EFFECTS OF HOME GARDEN AGROFORESTRY ON PEOPLE'S LIVELIHOODS IN PERI-URBAN AREAS OF KAMPALA: CASE STUDY OF NAKAWA DIVISION

BY

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REG NO: 13/U/8787/PS

STUD NO: 213020511

A SPECIAL PROJECT REPORT SUBMITTED TO THE SCHOOL OF FORESTRY, ENVIRONMENTAL AND GEOGRAPHICAL SCIENCES IN PARTIAL FUFILMENT OF THE REQUIREMENTS FOR THE AWARD OF A BACHELOR OF SCIENCE IN CONSERVATION FORESTRY AND PRODUCTS TECHNOLOGY OF MAKERERE UNIVERSITY

JULY 2017

DECLARATION

I MURIISA BENSON, declare that this special project report is my original work and has never been submitted for the award of a degree in this university or any other institution of higher learning. Although I might have consulted with others in the preparation of this report and cited a range of sources, the content of this special project is my own work.

Signature..... **Date**.15th/08/2017

MURIISA BENSON (STUDENT)

APPROVAL

This is to approve that this is an original work and no part of it has been produced before or altered in any form and the contents in it have been approved by my supervisor.

Signature.....Joseph Obua.....**Date**.....15 August 2017.....

PROF. OBUA JOSEPH (SUPERVISOR)

DEDICATION

To my mother Mrs. Mary Tumwine, Dad Mr. Byamugisha Emphrimu , Sisters Akampurira Brenda, Tumukunde Ronah ,Brothers Alex, Twineomujuni, Robert, Emmy, Mbabazi and Buzare other relatives and all my close friends especially Okello Pius, Shakira, Mukama , Ayebare Lawrence and the Lord God almighty. You have brought me this far.

ACKNOWLEDGEMENT

I thank God who has sustained my life, given me a sound mind throughout the process of conducting this research and seen me through everything and thus has enabled me to get this far. To Him be the glory. Amen.

I extend my inexpressible gratitude to my supervisor Professor Obua Joseph, for his exceptional guidance, and his unthinkable patience to me during the process of conducting this research study. You are the best.

In a special way I thank my Brothers Mr.Tineomujune Frank and Mr. Nkwasibwe Alex for their financial support throughout my research. I can‟t forget my Brother Nkwasibwe Alex again and my sisters Tumukuda Ronah and Akampurira Brenda for their help during data collection and my classmates and friends for the support and counsel they have given to see me come this far with this research.

Lastly, I thank the people of Nakawa division in Kampala District for accepting me to conduct the study in their area,

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FAO	:	Food Agriculture Organization.
NFA	:	National Forestry Authority
ALMANAC:	:	Agricultural Land Management Alternatives with Numerical. Assessment Criteria
FGDs	:	: Focus Group Discussions
SPSS	:	Special Package for Social Scientists

ABSTRACT

A study to elicit the knowledge effects of home garden agroforestry on people's livelihoods in peri-urban areas of Kampalawas carried out in Nakawa division Kampala District between June and July 2017. The specific objectives were to: (i)To inventory home garden agroforestry trees and crops in the study area. (ii) To examine the contribution of home garden agroforestry to food security and incomes of the households. (iii) To examine the challenges faced by households practicing home garden agroforestry in Nakawa Division.Cross sectional socio-economic surveys was used to collect data in which questionnaires having both open and close ended questions, key informant interviews and focus group discussions were conducted. Questionnaires were coded and entered into SPSS program and analyzed for the preferredPractice, Maintenance and contribution of home garden agroforestry. Home garden agroforestry contributed to the economy of Nakawa division by providing food security and household's income generation. Management of home garden agroforestry was being constrained by the high growth of household's sentization techniques and good relationships between the community and stalk holds in the division. Utilization of home gardenshad a positive significant attitude on household's willingness to keep and manage it. Indeed many respondents were motivated to retain home gardenson their homes such as home gardens due to the attraction of visitors and food security and income generation of households which were obtained from it since they have a very big positive impact on households and well-being. There is urgent need to formulate and implement laws and policies to guide and promote agriculture and commercialization of FAO like some home gardensand this should be spearheaded by institutions like Uganda Food agriculture Organization (FAO) and Community Based Organizations and backed by the provision of both financial and management support. All communities should maintain and sustain these home gardens through establishment and maintenance of commercial gardens containing some important tree and crop species. This may be one of the most effective avenues or enhancing the keeping and managing of home garden agroforestry.

