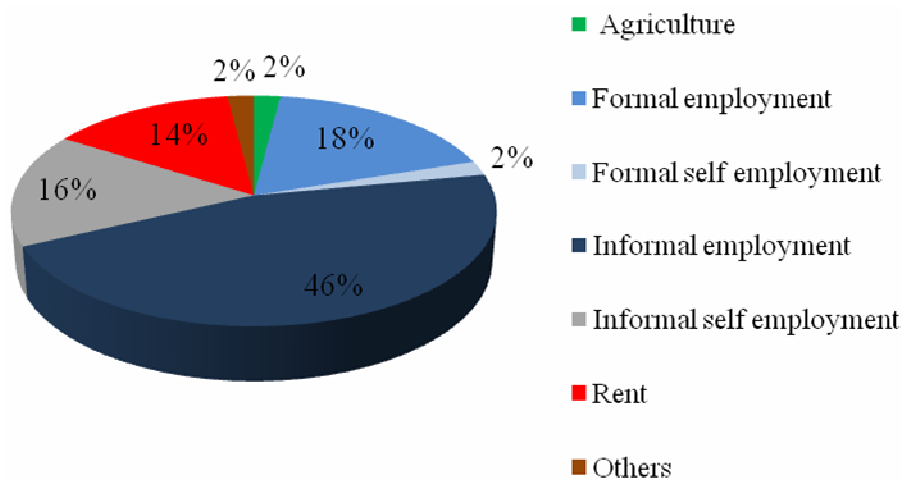


Figure 5.2.2.1(i): Households by Main Source of Income

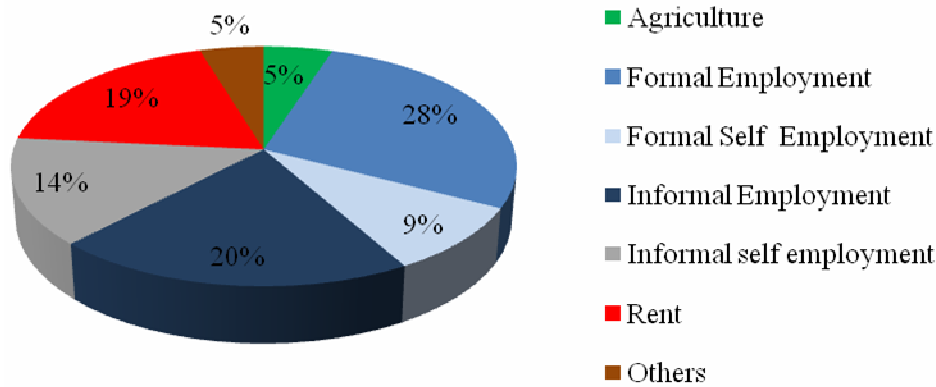


Figure 5.2.2.1(j): Contribution of Different Sources of Income to Aggregate Households income
 Source: Author

The above findings are in concurrence with studies carried out in many other peri-urban contexts, demonstrating that the contribution of agriculture to the peri-urban cash economy is often low compared to other livelihood strategies. In her study of peri-urban Dar es Salaam, Tanzania, Nelson (2007:60) observes:

“Statistics from the Household Budget Survey of 2000/01 indicate that agriculture is not a prominent primary source of income in Dar es Salaam region. Researchers found that farming was the main activity of 3% of adults in Dar es Salaam Region, compared to nearly 69% of people in mainland Tanzania Further, farming accounts for the main source of household cash income for just under 4% of residents in Dar es Salaam Region, which includes both the city and the peri-urban zone...”

The study has also revealed that the significance of agriculture as an economic activity in Lower Kiandani is on the decline, thanks to increasing urban activity and declining household land holdings. A location-differentiated analysis of the area highlighted some internal differences that indicate a trend where the economic significance of agriculture as a household livelihood activity is generally declining with distance towards the urban core. However, this trend is not always linear. Table 5.2.2.1(b) below is a summary of the major pointers to this trend.

Table 5.2.2.1(b): Locational Variation of Agricultural Production among the Study Households

Source: Author

Observation	Inner	Middle	Outer
Agriculture as an occupation			
By Respondents	12%	36%	9%
By Household members	2%	8%	3%
Households engaging in agriculture	88%	100%	100%
Agriculture as a main land use activity			
Households regarding agriculture as a main land use activity	36%	86%	100%
Households with multiple land uses	44%	14%	None
Households with agriculture as the main land use activity in multiple land uses	64%	50%	none
Households by husbandry practices			
Crop husbandry	23%	7%	none
Both crop and animal husbandry	77%	93%	100%
Crops grown	maize (86%) pulses (73%) vegetables (73%) Fruits (55%) tubers (9%) others (14%)	maize (100%) pulses (93%) vegetables (79%) fruits (71%) tubers (29%) others (21%)	maize (100%) pulses (100%) vegetables(36%) fruits (45%) tubers (18%) others(9%)
Animals kept	poultry (82%) goats (59%) cattle (35%)	poultry (92%) goats (69%) cattle(61%)	poultry(91%) goats(82%) cattle(73%)

	sheep (6%)		sheep(18%)
Reasons for engaging in Agriculture			
Food supply	91%	71%	64%
Both food supply and income	9%	29%	36%
Unreliability of agriculture to meet household needs	82%	43%	73%
Agriculture as a source of income			
Households with agriculture as a source of income	12%	43%	36%
Households with agriculture as the main source of income	None	7%	none
Income from agriculture as percentage of aggregate households income	1%	12%	3%
Households by land use change away from agriculture	56%	14%	none
Respondents proposing agricultural development as a strategy for improving livelihoods	32%	57%	55%

The above statistics show that the number of people engaged in agriculture as a livelihood activity is decreasing towards the city centre, with increasing urban activity and diminishing household land holdings. As depicted in the table above, the number of respondents and household members who are farmers by occupation was found to be lowest in the inner zone. It is also in this zone where some households are not dependent on agriculture at all as a livelihood activity, hence a significant increase in the incidence of alternative land uses from nil in the outer zone, to considerable levels in the inner areas.

The above is also indicative that, because household land holdings generally decrease with distance towards the urban core, the diversification in extensive crop and animal husbandry practices also decreases towards the city centre. Because of this reason, the cultivation of staple food crops (maize, beans and peas) which require bigger land units for economic production is lowest in the inner areas and its prevalence increases with distance away from the urban core. Similarly, the number of households keeping animals was found to increase towards the outer areas, with animals requiring more land (e.g. cattle) becoming more prevalent with distance away from the core.

Contrary to the foregoing with respect to extensive agricultural practices, the study findings in Table 5.2.2.1(b) above reveal that among the indigenous households, the production of high-value perishable agricultural products such as fruits and vegetables predominates from the outer to the inner areas, because of the competitive advantage associated with urban production of the same over rural production, due to proximity to a ready urban market. Moreover, diminishing household land holdings necessitate engagement in intensive farming practices, such as the cultivation of fruits and vegetables in this case.

Another important observation from the above table is that although the income value, and therefore the economic significance, of agriculture is lowest in the inner areas and generally increases outwards, its highest potential is actually in the middle peri-urban. With the highest number of respondents and household members whose livelihoods are largely agriculture-based, the middle zone also has the highest number of households for whom agriculture is a source of income. It is also the only zone of the study area where agriculture is the main source of income for some of the study households and where, relative to the aggregate zonal income, income from agriculture is highest. Unsurprisingly, the majority of the households in the middle zone were of the view that agricultural development was a priority intervention for sustainable livelihoods among the indigenous households of Lower Kiandani.

The agricultural predominance of the middle zone is explicable in the sense that as a peri-urban environment, it presents the best trade-off between household space and locational factors (i.e. proximity to the core and household land size holdings) which give it the highest potential for

agricultural production for the local urban market. Again, it is worth mentioning that compared to the outer zone, a purely agricultural area, the middle zone is better developed in terms of infrastructure, particularly roads, which are important for the marketing of fresh farm produce. The study showed that 29% of the respondents in this zone considered the road network to be in good condition, as opposed to 18% in the outer zone.

The investigation also revealed that in order for households to overcome space constraints on agriculture as household land holdings diminish towards the inner areas, a few households have put effort to modernize and intensify their agricultural practices by growing vegetables in greenhouses and zero-grazing cattle and goats.



Figure 5.2.2.1(k): A Greenhouse in the Inner Peri-urban



Figure 5.2.2.1(l): A Zero-grazing Cattle Shed in the Inner Peri-urban

The study also revealed that a significant 44% of the households who keep animals do not have any land set aside for the activity. Save for chicken which can be reared on the traditional free range system or in cages with little land requirement, this finding, with respect to cattle, goats and sheep, would suggest these households graze on either public land such as road and riparian reserves or relatives' land. While this observation obviously raises issues of the sustainability (or lack of it) of livestock farming in the area, it would also elicit thought and investigation on the role of social capital (social networks and relationships) in the household access to natural capital (land) in the peri-urban.



Figure 5.2.2.1(m): Chicken in a Cage in the Middle Peri-urban



Figure 5.2.2.1(n): Cattle Grazing by the Road in a Residential area in the Inner Peri-urban

The foregoing location-specific issues notwithstanding, the study found that agricultural production in Lower Kiandani is generally beset with challenges, as 96% of the respondents attested. This is partly because of the regional setting of the area and partly because of its peri-urban nature. Noting that Lower Kiandani is within a semi-arid region, harsh climatic conditions, mainly low rainfall (and of course high temperatures and rates of evaporation) are a constraint to farming for the majority of the households. In addition, land sub-division and land use conversion from agriculture due to the invading urban activity, has significantly reduced sizes of household land holdings. Moreover, vices such as theft of crops and animals, mainly fuelled by the proximity to the town, are prevalent in the study area, of course in addition to generic problems such as high cost of farm inputs and lack of capital for agricultural development, as shown by Figure 5.2.2.1(o) below.

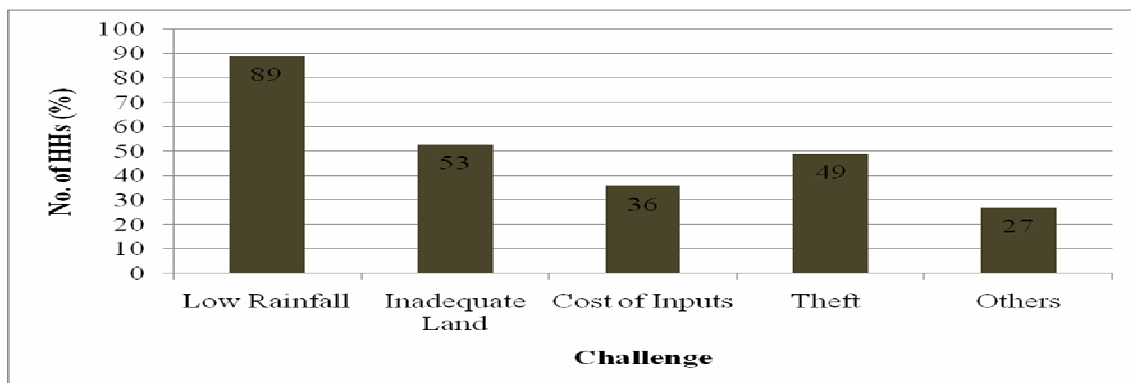


Figure 5.2.2.1(o): Agriculture-related Problems Faced by Households in Lower Kiandani

Source: Author

5.2.2.2 Non-agricultural Land Use Activities

Because of the challenges facing farming in Lower Kiandani and the consequential decline in the economic viability and sustainability of agriculture as a livelihood strategy, 36% of the sample households were found to have substantially changed the manner in which they use their land, either by introduction of new urban uses altogether, or by extending agricultural use to include new urban-based activities, thus changing use of part of the land while retaining the remainder for agricultural use, as depicted in Figure 5.2.2.1(c). The latter were found to be the majority. The motivation for land use change from agriculture was found to be the desire to maximize economic rent from land.

Non-agricultural land uses considered include mainly rental residential and commercial development. As shown in Figure 5.2.2.1(c), the study found that 34% of the households have introduced residential and commercial development on their land, out of which 30% were permutated with agriculture. Among the multiple land users, residential land use predominates with a prevalence of 40% compared to 7% for commercial development. The dominance of residential development in the study area appears to be attributable to the inability of the public sector to provide affordable urban housing, making housing delivery by private individuals an integral part of the national housing delivery initiative.

From a livelihood perspective, rental income from residential and commercial development was found to be a source of livelihood and the main source of income for 28% and 14% of the households respectively. Overall, rental income from these developments was found to constitute 19% of the aggregate income of the sample households {see Figures 5.2.2.1(h), 5.2.2.1(i) and 5.2.2.1(j) respectively}.

Whereas the above findings show that the new land uses are no doubt superior to agriculture with regard to economic rent, income and livelihood support, it is also clear from the foregoing that this economic advantage is only available to a minority of the indigenous peri-urban households in Lower Kiandani. One reason for this, obviously, is that the majority of them are still poor and vulnerable peasants who cannot raise the requisite financial capital and/or collateral to carry out residential and/or commercial development on their land. This form of economic exclusion

appears to typify most peri-urban environments. In the peri-urban areas of Kumasi, Ghana, for instance, Holland et al. (1996b) in Brook and Davila (2000: 33) reported that “many of the new villas being built in and around Kumasi belong to strangers rather than the local villagers”.

The investigation also reveals that much of the land use conversion in Lower Kiandani is not officially sanctioned. The study found that 61% of the households who have introduced new land uses had not sought planning permission from relevant authorities, an observation that appears to be corroborated by the fact that 34% of the respondents were also found to be oblivious of the existence and role of public agencies in private land use regulation. Whereas the majority (i.e. 88%) of the interviewees were generally not opposed to the new urban-based land uses and activities, it was also clear that poor planning and land use regulation had brought certain less-desirable urban activity. The proliferation of social entertainment places (specifically bars, pubs and lodgings) was cited by an overwhelming 91% of the respondents as some of the unwanted urban activity in the study area.

