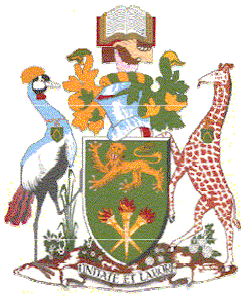

UNIVERSITY OF NAIROBI

URBAN AGRICULTURE AS AN AUTHENTIC URBAN LAND USE IN KENYA: A CASE STUDY OF KOMAROCK ESTATE

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(B.A)

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OCTOBER, 2013

DECLARATION

I, the undersigned, declare that the work contained in this report is my original work and has never been submitted for any degree in any other university.

Author (Sign): …… Date: ……..

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This Research Project has been submitted for examination with our approval as the university supervisors in the department of Real Estate and Construction Management

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ABSTRACT

Urban Agriculture (UA) is one of the ways that residents in the urban areas employ as a means to complement their food supply. UA is a common phenomenon within and around the urban areas in Kenya and other countries. The problem addressed in this study is that the practice has not been recognized as an urban land use in Kenya. There is no specific policy governing the practice therefore it continues to expand without any regulation. This study investigates UA as an urban land use in Kenya. In this regard, the study established the various benefits and contribution UA has on the people who practice it, the society and the environment. It also looks at the possible measures that can be taken to achieve sustainable UA practices. The study also analysed two UA policies from South Africa and Zambia as best practices.

The study was conducted in Infill B section of Komarock Estate where 80 households were sampled. In an attempt interrogate the policy framework guiding UA, 6 Government policy makers. The study found out that though a majority of the households practice UA, it has not yet been recognized as a legal urban land use in Kenya.

ACKNOWLEDGEMENTS

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Also, to my family and relatives who prayed for me and tolerated the inconveniences I caused them in one way or another during my study and contributed enormously to my academic success. God bless you all.

DEDICATION

This piece of work is dedicated to my family: my husband Mr. Karanja and my daughter Tess for their support and patience through the times that I could not be with them due to my commitment to accomplish this course.

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Urban areas in Kenya are facing an upsurge in population as a result of increasing rural – urban migration. This increase has resulted in an increase in housing and food demand amongst other demands. 60% of Nairobi's population live in dilapidated environments, with poverty levels ranging between 60 and 78% (Njenga, et al, 2002). As a result, urban agriculture (UA) as a land use in the urban areas has been gaining prominence. The practice is one of the livelihood coping mechanisms employed by urban dwellers (Ngotho, 2012). It is carried out within the urban and peri-urban areas hence the reference term urban and peri-urban agriculture. Since it is carried out within or around the built environment, UA is likely to have potential effects, either direct or indirect, on the built environment within which it exists.

The draft UPAL[1] policy (GoK, 2010: 1) states that urban farming includes:

> *"cultivation of crops and the raising of animals, processing and marketing of food and other uses within urban areas (intra-urban agriculture) and in the fringes of urban areas (peri-urban agriculture), in response to the daily demands of consumers within the town, city or metropolis; on land and using water found in these areas, applying intensive production methods, using and recycling natural resources and urban waste, to yield a diversity of crops and livestock products".*

This practice is referred to as Urban and Peri-Urban Agriculture and Livestock (UPAL).

Urban agriculture (UA) has also been defined by (wikipedia.org) as the practice of cultivating, processing, and distributing food in or around a village, town, or city. It can also involve animal husbandry, aquaculture, agro forestry, and horticulture. These activities also occur in peri-urban areas as well (wikipedia.org). This study however takes urban agriculture to be cultivation of

[1] Urban and Peri Urban Agriculture and Livestock

crops and rearing of livestock both for subsistence and commercial consumption. The practice may include horticulture, floriculture, growing of beauty plants, agro forestry and keeping of livestock and fishery both within the urban and the peri-urban areas. This approach is preferred because it represents all aspects of Urban Agriculture.

Land use is defined as the arrangements, activities and inputs people undertake in a certain urban land cover type to produce, change or maintain it (FAO/UNEP, 1999: pg 7)[2]. FAO[3](2004: pg 14)defines it 'as concerns the products and/or benefits obtained from use of the land as well as the land management actions (activities) carried out by humans to produce those products and benefits' . Urban land use is defined as "the spatial differences and similarities in certain types of land-use in urban areas which allow tracking of the history of their development and thus can be useful for future planning" (www.geographybaso.co.uk)

There are generally 6 widely accepted urban land uses. They include: residential; transportation; commercial; institutional and recreational land use. (wikianswers.com). There are several urban land use models that have been developed to try and show that towns and cities do not grow in a haphazard way but tend to develop recognisable shapes and patterns, therefore attempting to explain the layout of urban areas. They include Burgess model and Hoyt model. (www.geographybase.co.uk).

This research project adopts the FAO/UNEP, 1999 definition of urban land use where land use involves activities and inputs people undertake in a certain land cover type. This is because this definition seems to recognize all activities undertaken in any land cover. The study however

[2] Adapted from Wikipedia.org
[3] United Nations' Food and Agriculture Organization Water Development Division

looks at UA as one of the urban land uses with great potential and wide range of opportunities if well implemented. Though it is notable that all these definitions and models do not consider UA as one of the urban land uses, this project looks at the authenticity of the practice as one of the urban land uses.

Built environment refers to the human-made surroundings that provide the setting for human activity, ranging in scale from buildings and parks or green space to neighborhoods and cities that can often include their supporting infrastructure, such as water supply, or energy networks. The built environment encompasses places and spaces created or modified by people including buildings, parks, and transportation systems. In recent years, public health research has expanded the definition of built environment to include healthy food access and community gardens (wikipedia.org). University of Windsor defines built environment as those surroundings created for humans, by humans, and to be used for human activity. This study adopts the University of Windsor's definition of the built environment because it recognizes the human engagement in the creation and utilization of the built environment.

1.2 Problem Statement

With the increasing rapid urbanization in developing countries urban poverty and urban food insecurity have continued to persist. Complexity of urban life combined with high poverty levels has led to modification of the built environment to create livelihood survival strategies and as a result increased agricultural activities in urban areas have been experienced.

In Nairobi, 44% of households are under-nourished with up to 20 percent being ultra hungry (Kamau, et al, 2011). This therefore raises the question of supplementing the source of food

which is mainly done through food purchase. In this regard, UA plays a key role in supplying extra produce to urban areas. Though there is no exact statistics on the percentage of urban dwellers that practice urban agriculture in Kenya, it is estimated that 30 to 40% of urban dwellers practice it (FAO, 2012). The practice is believed to be on the increase despite the lack of policy to guide it (GoK, 2010:3). Urban agriculture has a great potential to economic development of this country.

In Kenya, due to lack of adequate land for agricultural use, the practice is normally practiced in open spaces and parks on public and individual homes / houses, along roadsides, at the gardens in the roundabouts, between railway lines, along rivers and river valleys, under power lines and within backyards of residential plots and along sewer lines (Olima, n.d.). This is however prohibited in the Land Act, 2012, Section 155 (1). It is faced by challenges such as environmental pollution, over utilization of the limited land leading to soil exhaustion, exposure to contamination by heavy metals and other pollutants due to irrigation using raw sewage increase in the incidence of zoonotic diseases because livestock is kept close to humans (Arku, et al, 2012).

In Nairobi, the urban poor populations in the informal settlements are the major actors. Vulnerable groups such as female–headed households, children, retired people, widows, and people with limited formal education are particularly involved in urban agriculture (GoK, 2010, Ayaga et al, 2004).

The importance of urban agriculture is increasingly being recognised by international organisations like United Nations Conference on Environment and Development (UNCED),

United Nations Centre for Human Settlements (HABITAT), World Food and Agriculture Organisation (FAO), and CGIAR.

Regardless of the identified importance of UA as an urban land use, Kenya still lacks a policy that directly addresses the issue of UA. The Ministry of Agriculture came up with a Draft National Urban and Peri-urban Agriculture and Livestock Policy in 2010 but the policy still remains in the draft form resulting to the underdevelopment of the sector due to lack of clear policy interventions geared to address current constraints and challenges. The Ministry of Nairobi Metropolitan Development noted that some portion of land in the Nairobi metropolitan region was under agricultural use (GoK, 2011). Where UA exists, it is unregulated (and its safety therefore not assured) and to an extreme extent harassment meted on those who practice it (Ngotho, 2012). In an attempt to redress this situation this study explores urban agriculture as an authentic urban land use in Kenya and looks into ways through which the practice can be supported legally through policy and legislative frameworks being put in place.

1.3 Objectives of the Study

The key objective of this study is to assess urban agriculture as an authentic urban land use in Kenya.

Specific objectives

1) Document the legal and institutional framework governing urban agriculture in Kenya
2) Identify best practices in countries where urban agriculture is an urban land use and make appropriate recommendations on sustainable UA practice in Kenya
3) Identify the effects of urban agriculture on the built environment.

1.4 Research questions

1) What is the legal and institutional framework governing urban agriculture in Kenya?
2) What are the best practices in other countries and what are the appropriate recommendations on sustainable UA practices in Kenya?
3) What are the effects of the practice of urban agriculture on the built environment?

1.5 Significance of the study

The purpose of this study is to look at ways to recognize UPA as a legitimate urban land use and suggest ways to make it sustainable by way of cost effectiveness and as an alternative way of agricultural production as well as a means of generating income to those who practice it. The study also looks at the need to have a policy which will give clear direction for sustainable development of the UA and underscore the importance of public-private sector partnerships in accelerating growth in the sub sector.

1.6 Justification of the study

As a result of the problems stated earlier, UA seems to fall between the cracks since no particular sector or agency seems to recognize it as a key urban use. Therefore, the results of this exploratory research will provide significant insight into the status of UA in Komarock gauging from the responses.

1.7 Scope of study

The study focused on UA and the practices that fall under it. In terms of coverage, the study covered Komarock Estate. Regarding the content scope, the study sought to establish the policy framework governing UA as well as the effects UA has on the built environment.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

Land is a critical resource that is central to economic, social and cultural development worldwide. With the increase in urban poverty, food insecurity and malnutrition shifting from rural to urban areas, renewed interest arises in alternative strategies of improving urban livelihoods as well as for urban food security and nutrition. As a result, the land resource has been put in different uses to help cope with the rising demands. Urban agriculture is one of the ways in which urban land is put in use

2.1 Urban Agriculture

Urban agriculture (UA) is the growing of plants and raising of animals for food and other uses within and around cities and towns and related activities as the production and delivery of inputs, processing and marketing of products (CoCT, 2007). This practice plays a significant role in national development by contributing towards food security, employment creation, poverty alleviation, and ecologising the "artificial" urban systems (Maingi, 2012). In this regard, about 800 million people in the world depend on urban agriculture either directly or indirectly (Ngotho, 2012). Thus urban agriculture is increasingly becoming a significant source of household food, a trend that is closely linked to declining incomes of vulnerable urban households, high rates of urbanisation, and the need to serve an emerging niche market in African cities bearing in mind the fact that households spent a high (30 percent) and increasing proportion of their total budget on food (Kamau, et al, 2011). UA plays an important role in enhancing urban food security since

the costs of supplying and distributing food to urban areas based on rural production and imports is expensive, and does not satisfy the demand, especially of the poorer sectors of the population (Prain & Lee-smith, 2010).