CHAPTER ONE

INTRODUCTION

1.1 Back ground of the study

Home garden agroforestry are common in most tropical countries and they play a vital role in supporting people's livelihoods in many diverse ways such as provision of food, fuel wood, building materials, cooking utensils, and fodder for livestock, and cash income among others. They are regarded as a source of income diversification and also play a crucial cultural and social role in rural communities. They may be seen as a buffer to household resource. Such as providing additional food, and in some cases cash income (FAO, 2004). Most people's livelihoods in rural farming communities keep and manage a home garden in addition to their main farm. Only few people's livelihoods do not have home gardens and this is usually caused by a variety of factors such as lack of land, lack of labour, or destruction of crops by animals. In rural communities where home gardens are found, community members have rules binding every member to enclose their animals so as to prevent destruction to home gardens. It is practiced as a mixture of crops (mostly vegetables, herbs, non-timber forest products), trees (fruit and or fodders trees), and provides a diversity of products to the cultivators (Ffolliott, 1998; Pandey, 2001). Home gardens are not static, but have evolved over centuries thanks to the adaptive abilities of farmers in responding to changing rural and livelihood conditions (Kumar and Nair, 2004). One major change that has occurred in home gardens over the years is the increase in external inputs such as chemical fertilizers or manure. This is in response to rapid loss of soil fertility and poor yields. Home gardens represent an agroforestry practice. Agroforestry has been variously defined but the World Agroforestry Centre (www.icraf.cgiar.org) defines it as "a dynamic, ecologically based, natural resources management system that, through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits forlandusersatlevels."

Agroforestry is increasingly becoming an important aspect of most farming systems.

Population growth, commercialization of farm products and the use of modern inputs have resulted in increased importance and attention been given to more intensive land use practices such as home gardens. Like most systems, these home gardens are constantly

facing pressure of change mainly brought about by demographic, economic, technological and social changes in society (Abebe, 2005).Rapid population increases have resulted in reduction of land available for farming while at the same time more mouths are left to be fed due to increased family sizes. In most countries, land is shared among the male children in a family and hence as the family size increases, the land per person reduces. In addition to the reduced land sizes, soil fertility also reduces as a result of continuous market oriented mono-cropping on the same piece of land. This situation has led farmers to adopt a more complex, and more intensive use of their lands in a bit to increase productivity, diversify income sources and also ensure sustainability in agriculture(Abebe,2005). Agroforestrypractices suchas homegardening isone wayt ensure increased production.

The high diversity of species in home gardens, which combines crops, trees, other woody plants and animals having different uses and production cycles, is considered as an essential feature because of the wide socioeconomic and ecological roles the diversity plays in these systems. These roles include: Year round production of food and a wide range of other products such as fuel wood, fodder, spices, medicinal plants and ornamentals (Fernandes and Nair, 1986; Wiersum, 1982: Christanty, 1985; Soemarwoto, 1987; Marten and Abdoellah, 1988; Gliessman, 1990). Decreased risks of production failure, increased resource productivity over time, expansion of the amount and quality of labour applied in the farm, and provision of output flexibility and alternative production should unfavourable circumstances develop (Wojkowski, 1993).Potential to serve as repositories of genetic diversity, besides acting as insurance against pests and disease outbreaks, which may be very severe in mono-cultural stands (Michon et al., 1983).

Avoidance of environmental deterioration commonly associated with mono-cultural production systems largely due to effective nutrient cycling and relatively small hazard for leaching and soil erosion (Jensen, 1993).Provision of materials for breeding of useful new crop varieties (Cromwell et al., 1999).Wider ecological services such as landscape protection, soil protection and health, water cycle and quality and air quality (Cromwell et al.., 1999).

1.2 Statement of the problem

Food and people's livelihood income insecurity are the major concerns today in some parts of Nakawa division which are fuelled by the increase in population density (FAO, 1999). High population density as a result of people's livelihood has put a lot of pressure on land as more of it is required for settlement (Musotsi et al, 2008). This has negatively affected food production, hence, resulting into food insecurity. As the result people have resorted agroforestry home gardens as the way to earn a living for their livelihoods as well as diversifying economic activities to achieve their needs and thus this research is aimed at effects of home garden agroforestry on people's livelihood. (According to the 2002 census, the population density of Nakawa division was 105 people per square kilometer, while in year 2010 the projection increase was 127.6 people per square kilometer DED (2012). Based on the MDG's goals for poverty alleviation, intensification and diversification of production strategies are of importance to meet the food and land requirement for the increased population.

1.3 Justification of the study

The study elaborates the effects of home garden agroforestry of Nakawa division by people's livelihoods. The findings was used to sensitize people's livelihoods about home garden agroforestry resources for example in issues of garden use and management, how to address the factors that hinder successful utilization of home garden agroforestry resources by people's livelihood. In addition, the results of the study was to provide information to resource managing organizations such as National Forestry Authority (NFA), FAO, private sector and other organizations on the resource utilization.