Table 5.2.2.2(a): Locational Variation of New Land Uses among the Study HHs

Source: Author

Observation Among HHs	Inner Zone	Mid- Zone	Outer Zone
New land uses	60%	14%	none
Multiple land uses	44%	14%	none
Residential development	52%	14%	none
Commercial development	20%	none	none
Rent is a source of income	48%	14%	none
Rent is the main source of income	28%	none	none
Contribution of rent to aggregate household income	37%	1%	none
Generally affirmative of urban development	84%	79%	73%

As shown in Table 5.2.2.2 above, the investigation revealed that the incidence of new land uses decreases with distance away from the city centre. Lying at an average radial distance of 3.7 km from the CBD, the outer peri-urban was found to be purely an agricultural zone with no

significant urban activity, save for sparse and small village shops (for daily domestic supplies like bread, sugar etc) that are typical of rural areas and which were considered not to constitute material change in land use. The lack of urban activity in this zone of the peri-urban can be explained in terms of its peripheral location with respect to the urban core, leading to poor (coverage by and state of) municipal infrastructure and services. Generally, the respondents were unanimous that the area is poorly serviced in terms of municipal infrastructure and services, with 55% of them citing the poor state of the roads; 91% citing poor water and sanitation services; 64% rating community facilities as poor and; 55% citing poor waste management.



Figure 5.2.2.2(a): Open Farms in the Outer Peri-urban Indicating Lack of Urban Activity

Source: Author



Figure 5.2.2.2(b): Small Village Shops in the Outer Peri-urban - (note the poor state of roads)

Source: Author

As one moves from the outer to the middle zone, stand-alone residential development, mainly medium and high-rent houses/apartments surrounded by farming activities, begin to emerge as the speculative value of land increases. And as the intensity of residential development increases towards the inner areas, complementary commercial activity in the form of small retail shops, medium-size restaurants, guest houses and offices - to cater for the emerging mobile urban residential population - also emerge. The study established that much of this development is by the middle-class newcomers as only 14% of the sample households were found to have constructed low-rent residential houses on their land, with rental income accounting for a paltry 1% of the aggregate household income.



Figure 5.2.2.2(c): A Block of Flats in a Maize Farm in the Middle Zone

Source: Author



Figure 5.2.2.2(d): A Small Shop at the Entrance to Residential Premises in the Middle Zone

Source: Author



Figure 5.2.2.2(e): A Signboard Giving Direction to an NGO Offices in the Middle Peri-urban

Source: Author



Figure 5.2.2.2(f): A Restaurant in the Middle Peri-urban

Source: Author

Lying at an average distance of 3.1 km from the CBD, the middle zone is closer to the core and therefore more reasonably within the city-centre commuting distance of many urban residents which makes it more ideal for residential development than the outer zone. Again, compared to the outer zone, the study found that the middle peri-urban is relatively more developed in terms of infrastructure, mainly the road network and water and sanitation services, which are important for urban development. One half, and another 21% of the respondents in this zone indicated the roads and water and sanitation services respectively, were at least fair.

The inner zone, as Table 5.2.2.2 clearly shows, was found to be predominantly urban with a mix of commercial and residential development, interspersed with pockets of cultivation. Land use conflicts, contradictions and contestations are most conspicuous in the inner peri-urban. Here, temporary/semi-permanent residential structures of mud, wattle and iron sheets, usually belonging to the original land owners, were found juxtaposed with middle and high-end residential bungalows, maisonettes and flats, owned or occupied by the newcomers. Commercial land use/activity was also found to be mixed, with hotels, bars and restaurants, furniture shops, funeral homes, roadside garages and other commercial activities all sitting side by side. Because it is situated closest to the CBD (at an average distance of 2.1 km), the inner zone is the most convenient part of the study area with respect to city-centre daily commuting. This makes it most ideal for residential and commercial development. Because of inadequate and often discordant regulatory oversight as evidenced by the study findings, the resulting activity jumble is sometimes inimical.



Figure 5.2.2.2(g): Temporary Structures next to Blocks of Flats in the Inner Peri-urban

Source: Author



Figure 5.2.2.2(h): Residential Development alongside Cultivation in the Inner Peri-urban

Source: Author



Figure 5.2.2.2(i): A Shop, Hotel and Bar in the Inner Zone *Source:* Author



Figure 5.2.2.2(j): A Mortuary in the Inner Zone *Source:* Author



Figure 5.2.2.2(k): A Roadside Motor Vehicle Repair Garage Next to a Block of Flats in the Inner Zone *Source:* Author



Figure 5.2.2.2(l): High-end Maisonettes and Bungalows in the Inner Zone *Source:* Author

As summarized in Table 5.2.2.2, the study revealed that 60% of the research households in the inner zone have introduced urban activities on their land, with 44% of them having multiple land uses. Residential development was found to comprise 52% of the cases of urban development compared to 20% for commercial development. Because of the significance of residential/commercial activity in the zone, rent was found to be a source of income for 48% of the sample households and indeed the main source of income for 28% of them. Overall, rental

income was found to contribute 37% of the aggregate income of all the study households in the inner zone {also see Figure 5.2.2.2(m) and Tables 5.2.2.2(b), 5.2.2.2(c) and 5.2.2.2(d) below, respectively}.

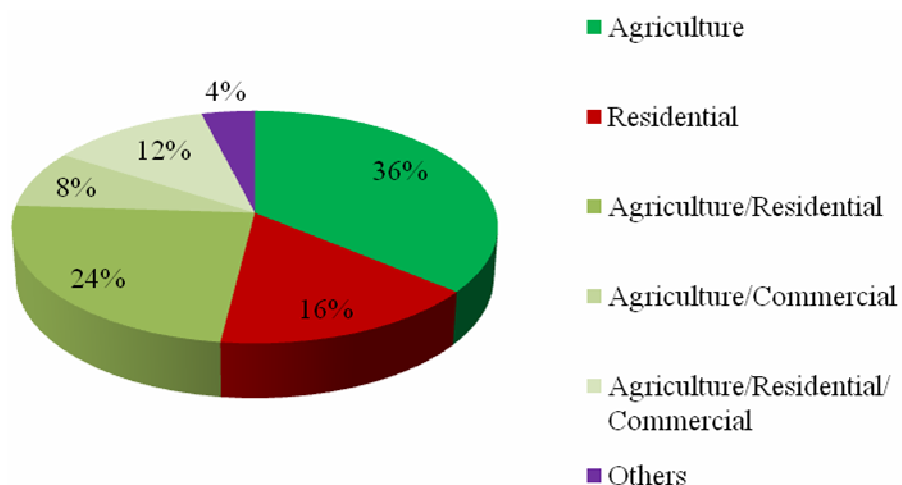


Figure 5.2.2.2(m): Households by Land Uses in the Inner Zone *Source: Author*

Table 5.2.2.2(b): Sources of Household Income in the Inner Peri-urban *Source: Author*

Source of Income	No. of HHs	Percentage
Agriculture	3	12
Formal Employment	5	20
Formal Self-employment	1	4
Informal Employment	14	56
Informal Self-employment	13	52
Rent	12	48

Table 5.2.2.2(c): Households by Main Source of Income in the Inner Peri-urban *Source: Author*

Source of Income	No. of HHs	Percentage
Formal employment	3	12
Informal employment	11	44
Informal self employment	4	16
Rent	7	28

Table 5.2.2.2(d): Household Income by Sources in the Inner Peri-urban *Source: Author*

Source	Income	Percent
Agriculture	204,400	1
Formal Employment	2,400,000	16
Formal Self Employment	520,000	4
Informal Employment	3,325,200	22
Informal self employment	2,886,000	20
Rent	5,512,800	37

5.2.2.3 Formal and Informal Employment

In this study, formal and informal employment are differentiated on the basis of ILO (2003) definition where an informal activity is work outside the governmental regulatory framework hence, not subject to labour legislation, social protection, taxes or employment benefits. The opposite applies for formal work.

The study revealed that because of the declining household land holdings, and therefore the diminishing agricultural value of such land, employment opportunities in non-farm formal and informal sectors provide a livelihood for the majority of the study households. Combined, these two sectors were found to constitute the main occupations for 82% of the respondents {see figure 5.2.2.1(g)} and coincidentally, the main sources of income for an equal number of households {see figure 5.2.2.1(i)}. They are also the main occupations for 90% of all the sample household members. Combined, the two sectors accounted for 71% of the aggregate income of all the study households {see figure 5.2.2.1(j)}.

As shown in the above figures {5.2.2.1(g, i and j)}, the formal sector was found to provide full-time employment for a combined 50% of the respondents as professionals {civil servants, teachers, lecturers, pharmacists, etc (18%)}, technicians (14%) and clerical personnel (18%), in both the public and private sectors. However, from a household income perspective, the study revealed that the sector is the main source of income for only 20% (18% salaried; 2% self employed) of the households but accounts for 37% (28% salaried; 9% self employed) of the income of all the sample households. These findings appear to suggest that formal employment is a better source of income for the indigenous peri-urban households compared to informal

employment. Many researchers have also used different studies carried elsewhere to arrive at the same conclusion. In their study of livelihoods in Accra, Ghana, for instance, Maxwell et al. (2000:36) found that “professionals have significantly higher incomes than petty traders, street food vendors, and laborers”.

The informal sector was also found to be a significant component of a household livelihood portfolio, accounting for the occupations of 32% of the respondents. Within these, Craft and Related works (i.e. masonry, welding, motor vehicle repair) were found to provide employment to 22% of the respondents while small-scale business (mainly shop-keeping) was found to employ another 10% of the respondents. Constituting the main source of income for 62% (46% salaried; 16% self employed) of the households, the sector was also found to account for 34% (20% salaried; 14% self employed) of the total income of the sample households.

From the above findings, the study appears to suggest two things with respect to the informal sector in the study area. Firstly, for the majority of the study households, the involvement in and the prevalence of the informal sector as a source of income may largely be a survivalist alternative for those who have been rationed out of formal employment opportunities by educational constraints. According to the study, the majority (78% and 74%) of the respondents and sample household members respectively, are not schooled beyond secondary level of education, meaning they possess little professional/technical skills which are prerequisites for much of the formal employment opportunities. Thus, their involuntary and non-competitive engagement in the informal sector can only earn them lower remuneration compared to formal employment which is generally better-rewarding.

Secondly, the above observation notwithstanding, the study appears to suggest that informal employment among the households is heterogeneous, consisting of those who are voluntarily informal (i.e. self-employed) and those in involuntary informality who cannot afford to be unemployed but have no hope for a formal job (i.e. paid workers). Whereas the majority of the households are involved in the less-rewarding informal paid employment, mainly craft and related activities and elementary work, the study shows that informal self-employment in business presents opportunity for better economic rewards for households. The fact that a small

number (16%) of the sample households in self-employment were found to contribute 14% of the aggregate income of all the study households, comparing closely with the relatively large number (46%) of the paid workers contributing 20% of the aggregate income, is a clear testimony to this argument. It would, therefore, appear that enhancing access to financial capital as well as human capital (business skills training) among the indigenous households would be one way of empowering the target community to exploit the economic potential of self employment and better their livelihoods.

From a locational point of view, the engagement in formal and informal employment in the study area did not appear to suggest any significant locational characteristics except the conspicuous absence of formal self-employment in the outer zone of the study area, as indicated in Table 5.2.2.3 below.

Table 5.2.2.3: Locational Variation of Formal and Informal Employment among the Study HHs

Source: Author

Observation	Inner zone		Middle zone		Outer zone	
	Paid	Self	Paid	Self	Paid	Self
Formal Employment						
Source of income	20%	4%	29%	7%	27%	-
Main source of income	12%	-	29%	7%	18%	-
Contribution to aggregate income	16%	4%	34%	22%	50%	-
Informal employment						
Source of income	56%	52%	50%	21%	73%	45%
Main source of income	44%	16%	43%	7%	55%	27%
Contribution to aggregate income	22%	20%	14%	3%	26%	21%

5.2.3 Household Location, Household Land Holding and Household Income

In order to draw conclusions about how a household's income is affected by the household locational and space factors (i.e. distance from city centre and household land holding respectively), the study applied three inferential methods: hypothesis-testing; correlation coefficients and; coefficients of variation – to infer the relationship between the three variables.

5.2.3.1 Hypothesis Testing

Tables 5.2.3.1(a-c) below represent the household incomes in Kenya shillings for the three samples of selected households in the three sub-zones of the study area - i.e. the Inner Zone, Middle Zone and Outer Zone respectively - as defined in the methodology section.

Table 5.2.3.1(a): Sample Household Incomes in the Inner Zone *Source: Author*

Household Serial No.	Income(Kshs)	Household Serial No	Income(Kshs)
1	48,000	14	480,000
2	60,000	15	584,000
3	138,000	16	612,000
4	148,800	17	720,000
5	168,000	18	768,000
6	252,000	19	780,000
7	336,000	20	792,000
8	348,000	21	1,080,000
9	360,000	22	1,080,000
10	360,000	23	1,240,000
11	406,800	24	1,356,000
12	420,000	25	1,920,000
13	420,000		

Table 5.2.3.1(b): Sample Household Incomes in the Middle Zone *Source: Author*

Household Serial No.	Income(Kshs)	Household Serial No	Income(Kshs)
1	72,000	8	600,000
2	110,000	9	660,000
3	135,120	10	885,600
4	168,000	11	978,000
5	240,000	12	1,250,000
6	261,200	13	1,505,440
7	492,000	14	2,280,000

Table 5.2.3.1(c): Sample Household Incomes in the Outer Zone *Source: Author*

Household Serial No.	Income(Kshs)	Household Serial No	Income(Kshs)
1	78,000	7	360,000
2	96,720	8	480,000
3	120,000	9	516,000
4	216,000	10	850,000
5	240,000	11	1,813,240
6	300,000		

The **Null** and **Alternative** hypotheses were stated as:

- **Null Hypothesis** : *There is no difference in the incomes of indigenous peri-urban households due to their locations with respect to the city centre.* In other words, the mean incomes of the indigenous households in the Inner, Middle and Outer zones of the peri-urban are statistically the same. Thus, $H_0: \mathbf{u}_1 = \mathbf{u}_2 = \mathbf{u}_3$ for \mathbf{u}_i being the respective mean incomes of the indigenous peri-urban household populations represented by the above three samples.

- **Alternative Hypothesis**: *There is a significant difference in the incomes of indigenous peri-urban households due to their locations with respect to the city centre.* Therefore the mean household incomes in the Inner, Middle and Outer zones are statistically different. Thus, $H_1: \mathbf{u}_1 \neq \mathbf{u}_2 \neq \mathbf{u}_3$ for \mathbf{u}_i being the respective mean incomes of the indigenous peri-urban household populations represented by the above three samples.