2.1.1 Types of Urban Agriculture

Categories of urban agriculture include ; micro farming in and around the house, small scale commercial horticulturists, small scale commercial livestock keeping and fish farming, small scale specialist producers, multi functional farms , institutional farms and gardens, community gardens and community farms, roof top gardens, vertical farming, backyard gardens (Maundu et al., n.d.).

Community garden provides land for family gardening use. Land is subdivided into smaller plots for individual household users where each gardener is responsible for maintaining his or her plot. They can either be normal or non formal and they are usually located on community owned land or on grounds of schools, churches, community centres and housing development (FAO, 2012).
Backyard gardens involve farming in the backyards of housing units. Home gardens are usually small and adjacent to a house or apartment, managed by residents with production primarily for home use. Institutional gardens are managed by schools, hospitals, prisons and factories (CoCT, 2007).

Roof top gardening involves the utilization of roof tops to undertake agricultural activities.
The different practices under UA include horticulture, floriculture, food crop growing, agro forestry, aquaculture, poultry keeping and livestock keeping.

2.1.2 Benefits of Urban Agriculture

i. Food supply and revenue generation

Food is a basic human right (Constitution of Kenya, 2010, Article 43, part 1c) yet, food and nutrition insecurity is a daily reality for millions of Kenyans living in both the rural and urban areas (Kamau, et al, 2011). As a result many people have turned to UA as a means of livelihood strategy. About 800 million people in the world depend on urban agriculture either directly or indirectly (Ngotho, 2012). Urban agriculture supplies over 80% of vegetables consumed in many cities. For example, an estimated 200,000 people who patronize restaurants and street foods in Accra consume food items and other products obtained from urban agriculture (Olufunke, n.d.).

In cities such as Accra and Dar es Salaam a significant number of people are increasingly depending on crops grown in public spaces for food (De Zeeuw, et al., 2010).

According to Kamau, et al, 2011, 44 percent of households residing in Nairobi are under-nourished with up to 20 percent being ultra hungry. Urban agriculture is a potentially viable policy response to the complex challenge of feeding a burgeoning mass of urban residents amid decline in food production in rural areas (Arku, et al, 2012). Urban agriculture is therefore an important means of achieving constant local food supply.

ii. Employment creation, livelihood support, and poverty reduction

UA is a major source of employment and income generation through sale of surplus therefore helps to improve the diet and health status as well as economic status of those who practice it (Maxwell, 2001). Considering its close proximity to potential market, this translates to low transportation cost being incurred. UA also makes productive use of land which is not ideal for construction for instance flood prone areas and land under power lines.(De Zeeuw, et al, 2011).

The agricultural sector in Kenya, including UA, provides an equivalent of 0.7 million formal full-time jobs and 3.7 million small and medium enterprise sector jobs. It is estimated that 75% of the Kenyan population is gainfully employed in food and feed production (GoK, 2010).

Besides the economic benefits for the urban agricultural producers, UA stimulates the development of related micro-enterprises: the production of necessary agricultural inputs and the processing, packaging and marketing of outputs. The activities or services rendered by these enterprises may owe their existence in part or wholly to UA. Other services may also be rendered by independent families and groups like animal health services, bookkeeping and transportation (Olufunke, n.d.).

iii. Urban waste management - Recycling wastes

Urban agriculture is part of the urban ecological system and plays an important role in the urban environmental management system. Firstly, a growing city produces more and more wastewater and organic wastes. For most cities the disposal of wastes has become a serious problem. Urban agriculture helps to solve such problems by turning urban wastes into a productive resource. UA creates opportunity for recycling urban organic wastes, such as poultry manure, cow dung, market and household waste, as well as human waste. Through efficient recycling of these wastes, environmental health is improved and the productivity of farming systems is enhanced (Frayne, et al, 2009). Treated waste water from sewers is used to irrigate farms while waste vegetable matter in municipal dump sites are used to provide organic compost in farms hence reducing pollution to these urban centers (Maxwell, 2001) . Market analysis in Accra showed that about 35,000 tons of compost could be sold annually to urban farmers and Real Estate

developers for gardening and landscaping. Through selling compost, revenue is generated and urban waste reduced by up to 50% (Olufunke, n.d.).

UA also impacts positively on the greening and cleaning of the city by turning derelict open spaces into green zones and maintaining buffer and reserve zones free of housing, with positive impacts on the micro-climate (Arku, et al, 2012). Degraded open spaces and vacant land are often used as informal waste dumpsites and are a source of crime and health problems. When such zones are turned into productive green spaces, not only an unhealthy situation is cleared, but also the neighbours will passively or actively enjoy the green area. Such activities may also enhance community self-esteem in the neighbourhood and stimulate other actions for improving the community's livelihood (ruaf.org).

iv. Wastewater use in urban and peri-urban agriculture

Access to adequate and suitable water for irrigation remains a major problem in UA. Urban farmers therefore resort to using waste water for irrigating their crops and feeding livestock. Using wastewater in urban agriculture is a key mechanism for sustainable management of water, supporting savings for domestic purposes (Maxwell, 2001).

Estimates show that out of the potential 42.7 million cubic metres of waste water produced per year in Accra, only about 0.36 million cubic metres (0.84%) and 1.3 million cubic metres (3.04%) of untreated wastewater are used in UPA, during the wet season and dry seasons respectively (Olufunke, n.d.).

2.1.3 Constraints to the development of urban agriculture

Several factors have been identified as constraints. Some are imposed by the government, the market, and support agencies (GoK, 2010). The constraints include: Inadequate institutional/legal frameworks, limited access to agricultural inputs and post production services, inadequate technical knowledge of urban agricultural practices, organizational constraints, political and socio-cultural biases, lack of physical security, poor rating of urban agriculture as an authentic urban land use and lack of access to land (Olima, n.d.)

a. Lack of Policy, Legal and Regulatory Framework

There is lack of a specific policy geared towards addressing the development of this important sub-sector. However, various legislations in Kenya refer directly to the sub-sector.

In Local Government Act (Cap. 265),Section 201, local authorities (equivalent to county governments in Constitution of Kenya, 2010) in Kenya had the authority to make by-laws necessary to maintain residents' health, safety and wellbeing; maintain good rule and government; prevent and suppress nuisance; control, regulate, prohibit or compel any act they are empowered to perform. In this regard, Nairobi County Council's by laws classifies keeping any animal or poultry which cause a nuisance to any resident in the neighborhood as an offence (NCC website). Section 144 (c) of the Local Government Act also prohibited cultivation by unauthorized persons on land that is not occupied or enclosed, or land belonging to private persons, government and local authorities. It does not however specify who the authorized persons are.

Section 155 (b) of the same Act, also permitted agricultural activities and rearing of livestock including provision of services that support them. The services may include extension education and prevention of outbreak and spread of diseases. Further, section 155(c) provided for the cultivation of famine relief crops by poor households to support themselves in any part of the country where there is a likelihood of foodstuffs shortage

The Public Health Act (Cap 242), section 157 (1) empowers the Minister for Health to prohibit cultivation or irrigation within and around townships.

The Land Control Act (Cap 302), 2010, section 2(a) part (i) defines agricultural land as land that is not within a municipality or a township while part 2(b) defines it as land in the Nairobi Area or in any municipality, township or urban centre that is declared by the Minister, by notice in the Gazette, to be agricultural land for the purposes of this Act.
The Act provides for controlling transaction of agricultural land. However, the minimum agricultural land that can be transacted is about 1 acre. This is unsupportive of UA since smaller land parcels than these exist where intensive UA activities are practiced. The Act also provides for controlling of transaction of agricultural land.

The National Land Policy (GoK, 2009: 28) recognizes the importance of urban agriculture, and the need for the zoning of land in ways that allow for it. The policy proposes some principles that shall be implemented to provide a framework for the proper carrying out of UA and forestry. The Physical Planning Act, Cap 286, 2009, Third Schedule part (iii) stipulates that agricultural potential of the urban region showing various agricultural activities and the process is an economic base.

The 2011 Urban Areas and Cities Act, aimed at establishing a nationwide legal framework for urban governance and management, requires that every city and municipality prepare an integrated development plan that should "provide a framework for regulated urban agriculture".

Agricultural Act (Cap 318) part I, 2 (i) defines agricultural land as " all land which is used for the purpose of agriculture, not being land which, under any law relating to town and country planning, is proposed for use for purposes other than agriculture". It also provides for conservation, management and development of natural resources for agricultural growth and development. However, this is particular for rural and not urban agriculture.

The Kenya Vision 2030 addresses agriculture in general and does not seem to recognize UA, for instance in fig 3.3.6, pg 43, indicating the potential land for additional crop production in Kenya, Nairobi province has been left out as one of the areas with potential. The Nairobi County government however has a provision for an Agriculture and Livestock department. The national government's strategy for the growth and development of the Nairobi metropolitan region to the year 2030 as formulated in the Nairobi Metropolitan Policy calls for "active measures" to prevent urban sprawl on prime peri-urban agricultural land, and proposes – at long last – to include agriculture among metropolitan land uses (FAO, 2012). However, it is important to note that this policy was formulated by the Ministry of Nairobi Metropolitan Development which was scrapped in 2013 after a new government took on power and the functions of the Ministry taken over by other departments hence the fate of the policy is still unknown.

Crop Production and Livestock Act (Cap 321), (GoK, 2012), part 4A stipulates that "subject to the approval of the Minister for the time being responsible for animal husbandry, a municipal council, an urban council and an area council may each make by-laws applicable to its area, or

any part thereof, for all or any of the following purposes for which no rules made under section 4 of this Act are in force in that area:- for prohibiting the keeping or grazing of any livestock on any agricultural land in such area and for regulating or controlling the numbers and kinds of livestock which may be kept on any such agricultural land"

The Ministry of Agriculture came up with a draft UPAL policy in 2010 to guide and regulate the practice. The policy however has not yet come into effect to date therefore leaving the sector unregulated.