1.4Significance of the study

The study was of great importance that the findings shall help in the following ways; is to hold up continuous production throughout the year (FAO, 2004a, b; Kebebew*et al.*, 2011) reported that in Southern Ethiopia 88.8% of the surveyed households were food secured throughout the year. The study also can solve the problem of land scarcity by using a small land the households have by integrating various components in the same piece of land hence food security and income generation (Devendra and Thomas, 2002; Abebe, 2005.

1.5 Objectives

1.5.1 Overall Objective

To assess the effects of home garden agroforestry resources on the livelihood of households living in Nakawa division.

1.5.2 Specific Objectives

i. To inventory home garden agroforestry trees and crops in the study area.
ii. To examinethe contribution of home garden agroforestry to food security and incomes of the households.
iii. To examine the challenges faced by households practicing home garden agroforestry in Nakawa Division.

1.5.3 Research questions

i. What type of inventory home garden agroforestry trees are practiced in the area?
ii. How important home garden agroforestry is to peoples of households?
iii. What challenges are faced by households practiced in home garden agroforestry in Nakawa Division?

1.5.4 Scope of the study

The research was carried out in Nakawa division in Kampala. Nakawa division is one of the five administrative divisions of Kampala the capital city of Uganda. Nakawa division lies in the East of the city bordering Kira town to the east, Wakiso district to the north, Kawempe division to the North West, Kampala Central to the west, Makindye division across the murchisons bay to the south west and Lake Victoria to the south. The coordinates of the division are; 20’00.00”N, 32˚37’00.0”E (Latitude; 0.333333; Longitude: 32.616667). Neighborhoods in the division include, Bugolobi, Bukoto, Butataka, Kiswa, Kiwatule, Kyambogo, Kyanja, Luzira, Mbuya, Mutungo, Nabisunsa, Naguru, Nakawa and Ntinda. The division covers an area of approximately 47.45square kilometers (18.32sq mi).

1.5.5 Time scope

The research data collection up to submission was taken a period of two months, with data collection in July 2017, analysis presentation of the collected data in July also, then writing a report in July about the findings and the final report submission in July.

1.5.6 Content scope

The research found out the various forms of home garden trees and crops present Nakawa division as the major contributors of these home gardens agroforestry, and there entry into the country, and amount produced per year, the measures put forth for its management and majority looked at the contribution it has on Nakawa division. The contribution included solving the problem of land scarcity by using a small land the households have by integrating various components in the same piece of land hence food security and income generation (Devendra and Thomas, 2002; Abebe, 2005).

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

2.2Definitions and general description

Home gardens are widely distributed throughout the world and have been extensively documented (Fernandes *et al.,* 1984). Uganda has been a home of home garden Agroforestry for ages since 1970s where they conceived home garden Agroforestry as a strategy to meet people's needs (Kitalyi et al., 2006). Home gardens have been established in various places in the country for various purposes. For example in Kilimanjaro and Bukoba they were established to cater the land scarcity problems, in Shinyanga (rotational wood lot) for soil conservation and animal feeds etc. Moreover, in Nakawa division, home garden Agroforestry technologies are well practiced although they are not yet recognized nor documented. The word "home garden" has been used rather loosely to describe diverse practices, from growing vegetables in the backyard to complex multistoried systems (Nair, 2012). It is used here to refer the intimate association of multipurpose trees and shrubs with annual and perennial crops and invariably livestock within the compounds of individual houses, with the whole crop-tree-animal unit being managed by family labor (Fernandes and Nair, 1986). Home gardens also provide the family with food and other goods; including construction materials, ornaments, or additional income (Kumar and Nair, 2004).Home gardens represent many Agroforestry characteristics, which imply that the close mix of diversified agricultural crops and multipurpose trees fulfills most of the basic needs of the local population Maroyi (2009). While the multistoried arrangement and high species diversity of the home gardens help to reduce environmental deterioration commonly associated with monoculture production systems (Nair and Kumar, 2005).

2.3Various systems of home garden Agroforestry

The concept of home garden Agroforestry is based on the development of the interface between agriculture and forestry. It is a sustainable multiple-production system whose outputs can be adjusted to local needs. The main components of Agroforestry systems are trees and shrubs, crops, pasture, and livestock together with environmental factors of climate, soil, and landform. Other components (e.g., bees, fish) occur in specialized

systems (Young, 1989). Under this definition, a variety of combinations of plants may be possible. Based on these three basic components, Agroforestry home garden systems can also be classified according to their practical purposes and component composition as reported by Hasanuzzaman (2008); Nair (1989); Hoogerbrugge and Fresco (1993) and Nair (1993) as follows: Agrosilvicultural home garden system, Silvopastoral home garden system and Agrosilvopastoral home garden system.