Using the *One-way ANOVA* technique, the study set out to carry out an *F-test* at a 95% confidence level (i.e. at 0.05 level of significance) to examine if the three samples of incomes represented populations with the same mean income i.e. if there were significant differences between the sample means. The following steps were followed:

1. The mean income in Kenya shillings of each of the three samples was calculated. Since the sample incomes were intended to form the basis for inference on the study population, it was considered that continuous/interval data would be more useful than the

discrete values observed. The sample incomes were therefore re-organized into frequency distributions as represented in Tables 5.2.3.1(d-f) below.

Table 5.2.3.1(d): Frequency Distribution for Household Incomes in the Inner Zone

Source: Author

Class interval (Kshs)	Midpoint (x)	Frequency (f)	fx
40,000 - 190,000	115,000	5	575000
190,000 - 340,000	265,000	2	530000
340,000 - 490,000	415,000	7	2905000
490,000 - 640,000	565,000	2	1130000
640,000 - 790,000	715,000	3	2145000
790,000 - 940,000	865,000	1	865000
940,000 - 1,090,000	1,015,000	2	2030000
1,090,000 - 1,240,000	1,165,000	1	1165000
1,240,000 - 1,390,000	1,315,000	1	1315000
1,390,000 - 1,540,000	1,465,000	0	0
1,540,000 - 1,690,000	1,615,000	0	0
1,690,000 - 1,840,000	1,765,000	0	0
1,840,000 - 1,990,000	1,915,000	1	1915000
		$\Sigma = 25$	$\Sigma = 14575000$

Table 5.2.3.1(e): Frequency Distribution for Household Incomes in the Middle Zone

Source: Author

Class Interval (Kshs)	Midpoint(x)	Frequency(f)	fx
70,000 - 220,000	145000	4	580000
220,000 - 370,000	295000	2	590000
370,000 - 520,000	445000	1	445000
520,000 - 670,000	595000	2	1190000
670,000 - 820,000	745000	0	0
820,000 - 970,000	895000	1	895000

970,000 - 1,120,000	1045000	1	1045000
1,120,000 - 1,270,000	1195000	1	1195000
1,270,000 - 1,420,000	1345000	0	0
1,420,000 - 1,570,000	1495000	1	1495000
1,570,000 - 1,720,000	1645000	0	0
1,720,000 - 1,870,000	1795000	0	0
1,870,000 - 2,020,000	1945000	0	0
2,020,000 - 2,170,000	2095000	0	0
2,170,000 - 2,320,000	2245000	1	2245000
		$\Sigma = 14$	$\Sigma = 9680000$

Table 5.2.3.1(f): Frequency Distribution for Household Incomes in the Outer Zone

Source: Author

Class Interval (Kshs)	Midpoint(x)	Frequency(f)	fx
70,000 - 220,000	145000	4	580000
220,000 - 370,000	295000	3	885000
370,000 - 520,000	445000	2	890000
520,000 - 670,000	595000	0	0
670,000 - 820,000	745000	0	0
820,000 - 970,000	895000	0	0
970,000 - 1,120,000	1045000	1	1045000
1,120,000 - 1,270,000	1195000	0	0
1,270,000 - 1,420,000	1345000	0	0
1,420,000 - 1,570,000	1495000	0	0
1,570,000 - 1,720,000	1645000	0	0
1,720,000 - 1,870,000	1795000	1	1795000
		$\Sigma = 11$	$\Sigma = 5195000$

2. The sample means \bar{x}_1 , \bar{x}_2 , and \bar{x}_3 were computed as $\bar{x}_i = \frac{\sum Fx}{\sum F}$ which gave the sample means as: $\bar{x}_1=583,000$, $\bar{x}_2= 691428.6$ and $\bar{x}_3 = 472272.7$ for the inner, middle and outer zones respectively,

3. The mean of the sample means above was then worked out as:

$$\bar{x} = \frac{\bar{x}_1 + \bar{x}_2 + \bar{x}_3}{k} = 582233.8, \text{ for } k = 3,$$

4. The deviations of the sample means (\bar{x}_1 , \bar{x}_2 , \bar{x}_3) from the mean of the sample means (\bar{x}) were then taken. The squares of the deviations were calculated and each square multiplied by the number of sample members in the corresponding sample. The sum of squares for variance between the samples (denoted as **SS_{between}**) was then obtained as:

$$\text{SS}_{\text{between}} = n_1(\bar{x}_1 - \bar{x})^2 + n_2(\bar{x}_2 - \bar{x})^2 + n_3(\bar{x}_3 - \bar{x})^2 = 2.9995 \times 10^{11}$$

for $n_1=25$, $n_2=14$ and $n_3 = 11$,

5. Dividing **SS_{between}** by the degrees of freedom (d.f) between the three samples (i.e. $k - 1$) gave the variance or the mean square between the samples (denoted as **MS_{between}**) as:

$$\text{MS}_{\text{between}} = \frac{\text{SS}_{\text{between}}}{k-1} = 1.49975 \times 10^{11},$$

6. The deviations of the sample household incomes (i.e. x_{1i} , x_{2i} , x_{3i}) from the corresponding means of the samples were obtained for the three samples. The squares of the deviations were then calculated and added up to give the sum of squares for variance within samples (denoted as **SS_{within}**) as :

$$\text{SS}_{\text{within}} = \sum (x_{1i} - \bar{x}_1)^2 + \sum (x_{2i} - \bar{x}_2)^2 + \sum (x_{3i} - \bar{x}_3)^2 = 1.28722 \times 10^{13}$$

for $1i = 1, 2, 3 \dots 25$; $2i = 1,2,3\dots 14$ and $3i = 1,2,3\dots 11$ as set out in Tables 5.2.3.1(g-i) below:

Table 5.2.3.1(g): Sum of Squares of Deviations of Sample Household Incomes from the
Sample mean in the Inner Zone *Source: Author*

Household Number	X_{1i}	\bar{X}_I	$X_{1i} - \bar{X}_I$	$(X_{1i} - \bar{X}_I)^2$
1	48,000	583,000	-535,000	2.862×10^{11}
2	60,000	583,000	-523,000	2.735×10^{11}
3	138,000	583,000	-445,000	1.98×10^{11}
4	148,800	583,000	-434,200	1.885×10^{11}
5	168,000	583,000	-415,000	1.722×10^{11}
6	252,000	583,000	-331,000	1.096×10^{11}
7	336,000	583,000	-247,000	6.101×10^{10}
8	348,000	583,000	-235,000	5.523×10^{10}
9	360,000	583,000	-223,000	4.973×10^{10}
10	360,000	583,000	-223,000	4.973×10^{10}
11	406,800	583,000	-176,200	3.105×10^{10}
12	420,000	583,000	-163,000	2.657×10^{10}
13	420,000	583,000	-163,000	2.657×10^{10}
14	480,000	583,000	-103,000	1.061×10^{10}
15	584,000	583,000	1,000	1.0×10^6
16	612,000	583,000	29,000	8.41×10^8
17	720,000	583,000	137,000	1.877×10^{10}
18	768,000	583,000	185,000	3.423×10^{10}
19	780,000	583,000	197,000	3.881×10^{10}
20	792,000	583,000	209,000	4.368×10^{10}
21	1,080,000	583,000	497,000	2.47×10^{11}
22	1,080,000	583,000	497,000	2.47×10^{11}
23	1,240,000	583,000	657,000	4.316×10^{11}
24	1,356,000	583,000	773,000	5.975×10^{11}
25	1,920,000	583,000	1,337,000	1.788×10^{12}
				$\Sigma = 4.986 \times 10^{12}$

Table 5.2.3.1(h): Sum of Squares of Deviations of Sample Household Incomes from the Sample Mean in the Middle Zone *Source: Author*

Household Number	X_{2i}	\bar{x}_2	$X_{2i} - \bar{x}_2$	$(X_{2i} - \bar{x}_2)^2$
1	72,000	691428.6	-619,429	3.83692×10^{11}
2	110,000	691428.6	-581,429	3.38059×10^{11}
3	135,120	691428.6	-556,309	3.09479×10^{11}
4	168,000	691428.6	-523,429	2.73977×10^{11}
5	240,000	691428.6	-451,429	2.03788×10^{11}
6	261,200	691428.6	-430,229	1.85097×10^{11}
7	492,000	691428.6	-199,429	39771766498
8	600,000	691428.6	-91,429	8359188898
9	660,000	691428.6	-31,429	987756898
10	885,600	691428.6	194,171	37702532578
11	978,000	691428.6	286,571	82123167298
12	1,250,000	691428.6	558,571	3.12002×10^{11}
13	1,505,440	691428.6	814,011	6.62615×10^{11}
14	2,280,000	691428.6	1,588,571	2.52356×10^{12}
				$\Sigma = 5.36121 \times 10^{12}$

Table 5.2.3.1(i): Sum of Squares of Deviations of Sample Household Incomes from the Sample Mean in the Outer Zone *Source: Author*

Household Number	X_{3i}	\bar{x}_3	$X_{3i} - \bar{x}_3$	$(X_{3i} - \bar{x}_3)^2$
1	78,000	472272.7	-394,273	1.55451×10^{11}
2	96,720	472272.7	-375,553	1.4104×10^{11}
3	120,000	472272.7	-352,273	1.24096×10^{11}
4	216,000	472272.7	-256,273	65675696765
5	240,000	472272.7	-232,273	53950607165
6	300,000	472272.7	-172,273	29677883165

7	360,000	472272.7	-112,273	12605159165
8	480,000	472272.7	7,727	59711165.29
9	516,000	472272.7	43,727	1912076765
10	850,000	472272.7	377,727	1.42678×10^{11}
11	1,813,240	472272.7	1,340,967	1.79819×10^{12}
				$\Sigma = 2.52534 \times 10^{12}$

7. The sum of the squares for variance within the samples in (6) above was then divided by the degrees of freedom (d.f) within the samples to give the variance or the mean square within the samples (denoted as MS_{within}) as:

$$MS_{\text{within}} = \frac{SS_{\text{within}}}{n-k} = 2.73877 \times 10^{11}, \text{ for } n \text{ (i.e. study sample size)} = 50 \text{ and } k = 3$$

8. the **F-ratio** was worked out as $F = \frac{MS_{\text{between}}}{MS_{\text{within}}} = 0.547598983 = 0.5476$,

9. Finally the ANOVA table for the test was set up as below:

Table 5.2.3.1(j): The ANOVA Table for the Hypothesis Test *Source: Author*

Source of Variation	SS	d.f	MS	F-Ratio (computed)	5% F-Limit (from F-table)
<i>Between Samples</i>	2.9995×10^{11}	2	1.49975×10^{11}	0.5476	F(2,47) = 3.20
<i>Within Samples</i>	1.28722×10^{13}	47	2.73877×10^{11}		

Since the F-Ratio as computed from the samples, i.e. **0.5476**, was found to be less than Critical F at (2, 47) degrees of freedom and 0.05 level of significance, i.e. **3.20**, the Null Hypothesis was accepted. *There is no difference in the incomes of the indigenous peri-urban households due to their locations with respect to the city centre.* This suggests that the differences in the household incomes that were recorded in the interviews were just a matter of chance.

By extension, it is sensible to deduce, hypothetically, that: *there is no difference in the incomes of the indigenous peri-urban households due to their land size holdings*, because, naturally,

average household land size holdings usually differ depending on the average household location in the peri-urban zone. The average household land size holding, a function of land sub-division, would naturally decrease with increasing intensity of urban development as one moves towards the city centre. The converse is true. This means that the average household land size holdings would therefore increase away from the city centre so that it is lowest in the inner peri-urban and highest in the outer peri-urban. The observation that the average incomes of indigenous peri-urban households are statistically the same irrespective of the household's location in the peri-urban would, therefore, logically imply that: *household land holdings do not significantly influence household incomes.*

5.2.3.2 Correlation coefficients

Table 5.2.3.2 below gives corresponding values of household income; household land holding and; distance from the city centre, for the entire sample of the study households. Using EXCEL software, the *Pearson's correlation coefficient* between household income and household land holding was found to be **0.22** while that between household income and household location (i.e. distance) from the city centre was found to be **-0.14**. These coefficients corroborate the result of the hypothesis test and the deductions made in 5.2.3.1 above. The two coefficients, though inverse, suggest very weak relationships between household income and household space and locational factors (i.e. land holding and distance from the city centre).

Table 5.2.3.2: Household Income, Land Holding and Distance from the city centre

Source: Author

SNo.	Income	Land Holding	Distance from City Centre	SNo.	Income	Land Holding	Distance from City Centre
1	584,000	0.52	2.9386888	26	72,000	0.257	2.9273034
2	138,000	0.074	1.6673872	27	885,600	0.395	1.9703769
3	48,000	1.729	1.746179	28	1,250,000	3	3.4425212
4	406,800	0.173	1.5780307	29	2,280,000	2.47	2.526829
5	1,240,000	0.25	1.6535686	30	261,200	0.371	1.9466782
6	1,080,000	0.111	1.7018593	31	135,120	3.458	3.5722352

7	768,000	0.222	2.1001809	32	660,000	6.422	3.6213602
8	1,920,000	2.5	1.9098976	33	110,000	0.648	3.3593102
9	148,800	0.111	1.9115577	34	1,505,440	52	3.518194
10	348,000	0.399	2.3961354	35	240,000	3.458	3.3775188
11	420,000	0.111	1.7464126	36	168,000	1.976	3.6001922
12	1,080,000	0.469	1.8002244	37	600,000	4.446	2.8860916
13	480,000	0.198	1.7893611	38	978,000	4.199	2.7921592
14	780,000	0.111	1.8006088	39	492,000	10.374	3.2197149
15	1,356,000	0.153	1.7830861	40	300,000	0.939	3.7147324
16	336,000	0.111	1.8635753	41	120,000	2.223	3.7254848
17	360,000	0.25	2.4289185	42	1,813,240	0.543	3.6161975
18	792,000	0.371	1.8332466	43	850,000	4	3.7207075
19	612,000	0.49	2.0017452	44	216,000	1	3.7000162
20	420,000	0.148	2.1616764	45	360,000	0.25	4.0065837
21	168,000	0.111	2.4552819	46	96,720	9.88	3.8885936
22	252,000	0.25	2.883138	47	480,000	2	3.8625558
23	720,000	2.223	2.8818064	48	78,000	9.386	3.1894616
24	360,000	1.037	2.2138121	49	516,000	1.828	3.4076256
25	60,000	1.5	2.1564863	50	240,000	1	3.540692

5.2.3.3 Standard Deviations and Coefficients of Variation

These were derived for the purpose of illustrating the inter-household variability of incomes and land holdings within the study area.