Though some of the policies and regulation implicitly and directly provide for the practice of UA, it is yet to be adopted and comprehensively provided for hence the continuation of the process in an unregulated manner. This has led to the continuation of the practice in an unregulated manner, without observation of safety measures, adoption of technology and other good agricultural practices.

b. Inadequate land

Unavailability and inaccessibility to adequate land for UA is a great constraint to the practice. Insecurity of tenure is also a big hindrance. Due to the rapid urbanization, there exists competition between UA and other urban land uses. As seen earlier in this report, UA is not even considered as one of the key urban land uses hence it is falls between the cracks. Areas that have been gazetted as designated town/municipal councils have been converted to commercial plots encroaching into potential agricultural land. This, combined with lack of a policy framework, gives other developments an upper hand. There is also the problem of theft and destruction by people and animals (Kawai, n.d.).

c. Inadequacy of clean water

There is acute inadequacy of clean water for irrigation and for livestock consumption. In the dry season in Accra, a typical 300 sq m plot of leafy vegetables requires around 80,000 litres of water over a 30-day period (FAO, 2012). Access to good quality water is a scarce and expensive exercise. It is estimated that 36% of total urban farmers in Nairobi use waste water for irrigation (Ayaga, Kibata, Lee-smith, & Njenga, 2004). These limitations have resulted to unsustainable land use, use of waste water for irrigation and poor produce handling leading to land degradation, low quality and contaminated animal feeds, poor animal and crop husbandry, contamination of produce and spread of diseases.

d. Lack of Technology Development and Dissemination

Research and technological development on agriculture and livestock is carried out by public, private and international institutions, while the Ministries of Agriculture and Livestock Development are the main extension service providers. Other service providers include agro-chemical companies, animal feed processors, NGO's and CBO's (GoK, 2010). Due to low prioritization of UA, most of these have focused on rural agriculture and consequently UA is left out.

e. Markets and Marketing

Markets and marketing of UPAL products just like other agricultural products are faced by many challenges. There are few and weak producer organizations, poor post harvest handling of produce/products, especially fresh and perishable products, due to inadequate storage and handling, transport and cargo space and lack of adequate market information that limit access to

niche markets and benefits from economies of scale unlike in the rural areas where such services are locally available. There is also poor acceptability of produce from UA with fears that they have been contaminated with lead and other heavy metals from the waste water.

f. Safety of the UPAL Practice and Products

The health of the people revolves around food products they consume, among other things. In addition, exposure of the farmers and consumers to risks associated with use of agro-chemicals and untreated sewage is a matter of concern. The products resulting from UPAL farming occasionally may not be safe for human consumption. Some of the cases that have been highlighted in the Kenyan media e.g. the recent fish business in informal settlements where the fish is gotten from the sewer tunnels and the vegetables irrigated using raw sewage in Ruai in a popular feature “kitoweo tatanishi” in one of the local television stations in May, 2012.

Safety of UA practice and products along the value chain is constrained by the following factors: Use of untreated waste water during production and handling of the products at various points of distribution, unsafe use of agrochemicals in crops and veterinary drugs and vaccines in animals and discharge of industrial effluent into the open posing great hazard to the crops, livestock and human.

g. Environmental Pollution

The increased urbanization and the consequent rise in demand for food by the urban population, has lead to growth in UA activities. This has been affected by the high rates of environmental pollution. The rise in pollution has been due to the following constraints: Rampant use of raw sewage obtained from vandalized sewer lines for cleaning of produce and irrigation purposes,

water pollution as a result of both domestic and industrial waste, polythene bags and plastics menace, noise and air pollution prevalent within the towns and their surroundings

h. Access to credit

Many financial organizations shy away from giving credit services to urban farmers unlike to rural farmers. This hinders them therefore from investing in their own production like purchasing good seed of higher value vegetables, or a motor pump, or fencing to protect crops from theft, which would help urban farmers improve their productivity, their contribution to the urban food supply and their own incomes (GoK, 2010)

2.1.4: Risks associated with UA

a. Health risks

Such concerns refer to contamination risks of producers, handlers, consumers and people in the vicinity of production areas caused by crop and husbandry inputs, products and by-products. Pathogens and toxic contamination from liquid and solid wastes also pose a great health risk to the human beings. Proximity to animals also exposes humans to zoonotic diseases and nuisance from the animals

b. Pollution and environmental risks

This includes air, water and land pollution. Air pollution may be as a result of noise from the animals as well as the foul smell from their excreta. Water pollution is as a result of these wastes as well as agrochemicals coming into contact with water while land pollution is as a result of environmental health issues include visual untidiness, soil erosion, destruction of vegetation, and siltation.

2.1.5: Who are involved in UA?

The actors involved in UA are many; they are the suppliers of resources, inputs and services, the producers, the transporters, the processors, the retailers and the consumers, the promoters and the managers (Mougeot n.d). The producers may vary from public to private entities for instance Zimbabwe's Harare City Council irrigates cattle pastures with treated municipal wastewater (Mougeot, n.d).

2.2 Urban Land Use

Urban land use is the arrangements, activities and inputs people undertake in a certain land cover type within an urban area to produce, change or maintain it. (FAO /UNEP 1999). There are generally 6 widely accepted urban land uses. They include: residential, transportation, commercial, institutional and recreational land use. (wikianswers.com).

Among these types of urban land uses include : residential land use which includes anywhere that people live, houses, apartments, buildings; transportation land use which is made up of 3 parts; vehicles, travels paths and terminal facilities; commercial land use which entails businesses; industrial land use for factories; institutional land use for schools, hospitals, government buildings, and churches, and finally recreational land use for parks, playgrounds, golf courses among others (wikianswers.com).

Urban land uses in Kenya are not any different. They range from residential, transportation, commercial, industrial, institutional and recreational. Only 16% (9.2 million hectares) of the total land area is in use in Kenya while 84% is arid and semi-arid therefore not comprehensively

utilised. Of the 16% in use, homesteads and infrastructure occupy 6%, game parks 13%, forests 19%, croplands 31%, and livestock/ dairy 31 %(Kenya Vision 2030, pg 42).

Continued rural to urban migration has exerted pressure on land use in the urban areas. The resultants high demand for housing has led to urban land use competition between agriculture and housing with housing been given priority due to its perceived high economic return.

2.2.1 Urban Land use planning in Kenya

Urban Areas and Cities Act, 2011, Section 20, part1 (d) stipulates that :

> *"Subject to the provisions of this Act, a board of a city or municipality shall control land use, land sub-division, land development and zoning by public and private sectors for any purpose, including industry, commerce, markets, shopping and other employment centres, residential areas, recreational areas, parks, entertainment, passenger transport, agriculture, and freight and transit stations within the framework of the spatial and master plans for the city or municipality as may be delegated by the county government"*

County Government's Act, 2012, section 111, part 1 envisages that every city/ municipal council must have a land use and building plan to guide and facilitate development within the particular city/ municipality. Constitution of Kenya, 2010, Section 67, part 2 (h) gives the National Land Commission the responsibility to monitor and have oversight responsibilities over land use planning throughout the country.

However, urban land use planning in Kenya seems to be following development (Werner, et al, 2011). Competition between agriculture and other urban land uses is on the increase due to rapid urbanization. Agricultural land in the peri- urban areas is slowly diminishing and the resultant effect is less production. Urban land use planning and development does not take into consideration of agricultural activities while the exploitation of open spaces has not been assessed to determine their potentiality (Gok, 2010).

2.2.2 UA as an urban land use in Kenya

Farming in urban areas is increasingly gaining significance. Farming activities are being undertaken along roadsides, middle of roundabouts, backyards of residential areas, parks, along rivers and in almost all public places (Olima, n.d.). Crops are cultivated and animals like cattle, goats, pigs, rabbits, poultry and sheep are reared.

> *"An estimated 50,000 bags of maize and 15,000 bags of beans are being produced in Nairobi annually. The Ministry estimates that up to a quarter million chicken are reared within Nairobi and about 45,000 goats and sheep. Conservative estimates show that about 42 million liters of milk are produced within Nairobi annually. This, in economic terms, means that milk alone generates up to Kshs. 800 million annually if priced at 20 Shs. per liter. Most of it reaches the urban poor as either food or income. In 1998, there were 24,000 dairy cattle in Nairobi, worth roughly one billion shillings. In Kasarani Division, about 180,000 trays of eggs were produced in 1998, worth Kshs. 27 million. In the same year 110,000 kilograms of sukuma wiki were grown in Dagoretti, while Langata Division produced 240,000 and Westlands Division an amazing 260,000 kilograms. All these figures indicate the potential economic contribution of urban agriculture, not only in Nairobi but also in other urban centers in Kenya, where the situation is similar" (Ayaga et al, 2004).*

These farming activities have continued to thrive with little regard for associated health issues. Proper regulation of urban agriculture can however lead to the provision of better nutrition, poverty alleviation and employment creation. In Kenya 60-70% of wastes produced in urban areas are organic (ruaf.org). This is thus a potential for improved soil fertility, a current constraint to agricultural production. It is also an input of livestock feed obtained from markets, households or selected industrial waste. Research has also shown that urban crop farming has higher productivity as compared to rural farming perhaps due to the inputs of waste and with the application of improved technologies in crop and livestock production and waste management (FAO, 2012). Therefore, its potential remains high in Kenya.

Though largely discouraged and facing accusations ranging from encouraging breeding of mosquitoes to acting as hiding places for thugs, urban agriculture is slowly emerging as a food security option, with reports indicating that up to half of the food consumed in Nairobi is grown

in big towns (The Standard, 13th January, 2013)[4]. It is estimated that over 30% of Nairobi residents engage in UA either as producers, processors or traders (Moustier, 2005[5], FAO, 2012). This has been demonstrated for Nairobi by Basweti et al. (2001)[6] that seedling nurseries offer an important source of income for significant numbers of people in urban and peri-urban areas and make a contribution to urban greening. The trend of urban agriculture in Nairobi showed it was on the decline due to competition of land by other land uses particularly urban development (GoK, 2010). This is so despite the fact that Nairobi is classified as a high and medium agricultural potential area in Kenya's development blueprint Vision 2030 (GoK, 2007: pg 43).

In Kisumu, urban farming practices largely include small–scale rain-fed mixed farming, small scale river irrigation, wetland farming, fish farming and free range livestock keeping. The most intensive agriculture in the larger Kisumu district peri-urban is still characterized by mainly small-scale subsistence plots consisting commonly of maize, groundnuts, beans and sorghum. Cultivation of crops such as kales, tomato and local vegetables for the urban market is reported to be on the increase (Kangethe *et al*, 2008)[7]. Residents have progressively reclaimed wetlands for the cultivation of cabbages, kales, yams and traditional vegetables (FAO, 2012). Also, tree seedlings "squat" on public space along the main access roads, with contribution to the environment and to beautification (Prain & Lee-Smith, 2010).

Two thirds of the Nakuru residents practice urban farming (Ngotho, 2012). In Nakuru, livestock-keepers use the manure from urban-raised livestock to fertilize crops on both urban and rural plots, underlining the importance of multi locational households and casting doubt on the

[4] The Standard is one of the daily newspapers
[5] Adapted from Arku et al, 2012
[6] Adapted from Prain & Lee-Smith, 2010
[7] This reference was obtained from Draft UPAL policy, GoK, 2010

usefulness of maintaining strict distinctions between urban and rural livelihoods (Prain & Lee-Smith, 2010) . In Mombasa, production of fruit and vegetables is widely practiced on balconies, in home gardens and in peri-urban open fields, both for domestic consumption and for sale in local markets and to tourist hotels (FAO, 2012).

Other towns in Kenya exhibit more or less the same trend. This therefore raises the question of recognition of UA as an urban land since the practice continues to expand in spite of the lack of policy regulation and support from the relevant quotas.