2.4Agrosilvicultural home garden system

This is an Agroforestry home gardens system where agronomic crops are combined with trees/shrubs on the same unit of land for higher or better-sustained production of annual crops, fodder, and wood. This system is most practiced in lowland sub humid tropics for food production purpose (Nair, 1993). Agroforestry home garden systems are generally more practiced in all areas where crop production is the most dominant economic land use activity for example Naguru, and parts of Nakawa division areas. Wider spacing is adopted without sacrificing tree population for easy cultural operation and to get more sunlight to the intercrop. Performance of the tree crops is better in this system when compared to monoculture (Young, 1989).

2.5 Silvopastoralhomegardens system

This is an Agroforestry home garden system where a range of crops and/or animals and trees are combined for better production of grasses and fodder (Nair, 1993). This combination can be arranged as a pure stand with fodder trees/shrubs planted as a protein bank (with cut-and-carry fodder production) and/or mixed in different configurations such as living fences of fodder trees and hedges. The trees / shrubs and grass components are arranged in such a way that their healthy coexistence is not disrupted. The acacia dominated system in the arid parts of Ethiopia, Kenya, and Somalia are good examples of this system (Bishaw and Abdelkadir, 2003).The Silvopastoral home garden system can be practised on both range and forest lands for the production of both feed and woody materials. Also the system can be practised on sloping ground by growing grasses and trees/shrubs together for soil conservation purposes (Young, 1989). The main objective of this practice is to supply feed for livestock during the dry season with high quality tree leaves and pods. This substantially

increases the productive capacity of poor and scarce pasture lands common on the Hararghe Highlands. Fuel wood and construction poles can also be produced with this system.

2.6 Agrosilvopastoral home gardens system

This is an Agroforestry home gardens practice by which food, pasture, and tree/shrub crops are combined on the same unit of land for the production of grass and browse feed, biomass for fuel wood and green manure, and food for human consumption (Lulandala, 2011).The system is practiced when the farmer needs all the benefits that would be obtained from Silvopastoral and Agrosilvicultural technologies from a unit of land (Bishaw and Abdelkadir, 2003; Tolunay, 2008; Bassullu and Tolunay, 2010). Usually such a technology is practised on cultivated land. Alternative rows of hedges, grass strips and/or crops would form such a technology, a form of alley cropping. Agrosilvopasture home gardens are also practised when the cropland is constrained by slope and threatened by erosion (Nair, 1993). These are very common problems of land use in most of the Kampala Highlands; therefore, this system has potential for use in various regions of the country. The practice encompasses many well-known land-use technologies long practised in Kampala Highlands (Abebe, 2005). Thus, it is apparent that Agroforestry is only a new word for an old practice: it is based on forestry, agriculture, animal husbandry, land resource management, and other disciplines that all form the systematic background of land use. Furthermore, it encompasses an awareness of interactions between humans and the environment and between demand and available resources in a given area. By definition Agroforestry is a collective term for land-use systems involving trees combined with crops and/or animals on the same unit of land. It combines production of multiple outputs with protection of the resource base. According to Bishaw and Abdelkadir (2003), Agroforestry is any sustainable land-use system that maintains or increases total yields by combining food crops (annuals) with tree crops (perennials) and/or livestock on the same unit of land, either alternately or at the same time, using management practices that suit the social and cultural characteristics of the local people and the economic and ecological conditions of the area.

2.7Benefits of home garden Agroforestry

Agroforestry home gardens are common in most tropical countries and they play a vital role in supporting people's hood in many diverse ways, including provision of food, fuel wood, building materials, and fodder for livestock, and income. They are regarded as source of income diversification and also play crucial cultural and social role in rural communities (Fernandes and Nair, 1986; Bonifasi, 2004; Guuroh*et al*., 2011) definedhomegardens as land use practices involving deliberate management of multipurpose trees and shrubs in intimate association with annual and perennial agricultural crops and invariably, livestock, within the compounds of individual houses, the whole croptreeanimal unit being managed by the family labour. Agroforestry homegardens are primarily used for subsistence purposes by people's livelihood; as they are increasingly being used to generate income (Mendez et al., 2001). The quantity of Agroforestry homegardens production that actually gets sold is highly variable, differing from one household to another. Hoogerbrugge and Fresco (1993) reported that between 9% and 51% of production is sold in Indonesia