Table 5.2.3.3(a): Standard Deviation and Coefficient of Variation in Household Incomes

Source: Author

CLASS INTERVAL		MID(X)	F	FX	$X - \bar{x}$	$(X - \bar{x})^2$	$F(X - \bar{x})^2$
40,000	190,000	115000	12	1380000	-474000	2.24676×10^{11}	2.69611×10^{12}
190,000	340,000	265000	7	1855000	-324000	1.04976×10^{11}	7.34832×10^{11}
340,000	490,000	415000	9	3735000	-174000	3.0276×10^{10}	2.72484×10^{11}
490,000	640,000	565000	5	2825000	-24000	5.76×10^8	2.88×10^9
640,000	790,000	715000	4	2860000	126000	1.5876×10^{10}	6.3504×10^{10}
790,000	940,000	865000	3	2595000	276000	7.6176×10^{10}	2.28528×10^{11}
940,000	1,090,000	1015000	3	3045000	426000	1.81476×10^{11}	5.44428×10^{11}
1,090,000	1,240,000	1165000	1	1165000	576000	3.31776×10^{11}	3.31776×10^{11}
1,240,000	1,390,000	1315000	2	2630000	726000	5.27076×10^{11}	1.05415×10^{12}
1,390,000	1,540,000	1465000	1	1465000	876000	7.67376×10^{11}	7.67376×10^{11}
1,540,000	1,690,000	1615000	0	0	1026000	1.05268×10^{12}	0
1,690,000	1,840,000	1765000	1	1765000	1176000	1.38298×10^{12}	1.38298×10^{12}
1,840,000	1,990,000	1915000	1	1915000	1326000	1.75828×10^{12}	1.75828×10^{12}
1,990,000	2,140,000	2065000	0	0	1476000	2.17858×10^{12}	0
2,140,000	2,290,000	2215000	1	2215000	1626000	2.64388×10^{12}	2.64388×10^{12}
			$\Sigma=50$	$\Sigma=29450000$			$\Sigma=1.24812 \times 10^{13}$

Mean income = $\frac{\Sigma FX}{\Sigma F} = 589,000$; Standard Deviation in Income = $\sqrt{\frac{\Sigma F(X - \bar{x})^2}{N-1}} = 504,696.312$

Coefficient of Variation in Income = $\frac{\text{Standard Deviation}}{\text{mean}} \times 100 = 85.7\%$

Table 5.2.3.3(b): Standard Deviation and Coefficient of Variation in Household Land Holdings

Source: Author

CLASS INTERVAL		MID(X)	F	FX	$X - \bar{x}$	$(X - \bar{x})^2$	$F(X - \bar{x})^2$
0.074	3.574	1.824	42	76.608	-1.68	2.8224	118.5408
3.574	7.074	5.324	4	21.296	1.82	3.3124	13.2496
7.074	10.574	8.824	3	26.472	5.32	28.3024	84.9072

10.574	14.074	12.324	0	0	8.82	77.7924	0
14.074	17.574	15.824	0	0	12.32	151.7824	0
17.574	21.074	19.324	0	0	15.82	250.2724	0
21.074	24.574	22.824	0	0	19.32	373.2624	0
24.574	28.074	26.324	0	0	22.82	520.7524	0
28.074	31.574	29.824	0	0	26.32	692.7424	0
31.574	35.074	33.324	0	0	29.82	889.2324	0
35.074	38.574	36.824	0	0	33.32	1110.222	0
38.574	42.074	40.324	0	0	36.82	1355.712	0
42.074	45.574	43.824	0	0	40.32	1625.702	0
45.574	49.074	47.324	0	0	43.82	1920.192	0
49.074	52.574	50.824	1	50.824	47.32	2239.182	2239.1824
			$\Sigma = 50$	$\Sigma = 175.2$			$\Sigma = 2455.88$

$$\text{Mean Land Holding} = \frac{\Sigma FX}{\Sigma F} = 3.504, \text{ Standard Deviation} = \sqrt{\frac{\Sigma F(X-\bar{x})^2}{N-1}} = 7.079$$

$$\text{Coefficient of variation in Household land holdings} = \frac{\text{Standard Deviation}}{\text{mean}} \times 100 = 202\%$$

The study sample was found to have a mean income of Kshs 589,000; standard deviation of Kshs. 504,696.312 and; a coefficient of variation in income of 85.7%, as derived from Table 5.2.3.3(b) above, suggesting a high degree of inter-household income variability. Similarly, the sample was found to have a mean household land holding of 3.504 acres; standard deviation of 7.079 acres and; a coefficient of variation in household land holding of 202%, again suggesting a very high degree of inter-household land holding variability.

The high variability in household incomes and land holdings is attributable to the fact that Lower Kiandani, like any other peri-urban environment, exhibits a high degree of socio-economic dynamism and inter-household dissonance with regard to occupations, economic activities, land holdings, etc. As a result, households benefit from rural and urban opportunities at different levels. In his analysis of Southeastern Asian cities, Narain (2010:5) observed the same thing and concluded that “wide inequalities can exist in peri-urban areas on account of the varying capabilities of peri-urban residents to benefit from access to urban and rural assets and livelihood

opportunities”. Because of the high degree of socio-economic variation, it is common to find poor households - who sell most of their land to newcomers for urban development - juxtaposed geographically with relatively wealthier households who hold larger parcels of land in anticipation of enhanced future land values or future own rental residential and/or commercial development.

From the above analyses (i.e. hypothesis test, correlation coefficients and standard deviations/coefficients of variation), two questions, albeit contradictory, appear to beg for answers. One, **do the results suggest that among the study households, the net decrease in the agricultural productivity of land as a result of decreasing household land sizes does not necessarily imperil these households in terms of their livelihoods and incomes?** Like it has been observed by many authors, peri-urban development can be both beneficial as well as detrimental to peri-urban agricultural communities. The peri-urban has been described as a mosaic of opportunities and threats that is in constant state of flux, over space and time. While it occasions loss of agricultural land and eventually diminishes the value of such land for primary production and associated livelihoods, peri-urbanization also does present new opportunities for urban-based livelihoods. Of particular significance to the foregoing is the high degree of livelihood diversification and economic dynamism associated with peri-urban settings. As observed elsewhere, Narain (2010); Adom (2011), the PUI is often characterized by inter and intra-household livelihoods differentiation even for households within the same location of the interface. Indigenous peri-urban households may therefore engage in multiple farm and non-farm/off-farm employment strategies to construct their livelihoods across both rural and urban domains. As a result, one could argue that because of the mix of livelihood activities and strategies, the positive and negative effects of both urban and rural economies equalize at different locations of the PUI.

The second question that appears to seek answers is: **is it possible that the indigenous households, especially those in the inner areas, have not taken sufficient advantage of the opportunities presented by urban development?** Some key findings appear to suggest this is the likely scenario in Lower Kiandani. First, the study findings indicate that the potential for rental income, from rental commercial/residential development, to support household livelihoods

especially in the inner areas, is quite superior compared to agricultural income. The study revealed that in the overall, only 28% of the sample households enjoyed rental income despite the high potential and indeed only half of these relied on rent as their main source of income. In addition, rental income was found to contribute 19% of the aggregate household income in Lower Kiandani. On the other hand, 92% of the sample households practice agriculture, but only 16% of them do it as a source of income, which contributes a paltry 5% of the aggregate households' income, with the rest doing it purely for the purpose of food supply. Thus, as a source of income, agriculture as currently practiced is definitely inferior to non-agricultural land uses especially in a semi-arid area like Lower Kiandani. The fact that household incomes are the same in the inner and outer locations implies that the potential of the inner areas is under-exploited. Furthermore, average household incomes for the three zones are low.

Secondly, the finding that there is a general poor performance of informal self-employment as a source of household income in the area appears to suggest the potential benefits of urbanization and urbanity have not sufficiently trickled down to the indigenous households. The study revealed that informal self-employment is the main source of income for only 16% of the households but contributes 20% of the aggregate households' income in the inner peri-urban, compared to 44% and 14% respectively for informal paid-employment in the same zone, suggesting the former is more rewarding but its potential has not been fully exploited. The third observation that appears to support the second question is that for the majority (76%) of those who had sub-divided and sold a portion of their family land in the inner peri-urban, the proceeds were used for ordinary day-to-day expenses such as food, clothing, medical care, school fees, etc, as opposed to real estate investment which is a sustainable source of income. Despite the high potential for rental income to support livelihoods in this zone, only 24% of the respondents appealed for financial support as a priority intervention strategy for livelihoods in Lower Kiandani. The study is of the opinion that for some reason, the majority of the study households are oblivious of the potential for rental income in this zone. In the outer areas, however, all the respondents were of the view that rental residential development was the most ideal use of their land, safe their location is too far from the city centre and infrastructure/ services are poor.

5.2.4 Preferred Interventions for Improvement of Household Livelihoods

As shown in Figure 5.2.4 below, the interviewees proposed a wide range of programmes and projects dealing with community facilities; infrastructure; employment; finance; governance; agriculture and; town planning services, which they considered best interventions for improvement of livelihoods in Lower Kiandani. As shown, there is divergent opinion among the study households on preferred areas of policy intervention, partly because of the social diversity which characterizes these households, and partly because of the multiplicity of development problems/needs in the area arising out of official disregard.

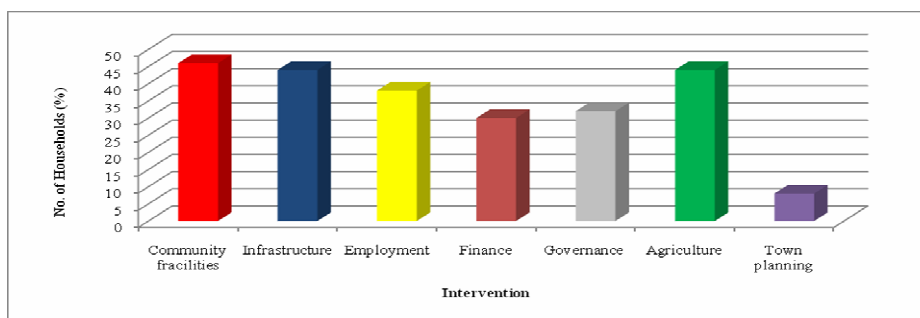


Figure 5.2.4: Respondents' Preferred Interventions for Improvement of Livelihoods in Lower Kiandani, by Sectors Source: Author

The highest number of respondents (46%) felt that provision of community facilities should be a priority in Lower Kiandani. This is not surprising because the investigation revealed a severe lack of such facilities, especially nursery and primary schools, in the area. The study found that the whole of the study area is served by only two public primary schools, Mumbuni and Miwongoni, located at the extreme inner and outer locations respectively. Because agriculture is an important component of the livelihoods of the indigenous households of Lower Kiandani, 44% of them felt that investment in agricultural development, particularly the promotion of irrigated agriculture and agricultural extension services, was a key intervention for sustainable livelihoods in the area. An equal number of the households were of the view that infrastructural development, particularly the improvement of the road network and domestic water supply, was a development priority for the area. This is in agreement with the research finding that 60% and 88% of the respondents felt the area road network and domestic water supply respectively were poor.

Perhaps because of the low potential for agriculture to sustain livelihoods in the study area, 38% of the respondents broadly suggested that public policy intervention in Lower Kiandani needs to address the high rate of unemployment in the area, mainly by revitalizing industrial activity in the town's moribund industrial sector as well as training youth in relevant industrial skills. Related to this, 30% of the respondents appealed for financial support in the form of government loans and commercial credit facilities for investment in agriculture, business and rental housing development. Another 32% of the respondents felt that Lower Kiandani was underrepresented in terms of political leadership and governance which, according to them, was undermining development in the area. It is worth mentioning that the finding that 50% and 52% of the respondents did not know the names of their electoral ward and elected leader respectively, suggests that the efficacy of the political leadership in the area may be wanting. Finally, 8% of the interviewees suggested that town planning services in the form of land use planning and development control, were important for sustainable livelihoods in Lower Kiandani

The above ideas appear to suggest that in order to improve the livelihoods of the study households, policy intervention strategies need to be multi-sectoral and multi-objective enough to promote multiple livelihood activities, enhance incomes and safeguard general well-being of the research households. Such policy must recognize the interdependence of and promote household access to the various livelihood assets – natural capital, physical capital, social capital, financial capital and human capital.

6.0 CHAPTER SIX: SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary

As pointed out under the introductory section of this work, the purpose of the study was to investigate how peri-urban development affects the livelihoods of indigenous households. Lower Kiandani, a peri-urban area of Machakos town which is also an administrative sub-location, was used as a case study. The work involved collection of household data using semi-structured questionnaires as interview schedules. Key informant data were collected using open-ended questionnaires as interview schedules. Direct observations were also made through field measurements and photography. Secondary data were obtained from various relevant Government Departments within and without Machakos County.

Data analysis involved pre-analysis (editing, coding, input and validation) upon which the actual analysis was carried out using SPSS and EXCEL computer softwares. Both qualitative and quantitative techniques were used in the analysis. Quantitative methods used both descriptive and inferential statistics. Descriptive tools were mainly means, variability measures and graphical methods. Inferential statistics employed correlation coefficients as well as hypothesis setting and testing using the One-Way ANOVA technique, at 95% confidence level.

The study found that land sub-division and land use change (peri-urban development) has diminished the agricultural value of land in Lower Kiandani while at the same time creating new opportunities for urban-based livelihoods. The majority of the study households were found to have diversified their livelihoods to embrace multiple activities as sources of food and income. However, an empirical test on the incomes of three samples of the indigenous households, based on their location with respect to the city centre, revealed that the mean incomes of the populations represented by the samples were statistically the same, meaning that there was no difference in the incomes of the indigenous households due to their location in the study area.

6.2 Conclusion

The study has shown that because of population pressure; economic reasons; commoditization of land; cultural factors and; institutional factors, majority of the indigenous households in Lower

Kiandani have sub-divided their agricultural land and/or changed the way they use such land. With its intensity generally increasing towards the urban core, land sub-division and land-use change has considerably diminished the agricultural value of land and, therefore, the economic viability and sustainability of agriculture as a sole livelihood activity, in Lower Kiandani. Indeed, majority of the households practice agriculture for purposes of food supply only, as opposed to a source of income. Even so, because of diminishing household land holdings, low (and often erratic) rainfall and high cost of farm inputs, virtually all of these households do not rely on agriculture as their sole source of food.