2.3 Country Case Studies of UA as an authentic Urban Land Use

2.3.1 Cape Town, SOUTH AFRICA

80% of Cape Town's population is considered food insecure (Frayne *et al.*, 2009: 13)[8]. This combined with the high national formal unemployment rate of 47% have led to food insecurity. Increasing food insecurity and the decline of real incomes have led to the popularization of informal urban agriculture. As a response to this, the government and other agencies are currently promoting urban agriculture as a solution to these social problems. Accordingly, both the National Government and the City of Cape Town Municipality have prioritized urban agriculture as a core thrust in their urban planning interventions (Geyer, et al, n.d.).

In Cape Town, South Africa, there is an Urban Agriculture Policy for the City of Cape Town (2007). It defines urban agriculture as being the production, processing, marketing and distribution of crops and animals and products in an urban environment using resources available in that urban area for the benefit largely of residents from that area. The purpose of the policy is

[8] Adapted from Geyer et al

to develop ‘an integrated and holistic approach for the effective and meaningful development of urban agriculture in the City of Cape Town and to create an enabling environment wherein public, private and civil society agents can work collectively to create more real and sustainable opportunities for local area economic development’ (CoCT, 2007).It also aims at giving formal recognition and status to urban agriculture.

The strategic goals of the policy include: to enable the poor to utilize urban agriculture as an element of their survival strategy (household food security), to enable people to create commercially sustainable economic opportunities through urban agriculture (jobs and income), to enable previously disadvantaged people to participate in the land redistribution for agricultural development programme (redress imbalances) and to facilitate human resources development (technical, business and social skills training).

The scope of the policy does not include commercial farming and other agricultural activities outside the urban edge of the city. The policy also proposes inclusion of urban agriculture as a multifunctional component in municipal land planning and standard development processes concerning land use and environmental protection, i.e. land use plans, zoning schemes and site development plans should provide for urban agricultural activities.

The city seeks to identify land in all urban areas suitable for urban agriculture. These pieces of land will be placed under the management of the Urban Agricultural Unit. The specific type of urban agricultural activity allowed per site will be determined by its location, size, accessibility, cost to provide basic infrastructure, environmental impacts, typography, and needs of the surrounding community

To promote UA, the city would identify land parcels available to prospective urban agricultural practitioners and lease out to the urban farmers who cannot be able to buy. It would also subsidise provision of water to the gardens of vulnerable groups.

In regard to livestock keeping, the policy prohibits livestock keeping in residential areas and road reserves in the city because it considers it to have adverse negative environmental health impacts. Instead, the policy specifies the creation of agricultural commonages outside urban areas for grazing purposes, which would eventually be integrated into the land reform programme. The city would introduce, in cooperation with other role-players, a support programme for urban agriculture which would include the following elements: assistance to access land, basic infrastructure, production inputs, tools and equipment and capacity and skills development.

The classification of urban agricultural operations is mainly based on the type and scale of such activities. They include: home based activities – home dwellers using their back or front yards to grow vegetables and/or to keep animals, small emerging farmers – This constitutes individuals or groups of people that are or want to be full time farmers. It is a formal business activity and needs to make a profit to survive, community based activities – this consist of a group of people from the community that come together to produce food collectively for themselves or a community institution and micro farmers – this includes individuals or groups of people that are involved in urban agricultural activities (both vegetable gardening and animal husbandry) to create an income

The Cape Town Spatial Development Framework (CTSDF) also plays a crucial role in integrating and aligning the planning priorities and principles of the various spheres of government spatially, thus ensuring the protection of agricultural land uses in specific areas.

The CTSDF provides the spatial framework in which agriculture is practised as an integral function of municipal land-use systems (City of Cape Town Metropolitan Municipality, 2010)[9]. The CTSDF reserves high potential and unique agricultural land beyond the urban edge exclusively for agricultural purposes to ensure food security. It also provides a theoretical framework in which various types of agricultural land uses are permitted within urban areas. In principle, it promotes urban agriculture, particularly in areas where it can provide employment and additional income in deprived communities (Geyer et al., n.d.). As a result, UA productivity has been on the increase and there are prospects of success in the sector(Frayne, et al, 2009)

2.3.2 Ndola City, ZAMBIA

Ndola is the third largest city of Zambia as well as the provincial headquarters of the Copperbelt Province. Ndola is on the border of the Democratic Republic of Congo. Most of Ndola district is classified as urban and peri-urban. It covers 110,300 hectares (most of which is under forest reserve) with a population of 374,757 (As per 2000 census)[10]. The City is predominantly a commercial and industrial city. Of Ndola's total land area, 41,418ha is agricultural land, 43,387ha forests and plantations, and 6,172ha is built up land, 2051ha is used for mining whereas other uses take up 17,267 ha (Ndola City Council, n.d).

[9] Adapted from Geyer, et al, n.d
[10] Adapted from www.ruaf.org

Urban agriculture is widely practiced in Ndola. The location of these farming activities is mainly in back yards, forest reserves, along main road tracks, along streams and river banks, on rented plots and small holdings. Mainly the farming carried out involves among other things, the growing of vegetables, pumpkins, maize, beans, groundnuts and sugar canes etc. Most of these crops are grown in open spaces and in the peri-urban area. There is institutional urban agriculture, largely practiced at schools, churches, prison grounds and police grounds. There is also community urban agriculture practiced in some of the open spaces.

Backyard urban agriculture is also practiced on the plots and is characterized by the production of various vegetables and poultry products. Large livestock like cattle is noticeable by its absence in the city (ruaf.org). A lot of the urban poor engage in urban agriculture in an effort to reduce poverty, improve food security as well as meet their nutritional needs. Therefore, urban agriculture has contributed greatly to economic empowerment, food security, nutrition and making available fresh foods to the population of Ndola (Ndola City Council, n.d, pg 3).

Ndola City Council formulated Urban Agriculture Policy to promote active participatory management and development of urban agriculture by all stakeholders. The Policy takes cognizance of existing laws and regulations, and institutions both private and government.

The purpose of the Policy is to provide guidelines for the development of a participatory framework and process for the development of urban agriculture in Ndola. Ultimately, the policy aims at the formal recognition of urban agriculture as a permissible land use practice and commercial activity in the Ndola municipality.

The policy defines UA as comprises of a variety of farming systems, ranging from subsistence production and processing at household level to fully commercialized agriculture, product processing, marketing and distribution systems for crops and livestock and related products within the urban setting using resources from within the urban area.

A number of national policies and council by-laws are used to foster urban agriculture in the city. The policies include; National environment policy, National forestry policy, National agricultural policy, Public health act, Water and sanitation act and the council by- laws.

The policy identifies land for use in UA as including area along streams, open spaces within townships, empty plots and small holdings on the peripheries of the city. Idle land in forest reserves and plantations could also be used for urban agriculture.

The vision of the City Council of Ndola is to ensure that the city has implemented a developed, legal and sustainable urban agriculture system for the city of Ndola which is well coordinated, participatory and contributes to the city's economy while maintaining the resource base by 2015.

The city of Ndola also has an Urban Agriculture Strategic Agenda. The objective of the strategic agenda is to provide guidance on the identification of main strategies or courses of action to be applied for the key issues pertaining to Urban Agriculture in Ndola and also to facilitate the development of a framework that will propose coordination mechanisms and identification of available resources and potential sources for implementation.

With the policy and the strategic agenda, the UA sector has recorded tremendous growth and is expected to address the food insecurity situation in the city (Kodamaya, 2011).

2.3.3: Comparative analysis of policy

Table 2.1: Comparative analysis of policy contexts

Policy issue	Capetown & Ndola	Implication	Kenya	Possible implication for Kenya
Presence of a legal UA policy Support by the authorities Support services to farmers Land set aside for UA	✓ ✓ ✓ ✓	• Regulated UA • Improved delivery of support services • Organized marketing system • Good agricultural practices • Quality control • Safe use of agrochemicals • Regular and effective inspection • Strengthened producer organizations • Agricultural investment and export promotion	× × × ×	• Unregulated UA practices • Harassment by the authorities • Use of waste water for irrigation • Small scale production • No marketing system in place • Unregulated use of chemicals • No producer organizations

		• Sustainable UA sector • Coordinated growth and development of the sector • Ensure better utilisation of high and medium potential lands • Large scale production • Value addition and market oriented production		

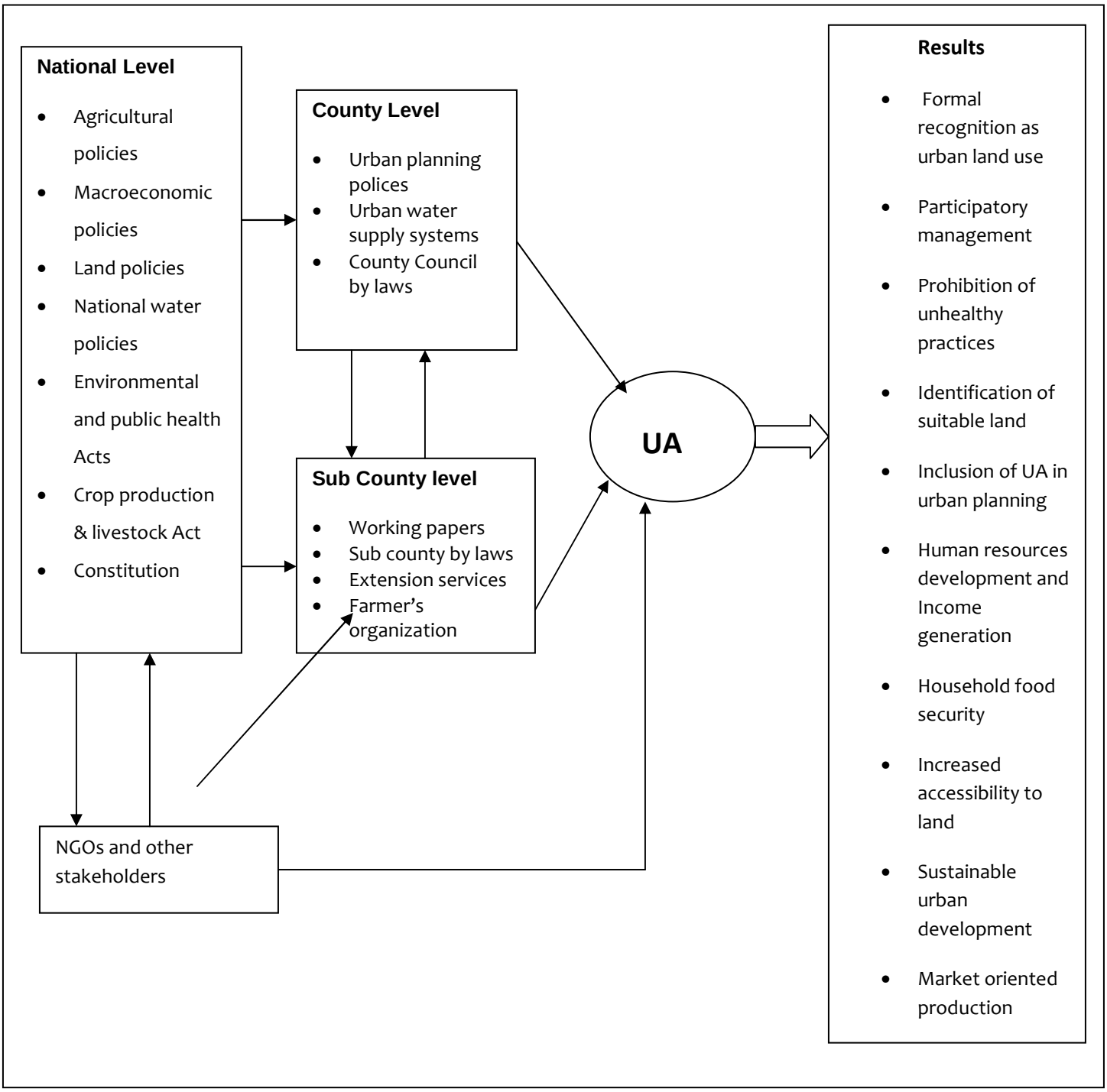
This implies that the major challenges facing UA in Kenya are as a result of a policy framework guiding the practice. With the introduction and implementation of an effective UA policy, the practice is likely to thrive well and have equivalent implications as is the case of Cape Town and Ndola.