2.8Sources of food security for the people's livelihood

i. **Homegardens.** Is land use technologies practiced around the homesteads, involving the integration of various woody perennials, herbaceous crops and /or animals. Home gardens are often overlooked as an important source of food security and income generation in the world. For subsistence and poor farmers, crop varieties and cultivars adapted to particular microniches around homesteads are crucial and accessible resources available to provide a secure livelihood. Gautam et al. (2004) reported that in India Agroforestry homegardens contributed 60% of the people's livelihood total fruit and vegetable consumption, in Philippines,twenty percentage (20%) of the foods consumed by families are produced in the homegardens whereas in Vietnam 51% of their produce is used by household members Trinh et al. (2003).and Marsh (1998) reported that the combined value of garden production, including sales of surplus vegetable produce and animal products combined with savings in food, varied seasonally but constituted a significant proportion of total income upwards of 20% for many.

ii. **Agriculture .**The majority of Ugandans like 80% depend on agriculture as their main occupation and source of livelihood (URT, 1997; Myaka et al., 2003). Agriculture sector in Uganda contributes 45% of the GDP, 80% of the employment and 85% of the total export earnings (FAO, 1993; FAO, 1999; Nyoni, 2007). Growing of diverse crops in Agroforestry homegardens has become important source of food security and influences the availability of quality food required by the people's livelihoods.

iii. **Forestry.** Forestry and trees make a significant source of food security and people's livelihood income. Forest foods are particularly important in predominantly subsistence economies in remote areas and they have a high potential of supplying food if well managed (FAO, 1996). As pointed out by Tewari (1994) and Makino (2003) that wide variety of forest products including non-timber forest products from diverse tree species for fruits, fodder, foods and firewood provide food security to a large low-income population particularly during periods of drought and works as an insurance against famine and crop failure.

iv. **Livestock.** Livestock keeping provides people with another important source of household food security by keeping a variety of domestic animals in their homegardens for several uses. Keeping these animals provide employment to rural farmers, food and can provide income (Njuki, 2001).

v. **Business (off-farm income generating activities).** Off-farm income generating activities are those activities apart from farming where people are engaged in to increase their income. The off-farm activities provide secondary sources of earnings for smallholder farmers and landless farmers. Diversification of activities in terms of on farm and off-farm activities contribute to the improvement of household economy (ICRAF, 1996).

2.9 Contribution of home garden agroforestry to people's food security

In most tropical home garden Agroforestry, food production is the first function and role. One major aspect of significant role of food production in homegardens is to hold up continuous production throughout the year (FAO, 2004a, b; Kebebew*et al.*, 2011) reported that in Southern Ethiopia 88.8% of the surveyed households were food secured throughout the year. Homegardens also can solve the problem of land scarcity by

using a small land the households have by integrating various components in the same piece of land hence food security and income generation (Devendra and Thomas, 2002; Abebe, 2005).The combination of crops with different production cycles and rhythms results in a relatively uninterrupted supply of food products (Nair, 2012). Depending upon the climate and other environmental characteristics, there may be peak and slack seasons for harvesting the various products, but generally there is something to harvest daily from most homegardens (Nair and Kumar, 2004). Most of this production is for home consumption, but any marketable surplus can provide a safeguard against future crop failures and security for the interval between the harvests (e.g. rice in Java and Sri Lanka, coffee and maize in Kampala, coconut and rice in southwestern India, and so on). Additionally, these harvesting and maintenance operations require only a relatively small amount of labor from the members of the family (Krishnal et al., 2012). Hence homegardens are among the best solutions of people's livelihood food security and income generation to smallholder farmers due to their diversity (Kebebew*et al*., 2011; Lulandala, 2011). This is especially in all areas of the tropics under pressure from increasing populations and unsystematic deforestation.

2.10 People's livelihood food security

Food security is access to food in terms of being adequate in quantity and quality for meeting all the nutritional requirements of people's livelihood from one year to the next and within the year (Kajembe et al., 2000). Beckford *et al*. (2011) reported that food security is a condition where all people at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. FAO (1996) revealed that many rural households do not have year-round access to adequate amounts of both fresh and processed staple foods and their fresh vegetables and fruits tend to be seasonal. As food being the central to well-being of any living creature, there must be food security constituted by one of the indices of measuring poverty level. A household or individual who spends over 70% of one's total income on food is said to be poor and food insecure. Therefore, food security is of paramount importance (Ndaeyo, 2007).