As a result of the foregoing, many indigenous households have diversified their livelihoods to embrace non-agricultural sources of income. The trend away from agricultural activities is more pronounced in locations in closer proximity to the urban core. Thus, engagement in multiple activities is a key strategy for livelihood diversification among these households. Much of this diversification is provided by business and other informal activity opportunities that have become available due to the new urban land uses as well as the proximity to the core. In the same vein, household incomes accruing from various livelihood activities exhibit a high degree of inter-household and inter-activity variability even for households in the same location of the study area.

The foregoing notwithstanding, the results of a further analysis with respect to the incomes of the three sets of sample households, through a statistical test of the study hypothesis and derivation of correlation coefficients, indicated that there is no significant difference between the mean household incomes of the populations represented by the three mean sample household incomes. Thus, for the indigenous households, household income is not significantly dependent on the location of the household in the peri-urban zone. It does not matter, therefore, whether the household is located in the inner, middle or outer areas of the peri-urban.

However, the study has also indicated that the above observation is due to the fact that majority of the indigenous households in Lower Kiandani have been unable to take advantage of the opportunities that urban development presents, with much of this potential being exploited by the newcomers. Otherwise, one would expect that in the inner areas, majority of the households, in

line with market rationality and in view of the prevailing local municipal policy predilection, would take advantage of the high land values and prospects for enhanced economic rent inherent in new urban-based land uses. The study revealed that income from rent is much higher than, and indeed not comparable with, income from agriculture in the inner areas where demand for rental housing is high and average household land holdings are small. Moreover, much of the engagement in the informal employment sector which provides the bulk of the livelihood options among the study households was found to be “involuntary” rather than “voluntary”- i.e. informal paid employment and not informal self-employment. The former pays less compared to the latter.

From a livelihoods vulnerability point of view, the study households may indeed be an “*endangered species*”. Maxwell et al. (2000: 149-150) underscore this livelihood risk by noting that in Peri-urban Accra, Ghana, peri-urbanization has “resulted in landlessness, the loss of traditional livelihoods, and the creation of a new class of urban poor from a group that was previously reasonably secure”. Thus, the study findings appear to advocate strongly for integrated policy initiatives, governmental or otherwise, which recognize this risk first and consequentially proceed to promote a diversity of livelihoods which benefit from both rural and urban economic domains. Again, as has been demonstrated empirically herein, such intervention should not be premised on a location-based analysis. Rather, it should address specific conditions and trends in both space and time, for it is indeed the socio-economic opportunities that arise from peri-urbanization (and not location) that determine benefits to household livelihoods and income levels. And these are dependent on government policy as well as private sector actors who will be attracted to the peri-urban. Kombe (2005) made the same observation with respect to livelihoods in peri-urban Dar es Salaam in Tanzania.

6.3 Recommendations

Three types of recommendations are given with respect to the theme and study area, namely: interventions for sustainable peri-urban livelihoods; methodological issues that could require review for future research on the subject and; areas of further research.

6.3.1 Interventions for Sustainable peri-urban Livelihoods

6.3.1.1 General

The study findings imply that, despite the sustained conversion of agricultural land into urban use, a sustainable livelihood policy for the indigenous households in Lower Kiandani must, of necessity, recognize the potential for agriculture to benefit these people during the rural-urban transition. Obviously, they cannot move seamlessly from farm to non-farm livelihoods during the urbanisation process, meaning that agricultural production still has a role to play as households gradually enter the urban economy, in the inevitable process of transition from the farm to the city.

Land use change away from agriculture in Lower Kiandani poses a threat to future food production and food security among the indigenous households since the study has revealed that agriculture in this peri-urban area is of central importance to food supply for these households. Public policy intervention to mitigate land sale and conversion rate seems necessary to secure food production, at least for the immediate future. The need for government intervention cannot be overemphasized as the finding indicates that peri-urban expansion threatens agricultural land and local food security in Lower Kiandani in the absence of alternative and more stable livelihood strategies

It is arguable that low agricultural returns have, on their part, acted to catalyze the sale of part of the family farmland to new developers and or the conversion of part of the land for non-farm activities, a process also fuelled by land speculation that creates the increased land demand and a readily available land market. This study acknowledges that it is almost impossible to eliminate land speculation in the study area, but advocates for the control/limiting of the speculative value of land in Lower Kiandani, meaning that to protect the interests of the farming households, government intervention needs to aim at increasing the economic viability, value and sustainability of agricultural production relative to urban development.

The clustering of land uses and activities which was found to characterize much of the inner areas of the study area appears to suggest how spatial policy for the area should be designed.

Taking into consideration the heterogeneity and proximity of different activities, mainly agricultural and non-agricultural ones, suitable intervention policy should, from a spatial point of view, take this feature into account and try to integrate, as much as possible, non-conflictive activities, effectively allowing these households to overcome distance and hence favour their choice of different livelihood strategies. The focus should be to maximize benefits and minimize negative externalities associated with peri-urbanization.

Governmental intervention may involve putting in place necessary strategies to attract development that generates high income opportunities and also to increase benefits from the engagement in the informal sector businesses. This is of vital necessity considering that the economic significance of agriculture is declining and that conversion of agricultural land to new urban usage is likely to continue and indeed accelerate. This should also be seen in the context that the study area is not clearly metropolitan and yet it is not deeply rural, a character that pre-empts the fears of potential struggles against inimical industrial location strategies of entrepreneurs. The promotion of multiple livelihood strategies appears to be more practical to the socio-economic reality of the indigenous peri-urban households in Lower Kiandani, as opposed to the vision of the established consideration of formal-informal and/or farm-non-farm dichotomy of activities and jobs.

Regarding agriculture, deliberate and explicit policy for sustainable development of UPA, for that is what farming in Lower Kiandani should be, spatially located alongside non-agricultural activities, is highly recommended for consideration alongside the above cluster or multiple livelihoods approach for the study area. There is need to steer governmental/municipal policy away from the traditional perspective that sees urban agriculture as conflictive, owing to competition for available (and limited) urban space, and embrace UPA. Under UPA, the promotion of food production systems that take advantage of opportunities offered by the proximity to the urban market should be an integral part of the livelihood enhancement intervention strategy for the indigenous households in Lower Kiandani. To this end, policy and facilitation is required to make agriculture more intensive and diverse, increasingly emphasising modern production of high value (and often perishable) products such as vegetables, fruits, milk,

eggs and fish (in ponds) with comparative advantage over rural production and which have a ready urban market.

Prevailing agriculture in the area, despite the immense market opportunity, is still rooted in low-risk, less productive and less profitable husbandry practices, mainly the production of staple foods such as maize, beans and peas, and the traditional rearing of local breeds of cattle, goats and poultry. In view of the inevitable reduction in household land holding sizes, agricultural extension services and education need to focus on farm development (intensification and diversification) and high value crop and animal productions. The extensive traditional land-consumptive husbandry practices that were found to be prevalent in the study area need to be discouraged to enhance the economic viability, profitability and sustainability of farming in Lower Kiandani. UPA has potential to contribute to feeding the target households, generating employment and incomes for them and supplying fresh produce to the larger local urban population. Moreover, urban wastes offer a specialist resource for agricultural production, providing a potentially cost-effective system of soil improvement and irrigation, with a secondary function in reducing urban pollution.

6.3.1.2 Specific and Targeted Interventions

To realize meaningful impact towards realization of the above three goals, it is imperative that public planning policy for the study area is tailored towards promotion of a set of integrated actors and actions to address the critical issues that have been identified. In doing so, it should be noted that the rural/urban dichotomy which has informed much of the planning practice in Kenya is not adequate in the study area, a PUI. Even though the study area is half-town and half-country, planning in the area cannot simply be an extrapolation of planning approaches and tools transplanted from urban and rural planning. This, indeed, is the main challenge of addressing Lower Kiandani as a policy space. It calls for a lot of innovation, dynamism and pragmatism in policy, planning and implementation. In view of the foregoing, the study considers the following as the most suitable and urgent interventionist measures with respect to indigenous households: regulation of land sub-division and land use change; promotion of multiple livelihood activities and; intensification and diversification of agriculture, in the study area. These programmes may be rolled out concurrently, but for purposes of planning, capacity, implementation and monitoring efficacy, they may be phased in the listed order.

6.3.1.2.1 Regulating Land Sub-division and Land Use Change

The situation in Lower Kiandani calls into question the efficacy of current land use planning and development control mechanisms in the area. Urban development is clearly ahead of planning and there is no clear institutional basis and capacity for enforcement of any desirable planning standards. Interviews with relevant officers in the County Department of Physical Planning and the defunct MCM as well as field observations of existing and up-coming urban development suggest that very little consideration has been made to control land sub-division and land use change in the area. To address this problem measures are required to address the main factors responsible for land sub-division and land use change in the study area, with a view to regulating the process of land use conversion in order to balance urban and rural land use interests.

The study revealed that economic factors where the study households sub-divided their land in order to sell to newcomers for urban development were common. The motivation here was found to be the need to raise money for a variety of uses. However, much of the proceeds of land sale, the study revealed, were expended in mundane things which do not warrant land sale. Whereas the economic motivation for land sub-division and land use change may be a function of an under-performing local rural economy and therefore poverty, the temptation to sell land because of the allure of the high land values is indeed real. To this end, the study recommends adherence to the provisions of the law governing sub-division and/or sale of agricultural land i.e. the Land Control Act, now repealed under the new Land Act (2013). In addition, deliberate policy intervention to empower the research population economically through creation of opportunities for gainful employment (e.g. business), especially for the youth, is recommended. Needless to say is the need for public education in the area on the dangers of wanton sub-division and disposal of family land.

Besides economic motivation, cultural reasons which were also found to be behind land sub-division need to be addressed. The need to sub-divide land to bequest to children for individual ownership, irrespective of the resultant sizes, should be discouraged in the study area. Instead, the study population should be encouraged to consider the economic viability of land and not just private ownership for the sake of it. After all, it is access to and use of land which is important and not the mere ownership. Government policy as well as public education needs to encourage

joint tenancy as well as *tenancy in common* among heirs of family land where sub-division of such land is deemed to lead to economically unproductive sizes. It may also be a lot easier, in the case of joint ownership, to pool resources to use/develop such land jointly. Moreover, the cultural requirement among the study households to bury the dead on ancestral land, partly because of which the living strive to own a piece of family land, should also be discouraged. Machakos town has a large cemetery ground which is under-utilized.

Regarding commoditization of land, there is need for a paradigm shift from the capitalist market-oriented viewpoint where urban and peri-urban land is seen as purely an economic commodity that can be traded at will, a notion that fuels land speculation. Instead, public policy needs to recognize the wider social function of land and land use in the greater public interest. To this end, efforts need to be made to move away from the absolute freehold land tenure in the area to a leasehold system where land use and land development terms and conditions are more explicit. It is of note that the defunct Municipal Council of Machakos had once earmarked Lower Kiandani to be annexed into the Machakos town Land Valuation Roll, an exercise that would have led to the conversion of the land registration and ownership system in the area. These efforts appear not to have succeeded. There is, however, an enhanced potential for achieving this goal now, if the radical changes in land registration and ownership stipulated in the new land laws- the Land Registration Act (2013); Land Act (2013) and; National Land Commission Act (2013) – are applied by both the county and national government.

The study has also revealed that because Lower Kiandani lies between town and country, it is effectively an institutional “no man’s land”. There is a multiplicity of laws applicable in the area, by various governmental agencies. To address this problem, there is a need to place the study area, alongside other peri-urban areas of Machakos town, under one public body to supervise land use and development. Such a body should be guided by one harmonized law and a clear policy to avoid institutional conflicts and contradictions that have created the void responsible for unregulated land sub-divisions and land use changes in the area. There is a remarkable window of opportunity for this in the current political and institutional dispensation of devolved government and a new set of land laws that have significantly removed much of the contradictions in the preceding land laws.

Lastly, the study recommends that responsible authorities (under the new county government) develop and implement a suitable land use planning and development control policy for Lower Kiandani and other peri-urban areas of Machakos town. It is of note that the above recommendations can only be useful if there is a system of land use standards, decision guides and action instruments – products of land use planning. Obviously, under the prevailing concept of economic ideology and economic development where economic determinism is adopted as the means of allocating scarce resources, land in Lower Kiandani will naturally tend to be allocated to its highest and best use, in terms of returns from economic rent. Under these conditions, agriculture cannot compete with urban land uses such as residential development. Economic returns from agriculture become less as the land market becomes highly speculative and land prices escalate, calling for a deliberate land use policy.

The best entry point in this case appears to be the preparation of a long-term (20-25 years) development guide, a Land Use Plan, for the area, articulating broad goals and specific objectives of its functional elements, in both maps and text. From this plan, short-term (5-6 years) land use decision guides (policies) and action instruments (e.g. sub-division standards) will be generated. Whereas strict land use planning and enforcement in Lower Kiandani may seem attractive to urban planners and politicians, care must be taken in this regard, for this approach is often expensive and incongruous with the prevailing local land tenure, unique local development situation and national economic policy. Moreover, specific policy governing private land use clearly contradicts economic liberalism and capitalist investment, meaning some kind of land-use incentives with some clear economic advantages for the study population, are likely to have more efficacy. Simple, innovative and pragmatic approaches are likely to work better for the area, a PUI, in this regard.

One of the simple, innovative and pragmatic approaches to land use planning in Lower Kiandani appears to be the promotion of vertical, land-saving construction designs in residential development - the predominant urban land user - as opposed to the widespread horizontal, land-consumptive development, alongside land subdivision regulations promoting certain minimum plot sizes. This, obviously, will reduce the amount of peri-urban space required per unit of housing, effectively reducing the amount of land taken out of agriculture, while providing

reasonable space for urban development. Ultimately, the rate of land sub-division and land use change will be slowed down. The cost of infrastructural services provision will also reduce significantly. In view of the foregoing, it appears the best incentive for achieving a change in the kind of housing development occurring in the area lies in devising and implementing a different and favourable rate of property taxation and development levying for vertical development. Such measures have had positive results elsewhere (Maxwell et al., 2000). There is abundant opportunity for this in the new political dispensation of the county government.

6.3.1.2.2 Strategies for Multiple Livelihoods and Agricultural Development

The study findings have indicated that majority of the indigenous households in Lower Kiandani have multiple livelihood strategies, both farm and non-farm. This is a potential opportunity for livelihoods enhancement. The study findings have also indicated that the economic significance of agriculture as a livelihood strategy is declining with increasing level of urban development in Lower Kiandani. This constitutes a threat to the rural-based livelihoods. Further, the study has also revealed that majority of the study population has been unable to take advantage of the opportunities presented by urban development in and around the area. This is perhaps the most important basis for intervention, with respect to the livelihoods of these people. Since in real life situations an average household will, usually, exploit both farm and non-farm strategies for survival or accumulation at the same time, the study recommends that interventions to promote multiple livelihoods should be conceived and implemented together with those for agricultural development – particularly the diversification and intensification of farming practices. The study identifies and recommends four key strategies for intervention in this respect namely, access to credit facilities; training; information and; infrastructure/community facilities development.