2.4 Effects of UA on the built environment

Unless practiced in highly specialised techniques, agriculture is a polluting industry, resulting in environmental pollution and negative health effects (Mwaniki, 2006)[11]. The inherent health risks of practising urban agriculture still remain a strong motivation against the practice Crops can easily be affected by harmful pathogens, heavy metals and synthetic chemicals in untreated waste water, air and soil (De Bon, Parrot & Moustier, 2010: 25)[12]. It is very difficult to regulate the use of chemical pesticides and fertilisers in production as most of the production is not bound for regulated markets. Livestock can also transmit diseases and attract pests such as rats and fleas in addition to creating unpleasant smells and noises (Van Veenhuizen, 2006). Livestock are often grazed on open stands and road reserves, creating safety risks for passing motorists.

[11] Adapted from Geyer, et al
[12] Adapted from Geyer, et al

2.5 Conceptual framework



CHAPTER 3

STUDY METHODOLOGY

3.0 Introduction

This section gives the background of the study area, outlines the sampling design, the data collection instruments and methods as well as date analysis techniques.

3.1 Background of the study area

The study had Komarock estate as its area of study. Komarock estate is a large middle-class residential area, 15 kms east of Nairobi CBD, situated in Kayole division, Embakasi district, Nairobi County. The geographical coordinates are 1°18' South and 36°45' East.

3.1.1Climate

At an altitude of 5,449 ft above the sea level, Komarock estate, like the rest of Nairobi, enjoys a fairly moderate climate. The average temperature is 24^0C. The cold season is between June and July while the warmest part of the year is from December to March. There are two rainy seasons, but rainfall can be moderate. The cloudiest part of the year is just after the first rainy season, when, until September, conditions are usually overcast with drizzle. As Nairobi is situated close to the equator, the differences between the seasons are minimal (Kenya Tourism Board travel guide, pg43). The annual Rainfall ranges between 300mm to 700mm for both long rains and the short rains.

3.1.2 Soil

Komarock is covered by volcanic soils (www.mapsofworld.com)

3.1.3 Land use

The major land use in the estate is residential (GoK, 2012). Transport is also key with good roads in and outside the estate.

3.1.4 Residential built environment

Komarock Estate comprises two parts, the old part popularly known as “Sector” which was put up between 70’s and 80’s. It has sections 1, 2 and 3. The other part is fairly new and popularly known as “Phase”. It was built by Kenya Building Society between 1990 and 1998. It includes Komarock Phase I, Phase II, Infill A, Infill B, Phase 3 A, 3B and phase 4. Phase 5 is an ongoing project by Housing Finance, Kenya commissioned in March 2012. Most of the houses resemble modern architecture of white buildings with striking orange tiled roof tops, all built in a town-house orientation.

3.2 Nature of research

This project is an exploratory research mainly employing qualitative research methods. Exploratory research is a form of research conducted for a problem that has not been clearly defined. The objective of this type of research is to identify key issues and key variables and also to gather preliminary information that will help define problems and suggest hypotheses. It is an investigation into a problem or situation which provides insights to the researcher (businessdictionary.com). Exploratory studies are typically done for three purposes: to satisfy the researcher’s curiosity and desire for better understanding, to test the feasibility of undertaking a more extensive study, and to develop the methods to be employed in any subsequent studies (wikianswers.com). In this case, this research was mainly conducted to give the researcher a better understanding of the UA phenomenon in Kenya.

3.3 Sampling design

Arleck and Settle (1995) recommends a 10% minimum sample size as long as the sample size will not be less than 30 and not more than 1000. In this case, this study will use 30% of the population (240 households). This will increase the degree of precision. Therefore, the study was to sample 30/100*240= 72 households

Systematic random sampling was used whereby all the 240 households were put in a sampling frame. Since to get a sample of 72 from a population of 240 would mean sampling every 3.3rd household which is not practical, the study settled on sampling every 3rd household giving a sample size of 80. Then every 3rd household was included in the sample i.e 3, 6, 9, 12, 15, upto 240.

This study chose systematic random sampling because on top of its simplicity in acquiring data, it also adds a degree of system into the sampling process. Some 6 more questionnaires were to be administered to policy makers, 3 to Nairobi County officials (from the Housing Development, City Planning and Environment departments) and 3 to the Ministry of Agriculture officials who are in charge of Kayole Division, within whose jurisdiction Komarock falls. The 6, who were the key informants to the study, were selected using purposive sampling method because of their extensive knowledge in the given area of study. This presents a total of 86 respondents presented with questionnaires.

3.4 Data collection instruments

The main data collection instruments used in this research includes questionnaires with both open ended and closed ended question. This is because questionnaires are time and cost effective. Observation and interviews were used because they facilitated face to face verbal responses which helped to obtain reliable and valid information behind participant's experiences. These instruments were used because of their time and cost efficiency. The direct observations helped to do situation analysis.

Data sources included the internet, newspapers, reports, publications and journals both published and unpublished.

3.4 Data collection

This research relied on primary data collected through questionnaires administered to the selected households within Infill B section, Komarock Estate as well as the selected Government officials. This is because questionnaires are both time and cost effective and also because the results are easy to analyse using a software package.

A total of 86 questionnaires were administered (80 households and 6 government officials) by the researcher for collection within 48 hours. This is because the target was that the questionnaires would be filled by the household heads, who are often out of the houses during day hours for work purposes and so could only fill them at night, and the tight work schedule of the government officials. The research targeted household heads because they are perceived to be the bread winners in the household and so had the details about the income levels which are a key determinant of the economic status of the household. In case the household head was unable

to fill the questionnaires, an alternate senior member of the family was allowed to do the same. In the case of the government offices, the departmental and sectional heads were to be respondent. This is because they are the authorized persons to give government information and can delegate in case they are not able. In the event that the heads were not available, other senior officers were allowed to do so.

Observations by the researcher were also useful to this study and detailed field notes taken for future analysis. This research also relied on secondary data from the literature on UA as well as electronic sites.

3.5 Analysis techniques.

Data analysis in this study entailed coding of the raw data obtained through the questionnaires, the observations and the field notes. Coding is the process of breaking down data into component parts, which are given names (categories). Codes act as tags that are placed on data. For closed questions, the categories were embedded in the question. For open questions, they had to be created. After the coding, Statistical Package for Social Scientists (SPSS) was used in analysis before drawing the conclusions. Data analysed was presented using tables and other appropriate statistical diagrams

3.6 Case study

This section gives a situational analysis of UA activities in Komarock Estate which is the study area. UA activities are wide spread within the estate both in the back and front yards as well as the road reserves. Trees, flowers, beauty plants, vegetables and other crops can be seen all over (see appendix l). The gardens are well groomed and the plants are healthy. Most of the gardens are protected from human and animal destruction using hedges.

The gardens are small in size and the plants are planted with little spacing to maximize on the production. The trees in the front yard overhang the parking area and the tall ones can be seen protruding over the perimeter fence. Avocado, mango, pawpaw, banana, guava and strawberry trees are a common phenomenon with some having fruits already.

Numerous cock crows can heard at day break and the presence of several animal feed vendors in and around the estate is a clear indication that animals are reared here.

Rain water harvesting is not common within the estate because the roofs in many of the houses are covered by tiles which means incase of any need for irrigation or watering of animals, either safe drinking water or waste water is used.

This therefore raises the need for an in depth investigation on this practice.

The good road and power networks. At the background are the banana, avocado and grievallia trees within the estate.

Pawpaw trees and kales as well as beauty plants outside houses in the estate.

CHAPTER 4

DATA ANALYSIS AND PRESENTATION

4.0 Research findings

This section gives an analysis of the data collected. Out of the 80 questionnaire presented to the households, the response rate was 90% (72 households) whilst that of the key informants (Government officials) was 100%.

4.1 Respondents characteristics

4.1.1 Age and housing tenure

Table 4.1 Distribution of all respondents by age groups and tenure type for residents

Age group	**Number of respondents**	**Percentage**	**Housing tenure**	**Percentage**
Below 30 years	11	14.1	Owner occupier	66.67
31-43 years	43	55.13	Rental	33.33
44-56 years	17	21.8		
Over 57 years	7	8.97		
Total	**78**	**100**		**100**

Source: Author, 2013

Regarding the distribution of respondents by age, it can be observed from table 4.1 that majority of the respondents (55.13%) were in the 31- 43 years age bracket, 21.8 % were aged 44-56 years, 14.1% were below 30 years while only 8.97% were over 57 years. The total was 78 because of the 72 respondents and the 6 key informants. Regarding the tenure type of the 72 respondents

(not including key informants), 66.67% of the respondents were owner occupiers while only 33.33% were tenants. Regarding the distribution of respondents in age groups, it was observed that over 91% were less than 57 years. This implies that the estate mostly attracted the residents aged 57 and below. For the key informants, it could be as a result of the public service voluntary retirement age of 55 years and 60 years compulsory. In regard to tenure, 66.67% of the respondents were owner occupiers. This means that the majority enjoyed security of tenure and were generally in charge of their compounds unlike in cases of tenants who, to some extent, were still under the control of the house owners. This could well then explain why a large percentage is engaged in UA.

4.1.2: Household type, household size and income levels

This section gives an analysis of the household types, household size and the income levels of the residents interviewed.