2.11Homegarden agroforestry to income generation

Homegardens can contribute to people's livelihood income in several ways. Income from homegardens comes from selling cereal crops, fruits, vegetables and other cash crops (e.g., lime, rambutan, jackfruits, durian, cloves, and coffee) to local brokers or merchants (Christanty*et al*., 1986; Marsh, 1998). In many cases, sales of products produced in homegardens significantly improve the family's financial status. For example in West Java, as much as two-thirds of the homegardens production is reported to be sold (Jensen, 1993a; Wilson, 1995), while in South African homegardens only 28% of such products were sold, the remainder being used for household consumption (High and Shackleton,2000). In Indonesia and Nicaragua home gardens contributed 21.1% and 35% of their total income respectively (Tynsong and Tiwari, 2010). In South-West Bangladesh and North Eastern Bangladesh, an average of 15.9% and 11.8% of household income is derived from home gardens respectively (Motiur *et al*., 2005). Hence generally, homegardens agroforestry play a great role in income generation as compared with other sources as it uses multiple components that produce diverse products.

2.12People's livelihood food insecurity

Food insecurity exists when members of a household have inadequate diet for part or throughout the year or face the possibility of inadequate diet in the future. Food insecurity is of two types; chronic food insecurity and transitory food insecurity (Nyange,2000).Chronic food insecurity occurs when there is persistent lack of households ability to buy or produce enough food, which can be attributed to persistent drought (Shilabu, 2008). While transitory food insecurity is a temporarily decline in household access to enough food due to instability in food production and prices or household income and health conditions (FAO, 1996).

2.13 strategies to people's livelihood food insecurity

Various reasons like continuous cultivation of open lands result into land degradation and consequently, poor crop production. This decreased harvest leads to inadequate food for the people's livelihood. Thus farmers look for alternatives to rehabilitate their farms' poor biophysical conditions, as well as augment production. Macandog et al.

(2003) reported that in order to cope with food insecurity, farmers resort to integrate trees, crops and livestock in the farm, homegardens and backyard farming for their people's livelihood sustenance. However, in Nakawa rural communities their coping strategies are not yet known.

2.14 Effects of home garden agroforestry to people's livelihood

i) Food Security. The contribution of Agroforestry home gardens to people's livelihood food security and income generation has been affected by different factors including the homegardens productivity, shortage of irrigation water, incidence of pests and diseases, markets and lack of extension services as reported by Mariro (2009).

ii) Homegardens productivity. Homegardens productivity is an essential aspect to be viewed out of homegardens fertility (Nair, 1993). High fertility results into high crop productivity as well ashighqualitylivestock fodder resulting into healthier animals. The fertility of Agroforestryhomegardens, which are usually more intensively cropped than other field systems is usually maintained with farmyard or pen manure, household manure, kitchen waste, compost, crop residues and sometimes toilet waste (Jensen, 1993b; Thorne and Tanner, 2002; Hailu, 2008). The productivity of homegardens is constrained by factors like drought and loss of fertility that are attributed by deforestation which lead to serious erosion especially along river banks and steep slopes. Home gardens Agroforestry as composite systems have the potential for increasing land use intensity while maintaining the productivity of the natural resources base. It enables the land to support much higher population densities than the traditional agriculture (Hailu, 2008).

iii) Homegardens and people's livelihood. Home garden agroforestry plays a vital role in contributing to people's livelihoods. Maroyi (2009) and Guuroh et al. (2011) reported that home garden agroforestry improves the family's nutritional status, health, and food security. Agroforestry homegardens therefore, is part of a people's livelihood strategy and has gained prominence as a natural asset through which sustainable use of resources, particularly for the livelihoods of the poor, may be achieved. Homestead gardening and Agroforestry systems provide an important contribution to sustainable

agricultural production because of their potential to meet economic, social, ecological, and institutional conditions for sustainable livelihoods (Nair,2006).

iv) Shortage of irrigation water. Water is a basic natural resource required to sustain life and provide various social needs as well as for economic development (URT, 2002). Many parts in Nakawa division in Kampala district depend on rain fed agriculture resulting into crop failure and hence people's livelihoods food insecurity. Water resource is of importance for food production not only because of its direct effects on yields and the size of cultivated area, but also reliable water supplies induce farmers to invest in other essential crop inputs, such as improved germplasm, fertilizers, and capacity building for better resource management (Rosegrant, 1997).

v) Incidence of pests and diseases. In some African countries, pests' impacts have been estimated on average of about 30% of the total subsistence production loss annually (Makundi, 1996). In Nakawa division, a shortfall in crop production especially cereal productions close to or around this figure threatens food security of practically the entire Nation. Pests and diseases together with low agricultural input supply are the major cause of production declines which lead to household food insecurity (SUA, 2006).

vi) Lack of extension services. Lack of agriculture extension services to farmers lead to poor knowledge of farming practices that leads to low yields, hence food insecurity. Moreover, majority of rural people depend on the surplus farm produce that they sell to get income for other needs. Therefore, failure of farm produce may lead to low income earnings. Agricultural extension service has been defined as the transfer of agricultural technology from experts (including progressive farmers) to farmers, livestock keepers and other stakeholders(URT, 1997). While experts are the link between the farmer,/ livestock keepers and research where agricultural technologies are developed, tested and modified. The research extension farmer/ livestock keeper linkage also provides a framework for planning research and extension activities, developing new technologies arising from research and extension experts, and from indigenous knowledge (URT, 1997). Therefore, lack of linkages between research extension and farmers/livestock keepers may lead to poor farmers/livestock keepers' problem solving and technologies dissemination (Tesha, 1996).