Public sector policy for increased access to credit facilities will be a key ingredient for agricultural intensification, diversification and modernization as well as the aiding of the transition to new livelihoods for the indigenous peri-urban households, the majority of whose livelihoods do not depend on access to significant financial capital. It is recommended that in view of the peculiarities of the study area, special credit schemes for peri-urban communities be created. In addition, public policy, through partnerships with lending institutions, may be used to influence the revision of existing credit conditions, with a view to allowing their participation in

current credit schemes for the informal sector. Credit facilities are envisaged to provide the much needed financial capital to empower the study community to start businesses, develop idle/under-used land, embrace modern agricultural practices, expand farming activities, exploit irrigated agriculture, etc. Moreover, such financial empowerment will, obviously, cushion these people against the temptation to sub-divide and sell land for trivial household needs.

Equally, it is recommended that the public sector, in partnership with other actors, especially NGOs and CBOs, initiates pre-agricultural displacement precautionary and post-displacement adaptation measures with a view to reducing livelihood vulnerability of urbanization-induced socio-economic change and enhancing livelihoods resilience. Training in new agricultural methods, industrial/artisanal activities and other economically-productive activities, including basic business skills, is important for these households. One suitable area for training is the processing of the peri-urban agricultural production for value addition and trade. Another recommended field of training is in industrial skills in *Jua-kali* light industrial activities, especially for the youth. Such skills are expected to empower the research population to overcome local livelihood challenges and take advantage of the new opportunities that urbanization presents. The efficacy of NGOs and CBOs in this respect has been demonstrated in many peri-urban contexts. Brook and Davila (2000), for instance, single out the exemplary role played by these bodies in supporting and diversifying local livelihood strategies in the Hubli-Dharwad peri-urban interface, India, where they “manage funds intended for disbursement as small credits” to farmers (p.42).

Upon addressing the issues of credit and training, the other most significant and urgent intervention appears to be creation of market linkage between the study community and the local urban market. Inclusive market intelligence is required to enable households to match supply with demand. Access to market information will enable these households to find market for farm and off-farm products realized after the suggested interventions, such as fresh farm produce, artefacts, etc. It will also facilitate access to business goods for traders. The need for market analysis and market training is often underestimated for livelihoods, especially those based on traditional activities, and more so in the “zone crying for attention”. With adequate market

training, even the most disadvantaged of the people can carry out market analysis and business planning to some reasonable degree.

Even though the land use planning process advocated for in 6.3.1.2.1 above will definitely address some of the local infrastructure/community facility and service requirements, it is emphasized that these are particularly critical for the livelihoods of the study community. The study has revealed a conspicuous absence of these facilities and services in Lower Kiandani. With regard to infrastructural services, most roads are in poor condition while others have never been opened. Water and sanitation services are also inadequate for the growing population while the coverage of waste management services is limited. As a result, the economic potential of land use in Lower Kiandani, both agricultural and otherwise, may not have been fully exploited. For instance, much of the land that is undeveloped because it is “peripherally” located in relation to the city centre lies within only 2-4 km from the core, compared to corridor development stretching to nearly 10 km along the main transit corridors of the town. Thus, infrastructural development/improvement is highly recommended so as to make the area more accessible and habitable, to open it for diverse and economically more productive land uses and activities.

Regarding community facilities, the study recommends urgent interventions with respect to three key public facilities whose local demand was found to be most pressing and urgent. There is conspicuous absence of public primary and nursery schools in the area, with only two primary schools, Mumbuni and Miwongoni, located at the extreme ends of the area. As a result, school children and teachers have to travel long distances, in some cases about 4 km, which is tedious and expensive. Nursery school education in the area is only provided by private institutions which is expensive to the households. There is need to increase coverage for these public facilities. The other community facility that is recommended for prioritization is a community market, alongside other complementary commercial facilities. The study revealed that much of the informal (and often illegal) roadside trading is due to lack of the facility. The establishment of an open-air market and associated trading spaces is highly recommended. It will create an opportunity for self-employment and reduce the incidence of proliferation of illegal roadside *Kiosks*. To achieve this, the Machakos County Government needs to explore modalities to acquire land to build these facilities to satisfy existing demand by the research population.

Note

In policy formulation, planning and implementation of all the recommended interventions, participatory action planning is highly recommended because it is envisaged to promote group action, increase confidence in dealing with socio-economic change and improve flows of information about threats and opportunities at the local level. This, in turn, is expected to encourage the creation of self-help groups. The role of Community-Based Organizations is particularly singled out, for they can mid-wive the process by actively providing requisite information and promoting local community links with government. NGOs, on their part, are envisaged to be instrumental in initiating and facilitating participatory action planning and in supporting the work of the community-based actors, as well as augmenting these activities through direct contact with the research community. These consultative and multi-actor processes will result in robust, comprehensive, acceptable and sustainable policy development and implementation.

6.3.2 Methodological Issues that Could Require Review for Future Research

6.3.2.1 The Measurement of Household Income

One of the methodological issues proposed for review is the measurement of household income. This study considers household income as the total annual cash in Kenya shillings that a household earns from formal employment in various sectors, informal employment/ income-generating activities, business, agriculture and non-agricultural activities etc. To emphasize, therefore, the foregoing means that household income includes income from formal sources, particularly formal salaried employment and formal self-employment.

In retrospection, it is hereby considered it would be more methodical to consider only those incomes from agriculture, other land use activities arising from land use change (such as rent from residential development) and all informal sources, to the exclusion of income from formal sources such as professional paid and self employments. The logic is that the new measurement would capture income from agriculture and only those other household livelihood activities which are highly likely to be direct alternatives to agriculture, as peri-urban agricultural value of land diminishes. A further reasoning is that chances of a direct causal relationship between loss of agriculture as a livelihood activity, and the embracing of formal sources of income as

alternatives, are indeed very slim - because of the education, training and skills likely to be required for these. For instance, it is unlikely that adult members of a household will seek formal education, training and employment because they have sold out most of their land and can no longer rely on agriculture as a livelihood activity. Rather, they will diversify into more realistic alternatives (usually informal activities associated with the burgeoning urbanity) under the circumstances. Formal employment is also likely to be equally distributed across both sides of the rural-urban divide.

6.3.2.2 The Scope of the Peri-urban area and Type of Data Used

Another methodological variation that is deemed likely to improve the quality of the findings of this study is to up-scale the geographical scope of the study area (say, to the fringes of a whole urban region such as Nairobi City Metropolitan Region) but this time round, rely on temporal secondary data only, which data would represent the dynamics and indices under investigation over specified time intervals. Such data could be obtained from relevant government departments (e.g. population census data and household surveys by KNBS) as well as past studies which deal with household livelihoods and incomes including any other dynamics and indices relevant to the subject under investigation. In carrying out the proposed variant, the researcher will, obviously, choose a study area for which preliminary inquiries will have indicated existence of sufficient temporal secondary data for the purpose of a historical analysis. The proposed research design will maximize the advantages of using a larger study area and therefore an enhancement in the heterogeneity of the study population which, consequentially, will minimize the potential localized factors that could be inherent in the current study design.

6.3.3 Areas of Further Research

Notwithstanding that the study achieved its purpose as designed, it is herein considered that two main questions which are pertinent to the research, and which questions have not been answered, ought to be explored further. The first question that appears to beg for an answer is “what is the gender-differentiated effect of peri-urbanization among the indigenous households?” The second question that is deemed to elicit further investigative work is “how does peri-urbanization affect the social capital of the indigenous households?”

6.3.3.1 Gender-differentiated Household Effects of Peri-urban Development

Whereas the study focused on the effect of peri-urban development on the livelihoods (and therefore incomes) of household units, it has been argued that men and women usually use and experience the urban environment in different ways (Aberra and King, 2006). Similarly, it has been argued that urbanization is likely to have a differential impact on the younger and older. A review of diverse peri-urban literature nearly universally suggests that urbanization of hitherto rural areas has potential to diminish the economic viability and sustainability of some of the rural-based livelihoods. There is also a near-universal consensus on the converse that peri-urbanization presents opportunities for new livelihoods or at least for improvement of existing ones. But there is a likelihood that there exist differentials in the practice of rural activities as well as in the uptake of new urban opportunities between men and women on one hand and the younger and the older on the other hand; meaning peri-urbanization is highly likely to have a differential effect on the study households, based on their structural compositions - in terms of sex and age of members. Maxwell et al. (2000) have noted that young single men often engage in multiple opportunities because they have the flexibility to do so, as opposed to older women who are mothers. The foregoing suggests a need for a further more detailed investigative work to analyze and compare the effects of peri-urbanization on men and women on one hand and; the young and the older members of the study households, on the other.

6.3.3.2 Effect of Peri-urbanization on Household Social Capital

While this study focuses on how a household's access to natural capital (herein indicated by land holding) affects its financial capital (herein indicated by income), an important, and often hidden component of a household's livelihood asset portfolio is its access to social capital. Representing the often unobtrusive social networks of mutual support that exist between and within households, extended family and communities, social capital can be mobilized to access employment opportunities, loans, food, childcare, accommodation, etc. Such relationships can also help communities to mobilize to demand for services and rights from Authorities.

In the peri-urban context, this study considers social capital a valuable and critical resource of the indigenous households who are hereby considered more vulnerable to the shocks and stresses of the peri-urban socio-economic change, a product of the burgeoning land use change and

inherent shift from a mainly rural-based subsistence economy, towards a predominantly more urban-based monetized economy. It is considered that the process of the urbanization of the urban periphery and the ensuing dominance of a cash economy, coupled with migrations, may weaken social networks for the indigenous households, especially in view of the inherent social fragmentations; competition for dwindling natural resources (land) and; the widening gap between the rich and the poor, a common characteristic of many peri-urban environments. One interesting observation of the study was that, it is still possible for some of the study households to keep animals such as cattle and goats, even when they do not have land for the same. Such households could be dependent on land belonging to the larger family unit. The foregoing, therefore, gives rise to a need to investigate how peri-urbanization affects these relationships which are deemed to have a bearing on a household's wellbeing and financial capital (income).

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APPENDICES

APPENDIX 1: RESEARCH PERMIT



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Department of Urban and Regional Planning
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Ref: UON/CAE/DURP/B63/71918/08

Date: 24th November, 2011

TO WHOM IT MAY CONCERN

RE: MR. RAPHAEL MWANZA MUTUA – B63/71918/2008

This is to certify that Mr. R.M. Mutua (B63/71918/2008) is a postgraduate (M.A. Planning) student in this department. Presently he is carrying out research work including fieldwork for his thesis entitled "Effects of Peri-Urban Development on the Livelihoods of Indigenous Households: The Case of Lower Kiandani Area, Machakos, Municipality."

This note is to kindly request any assistance to be offered to Mr. Mutua in respect to his research work and/or any other appropriate undertaking.

Such assistance will be highly appreciated.

With much thanks.

Yours faithfully,

A handwritten signature in blue ink, appearing to read 'S. Obiero'.



DR. SAMUEL V. OBIERO
CHAIRMAN
DEPARTMENT OF URBAN AND REGIONAL PLANNING

APPENDIX 2: HOUSEHOLD SCHEDULED QUESTIONNAIRE

University of Nairobi

Department of Urban and Regional Planning

Master of Arts (Planning) 2008/2009 Thesis Field Research

“The Effect of Peri-urban Development on the Livelihoods of Indigenous Households: The Case of Lower Kiandani Area, Machakos Municipality”.

Declaration: *The information supplied herein will be used for academic purposes only and will be treated with utmost confidentiality.*

Questionnaire Number.....Date of Interview.....Plot No.....
Zone No.....Distance from Machakos town CBD (km).....

SECTION A: HOUSEHOLD BACKGROUND INFORMATION

Respondents Background Information

1. Name.....Tel No.....
2. Age.....
3. Sex: 1. Male 2. Female
4. Marital Status: 1. Married 2. Single 3. Divorced/Separated 4. Widow/Widower
5. Level of Education 1. None 2. Primary 3. Secondary 4. College 5. University
6. Occupation.....

Household Background and Demographic Details

7. What is the composition of your household? 1. Nuclear Family 2. Extended Family
8. What is the total number of family members in your household?
9. For how long have you lived in Lower Kiandani area?
10. Do you consider Lower Kiandani your ancestral home? 1. Yes 2. No.

11. If No, where did your family live before settling here?
12. Do you have close relatives who have relocated to other areas? 1. Yes 2. No.
13. If **Yes**, what do you think made them relocate?
14. In the table below, provide information about your household.

Household Member	Age(yrs)	Sex	Level of Education	Occupation	Marital status
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

SECTION B: LAND USE, ECONOMIC ACTIVITIES, EMPLOYMENT AND INCOME

Land Use and Economic Activities

15. What is the size of your land in acres?
16. How did you acquire the land? 1. Inheritance 2.Purchase 3.Gift 4.Others (specify)
17. Apart from your family housing, what would you consider to be the other main land use activity/activities on your land? 1. Agriculture 2. Residential development 3. Commercial Development. 4. Land unused 5. Others (specify)
18. If multiple uses, estimate the percentage proportions under:
 1. Agriculture 2. Residential Development 3.Commercial Development

4. Unused Land 5. Others (specify)
19. Do you practice Agriculture? 1. Yes, 2. No
20. If **yes**, what type of Agriculture? 1. Crop Husbandry 2. Animal Husbandry 3. Both Crop Husbandry and Animal Husbandry.
21. Specify the following:
- a) Crops grown
 - b) Animals kept
22. State the proportion of your land used for:
- a) Growing crops b) Animal keeping/pastures
23. What is your main reason for practicing agriculture? 1. Food supply 2. Income 3. Both Food supply and Income
24. Does the practice of agriculture satisfy your needs in 23 above? 1. Yes 2. No
25. If **No**, in 19 above, give your reasons
26. Do you face problems/challenges in your practice of farming? 1. Yes 2. No
27. If **yes**, what challenges do you face as a farmer in Lower Kiandani?
1. Low Rainfall 2. Lack of enough land 3. Cost of inputs 4. Theft of crops 5. Others (specify)

Employment and Income

28. Apart from agriculture, what are your other household sources of income?
1. Formal employment 2. Formal self-employment 3. Informal employment 4. Informal self-employment 5. None 6. Others (specify)
29. What is your household annual income in Kenya shillings from:
- a) Agriculture (i) crops (ii) Animals
 - b) Formal employment
 - c) Formal self-employment
 - d) Informal employment
 - e) Informal self-employment
 - f) Others (specify)

Land Subdivision, Land Use Change and Development Control

30. Have you subdivided your land in the past? 1. Yes 2. No

31. If **yes**, why did you subdivide the land?
32. Have you changed the use of your land or incorporated a new use before?
1. Yes 2. No
33. If **yes**, why did you introduce the new use?
34. In 30 and 32 above, did you seek any formal approval? 1. Yes 2. No
35. If **yes**, which local institutions did you consult? 1. Municipal Council of Machakos 2 Land Administration office 3. Land Survey 4. Physical Planning office 5. Land Control Board 6. Others (specify)
36. Are you aware of any public agencies that are mandated to regulate how you use your land? 1. Yes 2. No
37. If **yes**, which ones and what role do they play?