Table 4.2 Size of the household and income levels (in KShs)

Type of household	**Frequency**	**Household size (family members)**	**No. of households**	**Percent**	**Household Income levels**	**Frequency**	**Percent**
Male headed	56 (77.78%)	1-3	5	6.94	< 20,000	4	5.56
Female headed	14 (19.44%)	4-6	58	80.56	20,001-40,000	40	55.56
Others	2 (2.78%)	7-9	8	11.11	40,001-60000	20	27.78
		10 and above	1	1.39	>60,001	5	6.94
					None	1	1.39
		Total	**72**	**100**	Don't Know	2	2.78
					Total	**72**	**100**

Source: Author, 2013

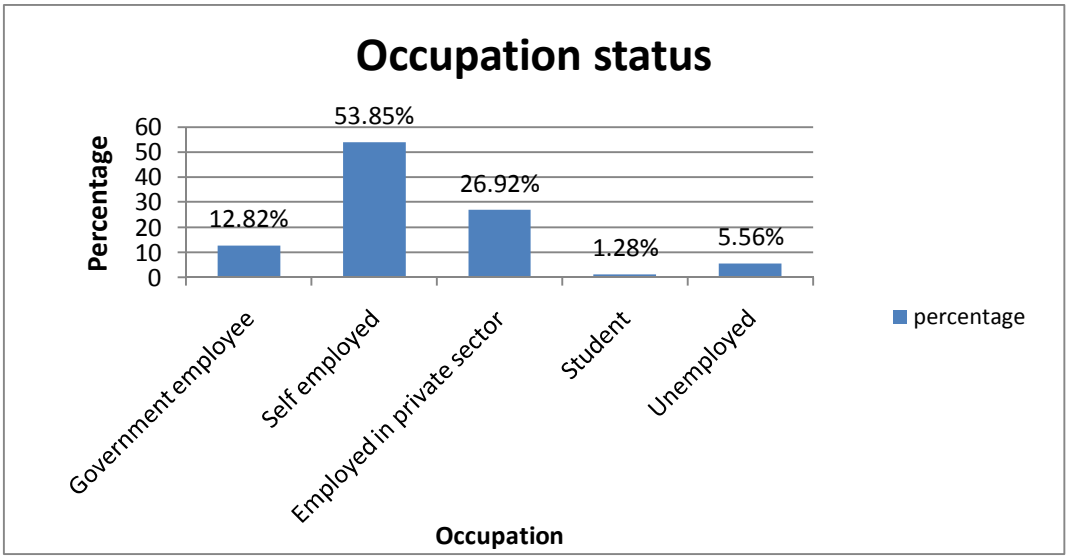
Table 4.2 presents the responses from the households hence the total 72. It was observed that 77.78% of the respondents were from male headed households, 19.44% were from female headed households while 2.78% were from other forms of households. It was also observed that majority of the households (80.56%) had between 4-6 family members, 11.11 % had 7-9 members, 6.94 % had 1 to 3 members while only 1.39% had 10 members and above. Regarding the household income levels, it was observed that the majority of the households (55.56%) had an income ranging between 20,001 and 40,000 while 27.78% earned between 40,001 and 60,000, 6.94% earned over 60,001, 5.56% earned less than 20,000, 2.78% of the respondents did not have an idea on the household's income while 1.39% claimed they did not have any income.

Over 96% of the respondents had a source of income, while over 93% were in some form of employment. This means that there were other sources of income to the respondents other than employment e.g. remittances from relatives. It also implies that unemployment level especially for the heads of households or their alternates (who were the main respondents) is low within the estate. This may not necessarily be the same for the other members of the household. It was also observed that there were more male headed households with a source of income than female headed households. The income levels were high among the male headed households and so was the household size.

4.1.3 Occupation status of the respondents

This section gives an analysis on the occupation status of the respondents, including the 6 key informants in percentage. Fig. 4.1 is a graphical presentation of the findings.

Figure 4. 1 Occupation status of the respondents



Source: Author, 2013

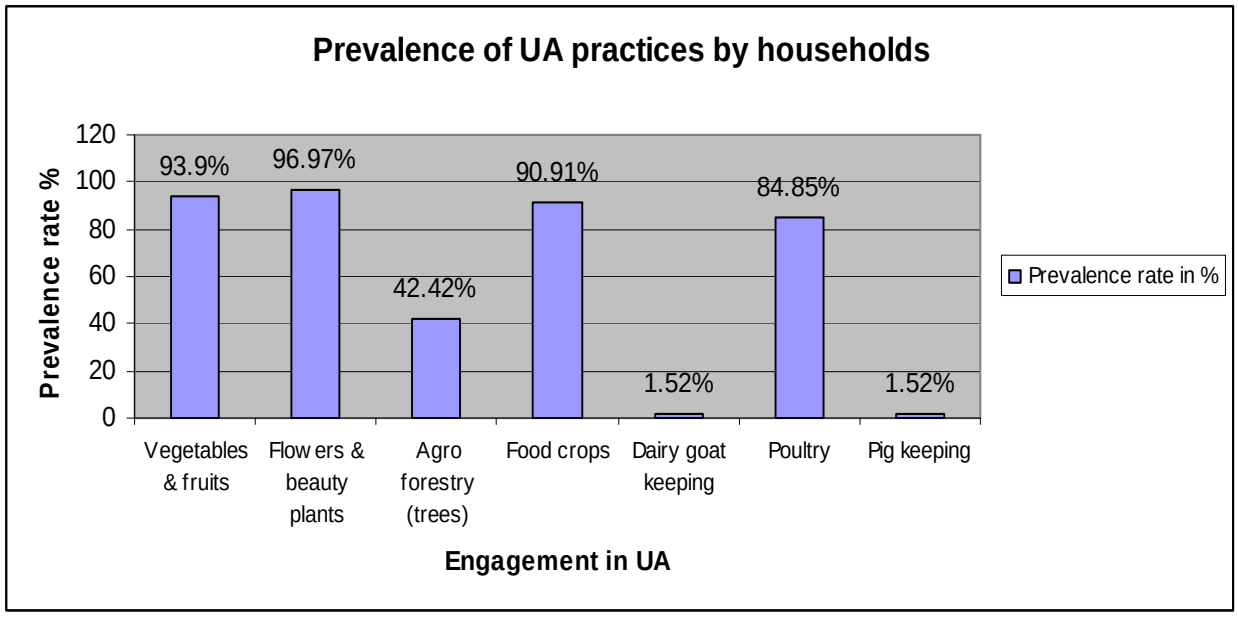
Fig. 4.1 shows that 53.85% of the respondents were in self employment, 26.92% were working in the private sector, 12.82 % were government employees (which include the 6 key informants), 5.56% were not in any kind of employment while 1.28% were students. This means that over 93% of the respondents were in some kind of employment. This implies that the unemployment levels are low in the estate. It was observed that there is no correlation between the occupation status and the practice of UA.

4.2 UA practice

4.2.1 Prevalence of UA and practices

91.7% of the respondents were practicing one or more of the practices under UA. All the 6 key informants agreed there was one or more practices under UA were carried out in Komarock. The prevalence rates of these practices are as shown in figure 4.2 below.

Figure 4. 2 Engagement in UA and the practices – household's responses



Source: Author, 2013

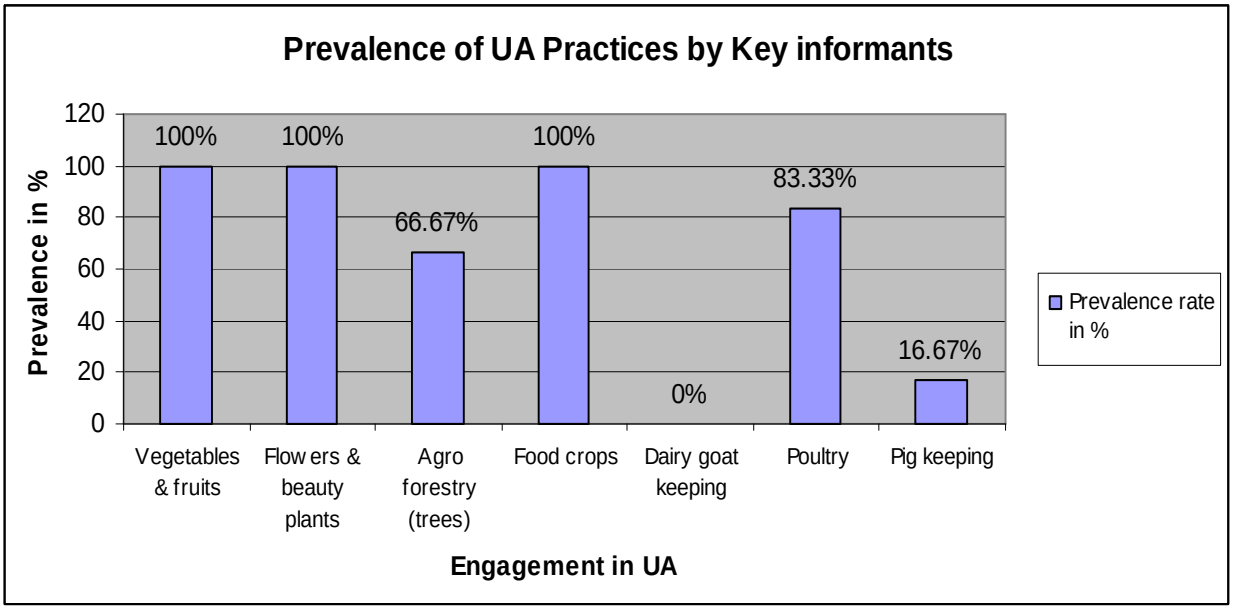
As can be seen in figure 4.2 above, 96.97% of the residents who engage in UA grow flowers and beauty plants, while 93.9% and 90.91% were engaged in vegetables & fruits growing and food crop growing respectively. Further, 84.85% were involved in poultry keeping, 42.42% were involved in tree growing, 1.52% involved in pig rearing and an equal percentage in dairy goat keeping. From the responses, it is easy to say that most of the respondents are more engaged in

plants growing than animal rearing except for poultry. This is to because of the high demand of fresh vegetables and fruits as a result of the increased population and nutritional needs within the estate. This could also be as a result of the high prices the produce command in the local markets therefore pushing residents to complement through their own production. 90.9% of the respondents were engaged in food crop production primarily for the same reasons

96.97% were engaged in growing of flowers and beauty plants. This is as a result of the aesthetic value attached to them. This means that the respondents were not only interested in the beauty but also were environmental conscious bearing in mind the key role that the plants play in environmental and soil conservation. 42.42% were engaged in agro forestry for the same reasons.

In animal rearing, poultry rearing prevalence is 84.85%. This is as a result of high demand for poultry produce including eggs and meat both within the household and outside. Poultry manure is also believed to be good for soil fertility. As a result, the manure is used in the gardens or sold off for use elsewhere. Poultry keeping is more prevalent since it does not require much space as compared to other animals. Poultry rearing especially the local breeds popularly known as “kienyeji” is also considered less expensive since the poultry is fed on domestic food wastes. Goat and pig keeping was minimal owing to the inadequacy of land and the high prices of animal feeds. In regard to the study’s objectives, it means that the two practices were viewed as not being sustainable.