vii) Lack of credit facilities and reliable markets. Availability and accessible credit facilities to farmers enhance production improvement by easily accessing the required inputs at right times (Mrindoko, 2012). Majority of smallholder farmers depend on farm products to get their food and incomes. Unreliable markets of their produce lead them to sell their produces by farm gate prices. These resulted into low earnings and food insecurity (IFAD, 2012). Empowerment of farmers through credit provision will improve their production status as well as their well beings as reported by Smale et al. (2009) who reported that empowered farmers through provision of agricultural inputs, upgraded the staple food production in Washington DC. Also Doward et al. (2008) reported that provision of subsidy fertilizers improves the production quantities of farmers and hence livelihood sustainability. On the other hand, lack of access to reliable markets and prices leads to people's livelihoods food insecurity and low income. A study byLyimo-Macha et al. (2005) indicated that the unreliability of markets and low prices (farm gate prices) of the products were among the most common problems affecting marketing and farmer's income in relation to actual production costs. Moreover, inefficient markets and seasonal variations in market prices affect the contribution of home garden agroforestry technologies.

viii) Land shortage. Land shortage is among the hindering factor in production to rural communities. Fernandes *et al*. (1984) reported that in Nakawa division average land size hold per household is 0.68 ha of which needs a strategic plan to improve their productivity.

2.15 Measures required for home garden Agroforestry improvement

According to Mariro (2009) and Rugalema et al. (1994), there are various factors that can be used to enhance the homegarden agroforestry productivity; these include adequacy of extension services, provision of knowledge skills on homegarden agroforestry management, training, and provision of incentives and use of rainwater harvest.

i) Adequacy of extension services

An adequate extension service is a mile stone for the home garden agroforestry improvement, as they can enhance the technology transfer to farmers effectively (URT, 1997). Mariro (2009)reported that there is a need for the government to improve the working environment of extension staff so as to encourage them; for example in service training this can enable them to go hand in hand with the changing technologies also their performance efficiency.

ii) Knowledge provision to farmers on home garden Agroforestry management

Provision of knowledge to farmers can lead to production increase which would motivate them to use the technologies. Therefore, coming in line with the national goal of poverty alleviation we need a strategic plan that will enhance the production capacity by empowering farmers with knowledge provision (URT, 2005). Furthermore, Chirwa *et al.* (2006) and Nair and Kumar (2008) reported that intensive tree pruning and proper arrangement of trees lead to increased productivity from homegardens agroforestry. This implies that knowledge and skills provision to farmers is a mile stone to farmers' livelihoods improvement.

2.16 Inventory of home garden agroforestry trees and crops

The Soil and Water Assessment Tool (SWAT) is a process-based hydrological and water resources assessment model that was developed to determine the effects of various management scenarios on trees and crops basing on water resources at the watershed scale and such inventory measure are in line with earlier studies of (Arnold et al., 1998; Arnold and Forher, 2005; Gassman et al., 2007). The plant growth model currently embedded in SWAT assumes a uniform, monotypic plant stand (Krysanova and Arnold, 2008). Agroforestry simulations by SWAT would be improved by the incorporation of a plant growth model capable of simulating competition and dynamic vegetation changes over time (Arnold and Forher, 2005). Agroforestry plant communities are complex systems composed of taller wood species competing with shorter grass or crop species for light, water, and nutrients. Realistic watershed scale simulations of hydrological processes in these systems require a comprehensive, realistic process-based model

capable of simulating competition for light, water, and nutrients on species growth and development, and effective at partitioning biomass among and within trees, crops, and grasses. Herein we describe just such a robust model, the Agricultural Land Management Alternatives with Numerical Assessment Criteria Model (ALMANAC; Kiniryetal., 1992).ALMANAC has been successfully applied to a large number of crop, grass, and tree species, as well as diverse managed and unmanaged communities. Part of the reason for the wide use of ALMANAC is the ease with which parameters may be derived from existing parameters for other, similar species, or developed with straightforward field work. With species-appropriate physiologically based parameters, ALMANAC's simulations of biomass production and seed yields have been validated at various locations across North America under a variety of climatic conditions.