Governance, Infrastructure, Service Delivery and General perceptions/preferences

38. How do you perceive land subdivision and land use change in Lower Kiandani area? 1. Good 2. Bad 3. Both Good and Bad 4. Can't tell
39. What would you prefer as the government position with respect to land subdivision and land use change in Lower Kiandani?
1. Ban 2. Limit 3 Allow 4. Don't Know 5. Others (specify)
40. Are there specific urban developments that you consider most suitable for Lower Kiandani? 1. Yes 2. No
41. If Yes, specify them
42. Are there specific urban developments that you consider **not** suitable for your area? 1. Yes 2. No
43. If **Yes**, specify them
44. Do you know the name of your:
 - a) Electoral Ward? 1. Yes 2. No
 - b) Local Ward Representative? 1. Yes 2. No
45. On a scale of 1-5, rate the Municipal infrastructure and service delivery with respect to:

- a) Roads 1. Poor 2. Fair 3. Good 4. Very Good 5. Excellent
 - b) Water and Sanitation: 1. Poor 2. Fair 3. Good 4. Very Good 5. Excellent
 - c) Solid waste management: 1. Poor 2. Fair 3. Good 4. Very Good 5. Excellent
 - d) Community facilities e.g. schools 1. Poor 2. Fair 3. Good 4. Very Good 5. Excellent
46. What do you consider to be the planning and development priorities for Lower Kiandani?

Thank You for Your Time and Co-operation

**APPENDIX 3: SCHEDULED QUESTIONNAIRE FOR THE TOWN CLERK,
MUNICIPAL COUNCIL OF MACHAKOS**

University of Nairobi

Department of Urban and Regional Planning

Master of Arts (Planning) 2008/2009 Thesis Field Research

“The Effect of Peri-urban Development on the Livelihoods of Indigenous Households: The Case of Lower Kiandani Area, Machakos Municipality”

Declaration: *The information supplied herein will be used for academic purposes only and will be treated with utmost confidentiality.*

Date of Interview-----

1. Generally, do you consider Lower Kiandani Urban or Rural? Explain your answer
2. Are you, as a council, involved in development control in Lower Kiandani? If yes, briefly state your involvement.
3. What do you consider to be the main factors behind land subdivision and land use change in Lower Kiandani?
4. What is your general policy with respect to peri-urbanization in the municipality and especially with respect to Lower Kiandani?
5. Given that Lower Kiandani is freehold agricultural land and is not planned, what guidance framework/action instruments do you use to issue development permissions?
6. What land use activities do you consider most suitable for Lower Kiandani?
7. What land use activities do you consider most unsuited for Lower Kiandani?
8. Which laws and regulations do you use you when approving development applications in lower Kiandani?
9. What is the procedure for issuance of development permission in your council?
10. What technical and operational problems/challenges do you face with regard to development control in lower Kiandani?
11. What other institutions do you liaise with in the course of issuing planning and development permissions and what are their roles?

12. Do you find the current institutional/legal framework sufficient with respect to planning and development control? Give reasons.
13. Lower Kiandani area is probably the most rapidly urbanizing zone of peri-urban Machakos. What planning efforts (past and present) have you made to guide urban development in the area?
14. What public investment programmes have you undertaken in Lower Kiandani within the last 5 years?
15. What future projects have you programmed for the area within the next 5 years?
16. In your own opinion, how do you think urban developments have affected the livelihoods of indigenous households in Lower Kiandani?
17. As a physical environment, what special problems does Lower Kiandani pose both to the council and the residents?
18. What do you think is the future of agriculture in Lower Kiandani area?
19. What would you recommend as planning priorities for the future of Lower Kiandani?
20. Comment on the state of urbanization and urban planning in:
 - a) Machakos
 - b) Kenya as a whole

Thank You for Your Time and Co-operation

**APPENDIX 4: SCHEDULED QUESTIONNAIRE FOR THE DISTRICT PHYSICAL
PLANNING OFFICER, MACHAKOS**

University of Nairobi

Department of Urban and Regional Planning

Master of Arts (Planning) 2008/2009 Thesis Field Research

“The Effect of Peri-urban Development on the Livelihoods of Indigenous Households: The Case of Lower Kiandani Area, Machakos Municipality”

Declaration: *The information supplied herein will be used for academic purposes only and will be treated with utmost confidentiality.*

Date of Interview.....

1. What is your mandate with respect to planning and development of lower Kiandani?
2. With respect to land subdivision, land use change and urban development in lower Kiandani, what is the role of the District Physical Planning Office?
3. What do you consider to be the main factors behind land subdivision and land use change in Lower Kiandani?
4. What other institutions/public agencies are involved in the processes of regulating land subdivision, land use change and urban development in Lower Kiandani?
5. How do you rate the level of local institutional liaison with respect to planning and land use regulation in Lower Kiandani? Explain your answer.
6. Which laws and regulations do you use when dealing with land use change and urban development in Lower Kiandani?
7. What is the process for the issuance of planning and development permission with respect to land subdivision, land use change and urban development in Lower Kiandani?
8. What do you use as planning Decision Guides and/or Action Instruments when considering applications for urban development permissions in the area?
9. With special reference to land subdivisions, how do you decide on or enforce minimum standards in the study area?

10. What new land uses do you encourage/discourage in Lower Kiandani?
11. What problems/challenges do you face in the process of regulating land use change and urban development in Lower Kiandani?
12. Lower Kiandani is perhaps the most rapidly urbanizing area of peri-urban Machakos. Given that this is an unplanned freehold agricultural area, what planning efforts (past and present) has your office and other relevant institutions initiated to guide urban development in the area?
13. What would you consider as the planning/development challenges/ problems of the study area?
14. What are the prospects for future development in Lower Kiandani?
15. With respect to agriculture, what is your opinion on the continued use of land for agriculture versus urban development in Lower Kiandani?
16. In what ways do you think peri-urbanization has affected the livelihood options of the indigenous households in the study area?
17. In your own opinion, is peri-urban development a positive or negative phenomenon with respect to the livelihoods and socio-economic wellbeing of the indigenous households in Lower Kiandani? Give reasons.
18. What would you recommend as the land use and development planning priorities for the future of Lower Kiandani?
19. As a planner, what issues do you think could arise and pose problems to the future planning of Lower Kiandani?
20. How do you rate the adequacy and efficiency of the current institutional/legal framework with regard to managing and guiding peri-urban development in Lower Kiandani and similar areas in the country? Explain your answer.
21. Commend on the state of urban planning in:
 - a) Machakos County
 - b) Kenya as a whole

Thank You for Your Time and Co-operation

**APPENDIX 5: SCHEDULED QUESTIONNAIRE FOR THE SECRETARY,
MACHAKOS CENTRAL DIVISION LAND CONTROL BOARD**

University of Nairobi

Department of Urban and Regional Planning

Master of Arts (Planning) 2008/2009 Thesis Field Research

“The Effect of Peri-urban Development on the Livelihoods of Indigenous Households: The Case of Lower Kiandani Area, Machakos Municipality”.

Declaration: *The information supplied herein will be used for academic purposes only and will be treated with utmost confidentiality.*

Date of Interview.....

1. Briefly, what is the role of your Board in land administration?
2. Who are the members of the Board?
3. How often does the Board meet?
4. Specifically, what would you say is the “control” function of the Board?
5. With respect to land subdivision, land use change and urban development, what is your position as a Board, on peri-urban development in Lower Kiandani area?
6. What considerations do you make when dealing with land subdivisions and land use change?
7. Which laws and regulations do you use when making such decisions?
8. What do you consider to be the main factors behind land subdivision and land use change in Lower Kiandani?
9. Which other institutions do you liaise with when making your decisions and what are their roles?
10. With respect to Lower Kiandani area, what challenges do you face when executing your duties?
11. In your opinion, has the Board been effective in discharging its mandate in Lower Kiandani? Explain your answer.

12. What do you think is the future of agriculture in Lower Kiandani?
13. In view of your local experience in Lower Kiandani, what do you think is the future of Land Control Boards with respect to peri-urban areas in the country?
14. Any other comments on the various issues discussed?

Thank You for Your Time and Co-operation

**APPENDIX 6: SCHEDULED QUESTIONNAIRE FOR THE DISTRICT
AGRICULTURAL OFFICER, MACHAKOS**

University of Nairobi

Department of Urban and Regional Planning

Master of Arts (Planning) 2008/2009 Thesis Field Research

“The Effect of Peri-urban Development on the Livelihoods of Indigenous Households: The Case of Lower Kiandani Area, Machakos Municipality”.

Declaration: *The information supplied herein will be used for academic purposes only and will be treated with utmost confidentiality.*

Date of Interview.....

1. What are the main roles of your office?
2. What is the existing agricultural productive capacity of lower Kiandani?
3. What would you consider as the unexploited agricultural potential in Lower Kiandani?
4. What problems/challenges do farmers in the area face?
5. Lower Kiandani sub-location is rapidly urbanizing. Between continued preservation of farmland and urban development, which one would you advocate for? Give your reasons.
6. Lower Kiandani is basically a rural-urban environment. Agricultural practices therein can thus be viewed as urban and peri-urban agriculture. What do you think forms the major constraints towards this form of agriculture in the area?
7. What do you think is the future of peri-urban and urban agriculture in Lower Kiandani?
8. With respect to land subdivision and land use change (from agriculture to urban uses), what role does your office play?

9. What do you consider to be the main factors behind land subdivision and land use change in Lower Kiandani?
10. What are some of the agricultural development public investment projects/programmes and services that you have undertaken/offered in Lower Kiandani in the recent past?
11. What future plans do you have for the area?
12. What issues would you want addressed by the future planning of Lower Kiandani?
13. Commend on the state of urban and peri-urban agriculture in:
 - a) Machakos
 - b) Kenya as a whole

Thank You for Your Time and Co-operation

APPENDIX 7: DATA ANALYSIS TABLES

RESPONDENTS DETAILS								
Age								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
10 to 19	3	6	1	4	-	-	2	18
20 to 29	8	16	5	20	2	14	1	9
30 to 39	11	22	5	20	3	22	3	28
40 to 49	8	16	4	16	3	22	1	9
50 to 59	8	16	3	12	3	21	2	18
60 to 69	8	16	4	16	2	14	2	18
70 to 79	4	8	3	12	1	7	-	-
Sex								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
Male	22	44	11	44	5	36	5	45
Female	28	56	14	56	9	64	6	55
Marital Status								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	25	100
Married	40	80	22	88	12	86	6	88
Single	9	18	2	8	2	14	5	8
Divorced/Separated	1	2	1	4	-	-	-	-
Level of Education								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
None	1	2	-	-	1	7	-	-
Primary	15	30	8	32	4	28	4	36
Secondary	23	46	13	52	4	29	6	55
College	9	18	3	12	4	29	1	9
University	2	4	1	4	1	7	-	-

Occupations								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total			25	100	14	100	11	100
Professionals			3	12	4	29	1	9
Farmers			3	12	5	36	1	9
Technicians			2	8	-	-	-	-
Business			5	20	1	7	1	9
Craft and Related Workers			3	12	1	7	1	9
Elementary Workers			2	8	1	7	2	18
Plant and Machine Operators			1	4	-	-	2	18
None			6	24	2	14	3	28
Household Composition								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
Nuclear family	20	40	8	32	7	50	5	45
Extended family	30	60	17	68	7	50	6	55
Number of family members in Respondent's Household								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
1 - 3	7	14	5	20	1	7	1	9
4 - 6	23	46	9	36	7	50	7	64
7 - 9	12	24	5	20	4	29	3	27
10-12	6	12	5	20	1	7	-	-
13 -15	2	4	1	4	1	7	-	-
How long have you lived in Lower Kiandani?								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100						
Up to 9	2	4						
10 to 19	6	12						
20 to 29	17	34						
30 to 39	13	26						
40 to 49	4	8						

50 to 59	4	8						
60 to 69	3	6						
70 to 79	1	2						
Do you consider L. Kiandani your ancestral Home?								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
Yes	32	63	15	60	10	71	8	73
No	18	37	10	40	4	29	3	27
If no , where did your family live before settling here?								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	18	100	10	100	4	100	3	100
within machakos municipality	10	56	3	30	3	75	3	100
outside municipality but within county	2	11	3	30	-	-	-	-
outside county	6	33	4	40	1	25	-	-
Do you have close relatives who have relocated to other areas?								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
Yes	17	34	8	32	3	21	8	73
No	33	66	17	64	11	79	3	27
If yes why do you think made them relocate?								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	17	100	8	100	3	100	8	100
To look for more land for Farming	16	94	8	100	3	100	8	100
To look for Employment	1	6	-	-	-	-	-	-
HOUSEHOLD DETAILS								
Age								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	304	100	160	100	84	100	60	100
Upto 9	42	14	19	12	15	18	7	12
10 to 19	55	18	24	15	17	20	15	25

20 to 29	62	20	40	25	16	19	9	15
30 to 39	67	22	33	20	16	19	17	28
40 to 49	26	9	17	11	4	5	5	8
50 to 59	22	7	13	8	8	10	2	3
60 to 69	21	7	9	6	7	8	4	7
70 to 79	7	2	4	2	1	1	1	2
80 to 89	1	0.3	1	1	-	-	-	-
90 to 99	2	0.7	-	-	-	-	-	-
Sex								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	304	100	160	100	84	100	60	100
Male	139	46	81	51	37	44	24	40
Female	165	54	79	49	47	56	36	60
Level of Education								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	304	100	160	100	84	100	60	100
None	21	7	7	4	7	8	3	4
Primary	108	35	65	41	20	24	23	41
Secondary	96	32	56	35	24	29	20	35
College	63	21	22	14	29	34	13	14
university	16	5	10	6	4	5	1	6
Occupations								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	304	100	160	100	84	100	60	100
Professionals	46	15	22	14	12	14	2	3
Farmers	13	4	4	2	7	8	1	2
Technicians	33	11	9	6	1	1	2	3
Business	27	9	21	13	5	6	1	2
Plant and Machine Operators	19	6	2	1	5	6	7	12
Craft and Related Workers	4	1	11	7	3	4	2	3
Elementary Workers	147	49	18	11	4	5	5	8
None	15	5	73	46	47	56	3	5
Marital Status								

	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	304	100	160	100	84	100	60	100
Married	144	48	83	52	36	43	23	38
Single	159	52	76	47	48	57	37	62
Divorce/separated	1	0	1	1	-	-	-	-

How Did You Acquire Your Household Land?