Figure 4. 3 Engagement in UA and the practices - responses by key informants



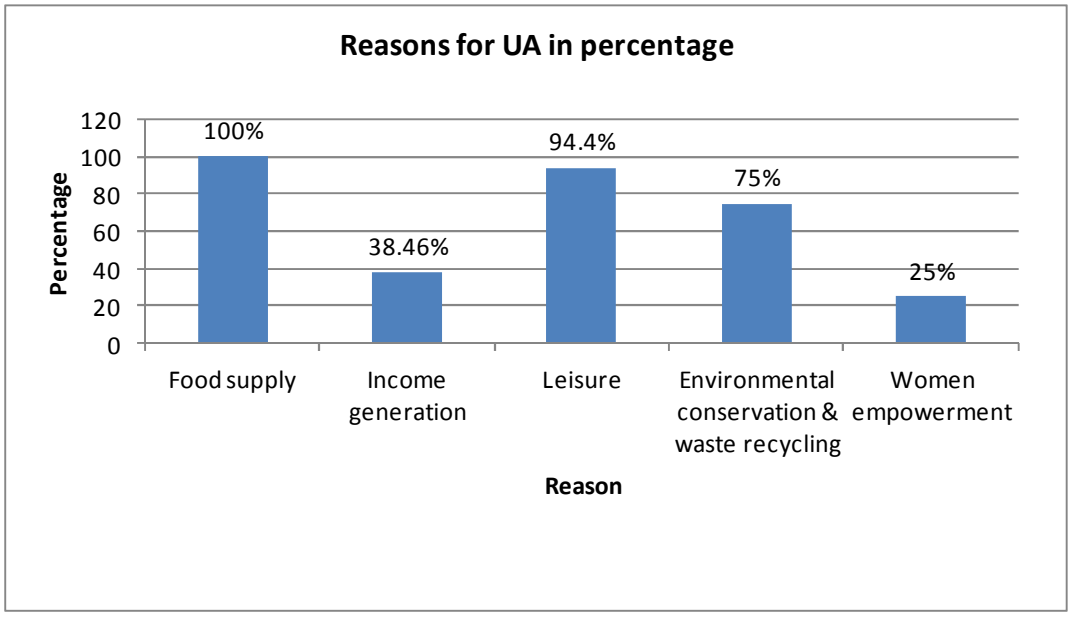
Source: Author, 2013

In regard to the responses by the key informants, all the 100% agreed that the residents were engaged in horticulture, grew flowers and beauty plants and also engaged in growing of food crops. 83.33% and 66.7% agreed that the residents were engaged in poultry keeping and tree growing respectively while only 16.67% agreed to pig rearing. However, none of the informants was aware of the residents engaging in dairy goat keeping because they felt that owing to the inadequacy of space and the high cost of inputs, this practice is not sustainable. There was no correlation observed between the practice and the household characteristics.

4.2.2 Reasons for engaging in UA

This section gives an analysis of the responses given by the 66 households who engaged in UA as well as the reasons given for the same by the key informants. The graphical presentation of the responses is presented in Fig. 4.4.

Figure 4. 4 Reasons for practicing UA



Source: Author, 2013

From Figure 4.4 all the respondents agreed that the main reason they engage in UA is to ensure a steady supply of fresh produce like vegetables, food crops, fruits and meat from the pig, milk from the dairy goats and eggs and meat from the poultry. Only 38.46% considered the practice a source of income, mainly poultry keepers, who also admitted that the income was less due to the small number of animals kept due to restraints in space. 94.4% admitted that it was a good leisure activity especially for the unemployed members of the household who had no engagements during the day hours. Further, 75% considered the practice a good means of environmental conservation while 25% considered it a means for women empowerment. In connection to the reasons why the residents engage in UA, all the respondents were in agreement that the main reason why they engage in the practice was for food supply. Due to small portions of land where the activities are carried out, the supply is not adequate and therefore it has to be

complemented through purchases from the many fresh farm produce markets and stalls within the estate and outside. This finding coincides with what was observed in the literature review.

As the practice being a source of income, only 38.46% concurred to this. This was particularly so for animal keepers especially the large scale poultry keepers who reared layers and broilers for sale. Others were the agro foresters who nurtured tree seedlings for sale. This means that the practice was not largely considered an income generating activity within the estate mainly because it was usually done in small scale and for subsistence purposes. 94.4% agreed that UA was a good leisure activity especially for the members of household who would otherwise be idle during the daytime hours. This means that in spite of the high employment level among the household heads, there is a significant level of unemployment among the other members of the households.

With 75% agreeing that they engage in UA for environmental conservation and for waste recycling purposes, it means that the respondents are conscious about their environment and neighborhood. This includes prevention of soil erosion, creation of green spaces which would then act as carbon sinks as well as fighting desertification. In waste recycling, the organic domestic waste is used as food for the animals or as compost for the gardens. Waste water is also used in irrigating the gardens.

As UA being a means of women empowerment, 25% felt that the practice would play a key role as there are many women in the estate who are “stay-at-home” mothers traditionally known as house wives. There is also a high number of domestic workers most of who are women. This finding blends with the literature by Arku et al, 2012 and Ayaga et al, 2004

4.2.3 Contributions and challenges of UA

This section gives an analysis on the contributions of UA as given by the 78 respondents (72 households and 6 key informants. It also gives the challenges facing the farmers.

Figure 4. 5 Contributions of UA

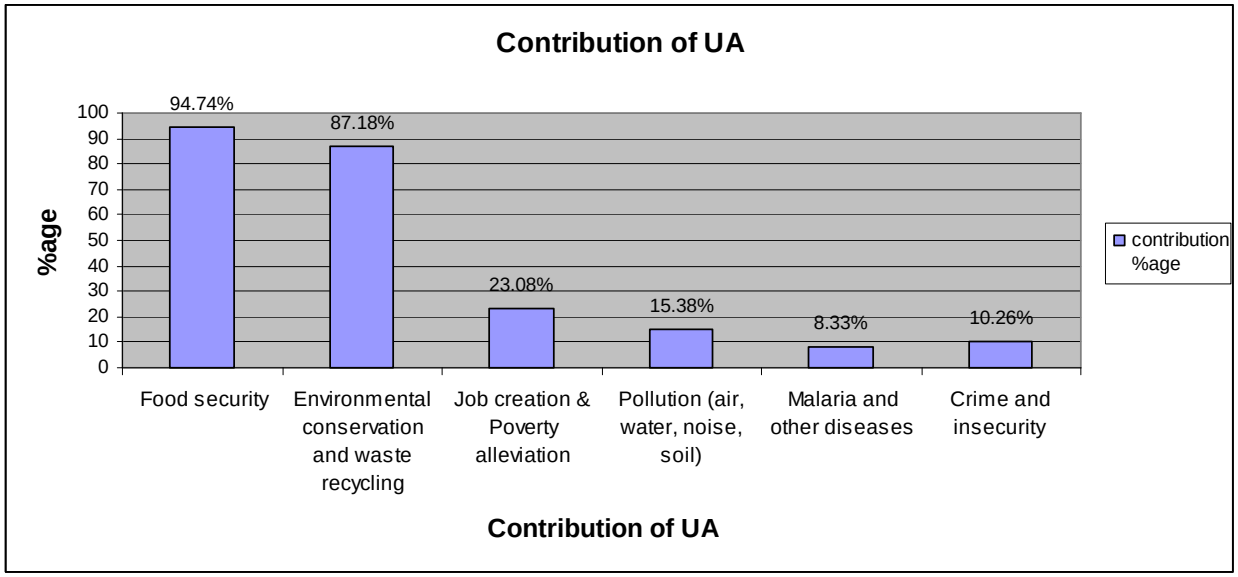
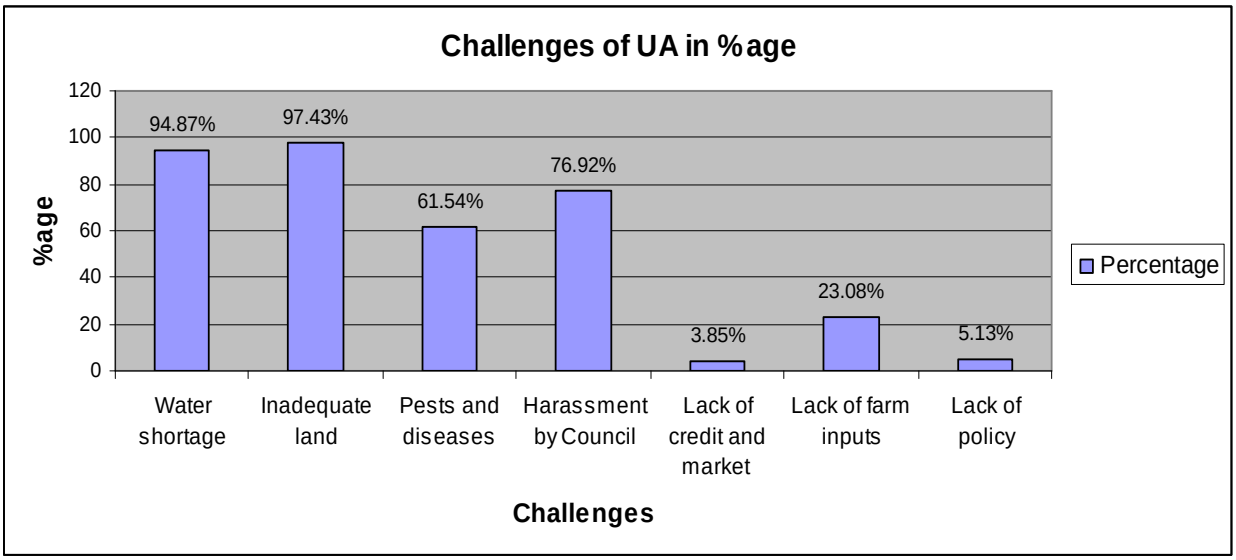


Figure 4. 6 Challenges of UA



Source: Author, 2013

Figure 4.5 shows that 94.74% and 87.18% of the respondents agreed that UA contributed to food security and environmental conservation respectively. This means that the respondents are conscious about their environment and appreciates the contribution that UA makes in the conservation and preservation. They also acknowledged that UA is a key means of waste recycling for both liquid and solid wastes. 23.08% agreed that UA contributed to job creation and poverty alleviation. This is because the practice is usually in small scale mainly engaging only a few household members. 15.38% felt that the practice contributes to pollution while 10.26% and 8.33% agreed that it contributed to crime and diseases respectively. This indicates that the respondents viewed UA to have more positive contributions than the negative.

Regarding the challenges to the practice, inadequate land and water shortage were the greatest challenges at 97.43% and 70.5% respectively as indicated in figure 4.6. Other challenges included harassment by Council officials at 57%, pests and diseases at 61.54% and lack of farm

inputs at 23.08%. Lack of credit and market facilities and lack of a policy framework did not seem to be a major challenge standing at 3.85% and 5.13% respectively.

Water shortage and inadequate land were identified as the main challenges to UA. This is due to the frequent water rationing in the estate as well as the housing developments and associated infrastructure which have been given a higher priority due to their higher returns. This was seen as the push factor to the prohibition of the practice since it call for wastage of safe drinking water. Pests and diseases is a challenge largely because of poor knowledge by the farmers, lack of extension services and high cost of chemicals. Harassment by council officials is as a result of restrictive by laws which are also a reason as to why the practice is illegal, while lack of farm inputs is as a result of lack of knowhow by the farmers.

Lack of credit facilities and market was not considered a major factor as the respondents argued that there is a very huge market which has not been met and that credit facilities would be availed by cooperatives if only the practice was well regulated. Lack of a policy regulation did not seem to be a challenge largely because majority of the respondents did not know whether there is a policy framework in place or not. This is as a result of low prioritization of the practice. This means that if only the farmers had adequate land, water and there was adequate support from the relevant authorities, the practice would be carried out smoothly as is the case of the Ndola and Cape Town best practices.

4.3 UA as a land use

4.3.1 UA as a key urban land use

The main objective of this study was to "assess UA as an urban land use in Kenya". In this regard, all the respondents were in agreement that UA is a key urban land use and should be recognized as so citing reasons such as: even if it is not recognized, it still and will continue to exist (98.72%), it is a way of ensuring food supply to those who practice it (96.15%), it is a way of conserving the environment (88.46%), it is a good leisure activity (76.92%), it helps in waste recycling (82.05%), it will create jobs (26.9%) and it will ensure women empowerment(7.69%).

4.3.2 UA and Policy framework

Interestingly, 94.87% (74) of the respondents, including some government officials, did not know whether there was a policy governing UA or not. 2.56% (2 respondents) said there was no policy at all while an equal percentage agreed that there was a policy. When asked what the policy stated about UA, only 1 of the 2 did not know what the policy stated while the other indicated that UA was prohibited within Nairobi. Regarding whether they would want a policy framework to be put in place or not, 98.72% (77 respondents) indicated that there was need to have one while 1.28% (1 respondent) felt there was no need for a policy since agriculture is mainly a rural activity.

This indicates the little knowledge that residents as well as the key informants have regarding existence of a UA policy. this could be as a result of the low prioritization of the practice both by the national and county governments resulting to the practice being neglected and given little recognition.

4.3.3 Effects of UA on the built environment

One of the specific objectives of this study was to "identify the effects of UA on the built environment". In the findings, 88.46% of the respondents were not able to give any direct effect of UA on the built environment. The other 9 respondents (11.54 %) gave several effects ranging from the walls being dirtified in the process of irrigation (7.69%) cracking of buildings due to tree roots (2.56%) and utilization of land that would otherwise be used for housing purposes therefore causing housing shortage (1.28%). All the respondents however identified the indirect effects as the contributions of UA to the people who live within the built environment as outlined in Figure 4.6 above

4.3.4 Potential effects of UA on housing administration

This question was posed to the 6 key informants. In response, they all agreed that UA did not have any potential effect on housing administration. This could be as a result of the little knowledge they have regarding housing administration and therefore the need for more housing administrators to be trained and employed both at the national and county governments.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the conclusion and recommendations, which are based on the findings of the study. The recommendations are proposed purposely for promotion of UA as a land use in relation to the research objectives which included:-

1) Document the legal and institutional framework governing urban agriculture in Kenya
2) Identify best practices in countries where urban agriculture is an urban land use and make appropriate recommendations on sustainable UA practice
3) Identify the effects of urban agriculture on the built environment.

5.1 Conclusion

The study established that majority of the respondents were engaged in one or more practices under UA. This implies that in spite of the lack of policy framework, the practice still continues. The reasons given for the engagement in the practice include for food security, income generation, leisure, environmental conservation and waste recycling as well as women empowerment. This was so regardless of the household type, size, income levels and occupation status. This contrasts with the popular belief that UA was usually practiced by the urban poor who are jobless and mostly living in the informal sector.

Research findings indicate that majority of the respondents agreed that UA had several contributions both positive and negative which include food security, environmental conservation, job creation,

pollution and crime. If managed well though, the positives outweigh the negatives hence the need to promote the practice in a sustainable manner.

The study indicates that the challenges facing UA are imposed by external factors, which the respondents have no control over but can only be addressed through a change in policy. The challenges include inadequacy of land, water shortage, harassment by Council officials and lack of policy framework.

Regarding UA being an urban land use, the respondents indicated that the practice is indeed a land use within the urban and peri-urban areas and should be recognized as so largely because even without the recognition the practice still thrives and also because of the benefits accrued from the practice.

Though the majority of the respondents did not know whether there is a UA policy in place or not, they felt the great need of having a policy in place since this will be able to regulate the sector as well as to give it formal recognition while maximizing the benefits of the practice not only to those who practice it but to the society at large.

5.2 Recommendations

The study puts forward the following recommendations arising from the intended objectives of the study:-

- UA should be recognized as a land use in Kenya and supported through the necessary legislation.
- A policy governing UA should be put in place to regulate the sector and to curb the uncertainty surrounding the sector

- Land should be availed to the urban farmers either on leasehold or freehold basis to enable them carry out the practice effectively.
- The UA policy should be harmonized with all other regulatory frameworks including Constitution, policy documents, Acts of Parliament, strategy papers, County Council by-laws among others to avoid a clash in the legislation
- Urban farmers should be provided with necessary support services including extension services, pest and diseases control chemical, credit facilities among others to enhance success in the sector.
- To avoid use of untreated waste water in irrigation, safe water should be availed to the farmers.

5.3 Areas for further research

This study has dealt extensively on UA as an urban land use and the policy framework guiding it but was not able to exhaustively identify the effect of UA on the built environment as well as on Housing Administration. The study therefore identifies this as a potential research area in future studies.

Secondly, the study findings showed that contrary to the popular belief that UA is usually carried out in the informal settlements by the urban poor, it is also practiced in middle income planned settlements. This research therefore identifies this shift as an area in need for further research.

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APPENDIX I: PHOTOS


Photos showing different kinds of flowers and beauty plants around the estate


Avocado and banana trees protruding from the compounds. Below some pawpaw trees and kales


APPENDIX II: QUESTIONNAIRE FOR KEY INFORMANTS

DECLARATION

Mary Kamau, a postgraduate student in the University of Nairobi, Department of Real Estate and Construction Management, is carrying out a survey on "Urban Agriculture as an authentic land use in Kenya", a case study of Komarock estate. Please assist her by filling the following questionnaire. Your responses will be handled with utmost confidentiality and will only be used for academic purposes

SECTION I

Name (optional): ……..

Ministry……Department/ section…….

Rank: ……..

How long have you been working in this office? ..... (Years).

SECTION II

Is urban agriculture (UA) practiced in Komarock estate? 1. Yes ☐ 2. No ☐

If **yes**, what do you think are the main reasons why people engage in urban agriculture?

(a)

(b)

(c)

What are the practices they are engaged in?

	Practice	Tick where applicable
	Horticulture (Vegetables & fruits)	
	Floriculture and beauty plants	
	Agro forestry	
	Food crop growing (maize, beans, root crops etc)	
	Dairy goat keeping	

Poultry keeping	
Pig rearing	
Others (specify)	

If **No**, what do you think are the reasons for not engaging in UA?

(a)

(b)

(c)

SECTION III

What do you perceive to be the main contribution of UA to the residents of Komarock?

(a)

(b)

(c)

What do you think are the challenges facing those who practice UA?

(a)

(b)

(c)

Is there any policy framework regulating UA? 1. Yes ☐ 2. No ☐

If **Yes**, what does it state?

……
…….

Do you think the provisions in the policy/ policies are adequate? 1. Yes ☐ 2. No ☐

What would you want to be reviewed/ included in the policy?

.....
.....

If **No**, do you think there should be one? 1. Yes ☐ 2. No ☐

If Yes, why?

(a)

(b)

(c)

If No, why?

(a)

(b)

(c)

What do you wish would be included in the policy?

(a)

(b)

(c)

Section IV

What are the impacts of UA on the physical environment in Komarock?

(a)

(b)

(c)

What are the impacts of UA on the built environment?

(a)

(b)

(c)

Do you think that UA should be recognized and encouraged as one of the major land uses in Komarock and Nairobi at large? 1. YES ☐ 2. NO ☐

If **Yes**, Why and how?

(a)

(b)

(c)

If **No**, why ?

(a)

(b)

(c)

Thank you for your time.

APPENDIX III: HOUSEHOLD QUESTIONNAIRE

DECLARATION

Mary Kamau, a postgraduate student in the University of Nairobi, Department of Real Estate and Construction Management, is carrying out a survey on "Urban Agriculture as an authentic land use in Kenya", a case study of Komarock Estate. Please assist her by filling the following questionnaire. Your responses will be handled with utmost confidentiality and will only be used for academic purposes.

SECTION I: HOUSEHOLD DETAILS

Name (Optional): ……

Place of residence: …….

Occupation: ……..

1. What is your type of household?

Type of household	Tick where applicable
Male headed	
Female headed	
Others (specify)	

2. What is the size of your household (number of family members)? .....

3. What is your house tenure? 1. Rental ☐ 2. Owner occupier ☐

4. What is the number of members of the household in these age groups?

Age group	Numbers of persons
0-12	
13-25	
26- 35	
36 and above	

5. How many members of the household are in employment (either formal or informal)? ……

6. What is the average income of the household?

Income range in Kshs	Tick where applicable
None	
Less than 9,999	
10,000- 19,999	
20,000- 29,999	
30,000 and above	
Don't know	

SECTION II

7. Does your household engage in any of the practices of urban agriculture (UA)? 1. Yes ☐ 2. No ☐
   if Yes, go to question 7
   if No, go to question 9

8. What practice is your household engaged in?

Practice	Tick where applicable
Horticulture (Vegetables & fruits)	
Floriculture and beauty plants	
Agro forestry	
Food crop growing (maize, beans, root crops etc)	
Dairy goat keeping	
Poultry keeping	
Pig rearing	
Others (specify)	

9. What are the main reasons for engaging in the practice/ practices in (7) above?
   (a)
   (b)
   (c)

10. What are the reasons for **NOT** engaging in UA?
    (a)
    (b)
    (c)

SECTION III (For those NOT engaging in UA)

11. What is the extent of this practice in Infill B in terms of the number of households who practice it?

    ……

12. What do you think are the reasons why people to engage in UA?
    (a)
    (b)
    (c)

13. What do you perceive to be the main contribution of UA to the residents of Komarock?
    (a)
    (b)
    (c)

14. What do you think are the challenges facing those who practice UA?
    (a)
    (b)
    (c)

15. What is the policy framework regulating UA ?

    ……

16. Do you think that UA should be recognized and encouraged as one of the major activities in Infill B and Nairobi at large? 1. YES 2. NO

17. If Yes, Why and how?
    (a)
    (b)
    (c)

18. If No, why ?
    (a)
    (b)
    (c)

SECTION IV (For those who engage in UA)

19. What is the extent of this practice in Komarock in terms of the number of households who practice it?

    ……..

20. What do you perceive to be the main contribution of UA to your household and to Infill B at large?
    (a)
    (b)
    (c)

21. What challenges do you face while engaging in UA?
    (a)
    (b)
    (c)

22. What is the policy framework regulating UA?
    ……
    ……..

23. Do you think that UA should be recognized and encouraged as one of the major activities in Komarock and Nairobi at large? 1. YES 2. NO

24. If Yes, Why and how?
    (a)
    (b)
    (c)

25. If No, why ?
    (a)
    (b)
    (c)

26. What are the potential effects of UA on the built environment?
    (a)
    (b)
    (c)

THANK YOU FOR YOUR TIME.