	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	84	100	11	100
Inheritance	33	66	13	52	36	43	8	73
Purchase	17	34	12	48	48	57	3	27

Households by Main Land use Activity Apart from Family Housing

	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
Agriculture	32	64	9	36	12	86	11	100
Residential	3	6	4	16	-	-	-	-
Agriculture/Residential	9	18	6	24	2	14	-	-
Agriculture/Commercial	2	4	2	8	-	-	-	-
Agriculture/Residential/Commercial	3	6	3	12	-	-	-	-
Others	1	2	1	4	-	-	-	-

Households with Multiple Land Uses

	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
	15	30	11	44	2	14	-	-

Households by Main land use Activity in Multiple Land Uses

	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	15	100	11	100	2	100	-	-
Agriculture	8	53	7	64	1	50	-	-
Residential	6	40	3	27	1	50	-	-
Commercial	1	7	1	9	-	-	-	-

Do you practice Agriculture?

	Whole Area	Inner Zone	Middle Zone	Outer Zone
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	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
Yes	45	90	22	88	14	100	11	100
No	5	10	3	12	-	-	-	-
If Yes, what type of Agriculture?								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	45	100	22	100	14	100	11	100
Crop husbandry	6	13	5	23	1	7	-	-
Both crop and Animal husbandry	39	87	17	77	13	93	11	100
Crops Grown by Households								
	Whole Area No. of HHs =45		Inner Zone No. of HHs =22		Middle Zone No. of HHs =14		Outer Zone No. of HHs =11	
Crop	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Maize	44	98	19	86	14	100	11	100
Pulses	40	89	16	73	13	93	11	100
Vegetables	31	69	16	73	11	79	4	36
Fruits	27	60	12	55	10	71	5	45
Tubers	8	18	2	9	4	29	2	18
Others	7	16	3	14	3	21	1	9
Animals Kept by Households								
	Whole Area No. of HHs =39		Inner Zone No. of HHs = 17		Middle Zone No. of HHs = 13		Outer Zone No. of HHs= 11	
Animals	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Cattle	22	56	6	35	8	62	8	73
Goats	28	72	10	59	9	69	9	82
Sheep	3	8	1	6	-	-	2	18
Poultry	36	92	14	82	12	92	10	91
Households by Proportion of Land Used for Growing Crops/Keeping Animals								
	Whole Area No. of HHs = 39		Inner Zone No. of HHs = 17		Middle Zone No. of HHs =13		Outer Zone No. of HHs =11	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
More than 50% used for Growing Crops	27	69	13	76	8	62	8	73
More than 50% Used for Keeping Animals	9	23	2	12	5	38	2	18
Land Equally Shared	3	8	2	12	-	-	1	9
Households Keeping Animals but With No Land Set aside for the Activity								

	Whole Area No. of HHS = 39		Inner Zone No. of HHS =17		Middle Zone No. of HHS =13		Outer Zone No. of HHS =11	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
	17	44	10	59	5	38	5	45
Total Households Land Use by Crop and Animal Husbandry								
	Whole Area Total Land Under Agriculture=140.04Acres		Inner Zone Total Land Under Agriculture=11.62 Acres		Middle Zone Total Land Under Agriculture=93.017 Acres		Outer Zone Total Land Under Agriculture=33.049Acres	
	Land in Acres	Percent	Land in Acres	Percent	Land in Acres	Percent	Land in Acres	Percent
Crop	70.115	50	9.102	78	45.722	49	21.181	64
Animal	60.053	43	2.52	22	45.665	49	11.868	36
Unused Land	9.803	7	-	-	1.63	2	-	-
What is your main reason for practicing Agriculture?								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	45	100	22	100	14	100	11	100
Food supply	38	84	20	91	10	71	7	64
Both Food supply and Income	7	16	2	9	4	29	4	36
Does the practice of agriculture satisfy your needs in 23 above?								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	45	100	22	100	14	100	11	100
1 Yes	15	33	4	18	8	57	3	27
2 No	30	67	18	82	6	43	8	73
Reason for not Practising Agriculture								
	Lack of land		Lack of land					
Do you face problems /challenges in your farming?								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	45	100	22	100	14	100	11	100
Yes	43	96	21	95	14	100	9	82
No	2	4	1	5	-	-	2	18
Problems Faced By Farmers in Lower Kiandani								
	Whole Area No. of HHs =45		Inner Zone No. of HHs = 21		Middle Zone No. of HHs = 14		Outer Zone No. of HHs =9	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Low Rainfall	40	89	19	90	86	12	9	100

Inadequate Land	24	53	12	57	43	6	7	78
Cost of Inputs	16	36	9	43	43	6	2	22
Theft	22	49	7	33	64	9	5	56
Others	12	27	4	19	43	6	2	22
Sources of Income for Households								
	Whole Area No. of HHs =50		Inner Zone No. of HHs = 25		Middle Zone No. of HHs =14		Outer Zone No. of HHs = 11	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Agriculture	13	26	3	12	6	43	4	36
Formal Employment	12	24	5	20	4	29	3	27
Formal Self-employment	2	4	1	4	1	7	-	-
Informal Employment	28	56	14	56	7	50	8	73
Informal Self-employment	22	44	13	52	3	21	5	45
Rent	14	28	12	48	2	14	-	-
Others	2	4	-	-	2	14	-	-
Households by Main Source of Income								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
Agriculture	1	2	-	-	1	7	-	-
Formal employment	9	18	3	12	4	29	2	18
Formal Self Employment	1	2	-	-	1	7	-	-
Informal employment	23	46	11	44	6	43	6	55
Informal self employment	8	16	4	16	1	7	3	27
Rent	7	14	7	28	-	-	-	-
Others	1	2	-	-	1	7	-	-
Households by No. of Sources of Income								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50		25	100	14	100	11	100
Single Source	18	36	7	28	5	36	4	36
Multiple Sources	32	64	18	72	9	64	7	64
Total Incomes by Sources								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Income	Percent	Income	Percent	Income	Percent	Income	Percent

Agriculture	1,500,920	5	204,400	1	1,150,560	12	145,960	3
Formal Employment	8,242,000	28	2,400,000	16	3,240,000	34	2,602,000	50
Formal Self Employment	2,680,000	9	520,000	4	2,160,000	22	-	-
Informal Employment	6,057,200	20	3,325,200	22	1,346,000	14	1,386,000	26
Informal self employment	4,286,000	14	2,886,000	20	284,000	3	1,116,000	21
Rent	5,577,600	19	5,512,800	37	64,800	1	-	-
Others	1,392,000	5	-	-	1,392,000	14	-	-
Total	29,735,720	100	14,848,400	100	9,637,360	100	5,249,960	100

Have you subdivided your land in the past?

	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
1 Yes	22	44	13	52	3	21	6	55
2 No	28	56	12	48	11	79	5	45

If Yes, why did you subdivide the land?

	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	22	100	13	100	3	100	6	100
Inheritance	10	45	3	23	3	100	5	83
Sale	5	23	4	31	-	-	1	17
Both Inheritance and Sale	6	27	5	38	-	-	-	-
For Residential Development	1	5	1	8	-	-	-	-

Have you changed the use of your land or incorporated a new use before?

	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
1 Yes	15	30	14	56	2	14	-	-
2 No	35	70	11	44	12	86	11	100

If Yes, why did you introduce the new use?

	Whole Area	Inner Zone	Middle Zone	Outer Zone
	For Extra Income	For Extra Income	For Extra Income	-

In 30 and 32 above, did you seek any formal approval?

	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent

Total	33	100	22	100	5	100	11	100
1 Yes	13	39	11	50	2	40	-	-
2 No	20	61	11	50	3	60	11	100
Respondents by Institutions Consulted for Approval								
	Whole Area No. of HHs =13		Inner Zone No. of HHs = 11		Middle Zone No. of HHs =2		Outer Zone No. of HHs =0	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Municipal Council of Machakos	12	92	11	100	2	100	-	-
Land Administration Office	1	8	1	9	-	-	-	-
Land Survey	3	23	3	27	-	-	-	-
Physical Planning Office	3	23	3	27	-	-	-	-
Respondents by Awareness of Public Agencies Involved in Regulating Land Use								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
Aware	33	66	19	76	10	71	3	27
Not Aware	17	34	6	24	4	29	8	73
Respondents By Awareness of Types of Public Agencies Involved in Regulating Land Use								
	Whole Area No. of Respondents=33		Inner Zone No. of Respondents = 19		Middle Zone No. of Respondents= 10		Outer Zone No. of Respondents=3	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Municipal Council of Machakos	24	72	17	89	6	60	1	33
Ministry of Lands	10	30	6	32	3	30	1	33
Ministry of Agriculture	6	18	1	5	4	40	1	33
Ministry of Medical Services and Public Health	6	18	5	26	1	10	1	33
Ministry of Water and Irrigation	1	3	1	5	-	-	-	-
Ministry of Environment	1	3	-	-	-	-	-	-
Provincial Administration	2	6	1	5	1	10	-	-
Respondents by Awareness of Roles of Public Agencies Mandated to Regulate Land Use								
	Whole Area No. of Respondents =33		Inner Zone No. of Respondents = 19		Middle Zone No. of Respondents =10		Outer Zone No. of Respondents =3	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Development Control	30	91	18	95	7	70	1	33
Water and Sanitation Services	8	24	5	26	-	-	1	33
Land Administration	3	9	3	16	1	10	1	33
Agricultural Extension Services	4	12	1	5	4	40	1	33

Environment	1	3	-	-	-	-	-	-
Others	2	6	1	5	2	20	-	-
Respondents by their Perceptions of land subdivision and land use change in lower kiandani?								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
Good	22	44	11	44	5	36	5	46
Bad	9	18	4	16	3	21	3	27
Both Good and Bad	19	38	10	40	6	43	3	27
Respondents by Opinion on How Government Should deal with Land Subdivision and Land Use Change in Lower Kiandani								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
Ban	4	8	1	4	2	14	1	9
Limit	28	56	18	72	8	57	3	27
Allow	16	32	5	20	4	29	7	64
No Idea	2	4	1	4	-	-	-	-
Are there specific urban dev that you consider most suitable for lower kiandani?								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
Yes	45	90	24	96	13	93	10	91
No	5	10	1	4	1	7	1	9
Respondents By Specific Urban Developments Considered Most Suitable for Lower Kiandani								
	Whole Area No. of Respondents =45		Inner Zone No. of Respondents = 24		Middle Zone No. of Respondents =13		Outer Zone No. of Respondents =10	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Residential Development	23	51	10	42	10	77	4	40
Commercial Development	18	40	9	38	4	31	3	30
Community Facilities and Services	31	69	15	63	8	62	8	80
Infrastructure and Services	15	33	6	25	6	46	4	40
Industrial Development	8	18	5	21	2	15	1	10
Agriculture	4	9	2	8	3	23	1	10
Recreation	3	7	3	13	-	-	-	-

Are there specific urban developments that you consider NOT suitable for your area?

	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
Yes	34	68	16	64	13	93	6	55
No	16	32	9	36	1	7	5	45

Respondents By Specific Urban Developments Considered NOT Suitable for Lower Kiandani

Total No. of Respondents = 16

	Whole Area Zone No. of Respondents =34		Inner Zone No. of Respondents = 16		Middle Zone No. of Respondents = 13		Outer Zone No. of Respondents =6	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Social Entertainment Places	31	91	14	88	11	85	6	100
Industrial Activities	2	6	2	6	-	-	-	-
Commercial Developments	2	6	1	6	1	8	-	-
Others(Sand Harvesting, Funeral homes, Showground, farming)	4	12	3	12	1	8	-	-

Do you know the name of your Electoral Ward?

	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
1 Yes	25	50	11	44	9	64	6	55
2 No	25	50	14	56	5	36	5	45

Do you know the name of your Local councillor?

	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
1 Yes	24	48	9	36	7	50	8	73
2 No	26	52	16	64	7	50	3	27

On a scale of 1-5, rate the Municipal infrastructure and service delivery with respect to:

a) Roads

	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
1 Poor	30	60	16	64	7	50	6	55
2 Fair	13	26	8	32	3	21	3	27
3 Good	7	14	1	4	4	29	2	18

b) Water and sanitation								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
1 Poor	44	88	24	96	11	79	10	91
2 Fair	2	4	1	4	-	-	-	-
3 Good	4	8			3	21	1	9
c) Solid waste management								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
1 Poor	28	56	13	52	9	64	6	55
2 Fair	12	24	9	36	3	22	-	-
3 Good	10	20	3	12	2	14	5	45
d) Community facilities e.g. schools								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Total	50	100	25	100	14	100	11	100
1 Poor	30	60	16	64	9	64	7	64
2 Fair	9	18	3	12	4	29	1	9
3 Good	11	22	6	24	1	7	3	27
What do you think should be done to improve the livelihoods of the residents of Lower Kiandani?								
	Whole Area		Inner Zone		Middle Zone		Outer Zone	
	No. of Respondents =50		No. of Respondents = 25		No. of Respondents =14		No. of Respondents =11	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Community Facilities and Social Services	23	46	17	68	4	29	2	18
Infrastructural Development	22	44	12	48	6	43	2	18
Creation of Employment	19	38	11	44	3	21	5	45
Financial Support	15	30	6	24	4	29	5	45
Improvement In Governance and Leadership	16	32	8	32	4	29	4	36
Agricultural Development	22	44	8	32	8	57	6	55
Environment and Town Planning Services	4	8	3	12	1	7	1	9