CHAPTER THREE

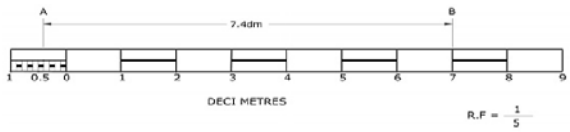
STUDY AREA AND METHODS

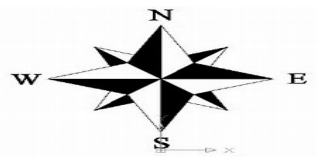
3.1The study area

3.1.1Location and Size

Nakawa Division lies in the eastern part of the city, bordering Kira Town to the east, Wakiso District to the north, Kawempe Division to the north-west, Kampala Central Division to the west, Makindye Division across Murchison Bay to the south-west *and* Lake Victoria to the south. The coordinates of the division are 0°20'00.0"N, 32°37'00.0"E (Latitude: 0.333333; Longitude: 32.616667). Neighborhoods in the division include Bugoloobi, Bukoto, Butabika, Kiswa, Kiwaatule, Kyambogo, Kyanja, Luzira, Mbuya, Mutungo, Nabisunsa, Naguru, Nakawa, and Ntinda. The division covers an area of approximately 47.45 square kilometres (18.32 sq mi).

Figure 3.1: Location of Nakawa division in Kampala District.





3.1.2 Population of the Study

The populations of the study are both men and women around Nakawa division in Kampala district. Other resource persons who were interviewed include Chairman of the area, and community members living in the division.

3.1.3Climate and vegetation

Nakawa division is characterized by comparatively small seasonal variations in temperature. Due to a high rate of evaporation from the lake surface and to regular winds, which drift across the lake from east to west all seasons, the average annual rainfall is high; 1,558 millimetres (61.3 in). There is a tendency of the rainfall to decrease as one move northwards from the lake shores. The rain falls in 160 to 170 days each year, with two peaks from March to May and from October to November.

Only a small proportion of the division vegetation can be considered as natural. The vegetation of the hills, which was originally shrubs and forests, has been modified to a greater extent as a result of clearing to give way for settlement (high income residential neighborhoods on the hills) and the papyrus swamps have been encroached on, in the valleys, by illegal developers.

3.1.4Topography, Geology and soil

The topography of Nakawa division is characterized by flat-topped hills of uniform height divided by shallow valleys forming papyrus swamps. Most of the streams flow into Lake Victoria. The streams are characterized by low gradient and comparatively broad valley floors. Owing to alluvial aggregation, low gradient, and frequent local silting, many valley floors have become seasonal or permanent swamps.

The soil geology from which the soils of the corridor formed belongs to the Basement Complex. It consists of a variety of metamorphic largely granitoid rocks, acid gneisses, schists and sand stones. Most of these rocks are highly weathered.

3.1.5 People and economic activities

Nakawa division is a predominantly urban area which is occupied by Baganda tribe as the main ethnic group in the division. However, the economic activity of the area is

mainlytrade.These include; general shops (Groceries), Food shops (restaurants), Auto rep airs (garages), and Furniture shops. With80% of the households in the division were involved in businesses in the division.

3.1.6Research design

The study wasrandom sampling in nature involving the selection of data in each household's family. This gave an outside of the situation in Nakawa division. A survey design will be used involving use of questionnairesand interviews as the data collection tool to quantify variable distribution in the study area.

However, in random sampling design, both qualitative and quantitative data was collected. Qualitative data will be used to collect data from each household's family and any other relevant information on home garden agroforestry. Quantitative data was used to obtain data from direct observations in the field and information from existing literature.

3.1.7Communication

Nakawa is well connected with public transport by use of commuter taxis, motorcycles an d bicycles. The taxis are the most commonly used compared to the others.

3.2 Data collection

3.2.1 Sample size

About 50 respondents was selected, one (1) chairperson of the area and (49) communities (both were men and women).

3.2.2 Instrumentation

Semi-structured questionnaires were used to collect information about Effects of home garden agroforestry on people's livelihoods in peri-urban areas of Kampala: case study of Nakawa Division. Both Focus Group Discussions (FGDs) and Key Informant Interviews was also carried out using interview guides.

3.3Methods of data collection

3.3.1Primary data

Data collection was done using semi structured questionnaire interview (self-administered) to the respondents. The questionnaires were consisted a set of both open

ended and close ended which will be answered by the respondents themselves. The researcher uses this method because it will offer a chance to the respondents to answer at their convenient time.

3.3.2Inventory of trees and crops

Transect walk was used to collect data on trees and crops in the home gardens. The tree species and agricultural crops was identified by species and recorded.

3.3.3Secondary data

This method was also applied to help me and have logical flow of information related to the investigation of this research study. Sources of secondary data will be included text books, internet, journals and others.

3.3.4Data Analysis

Data was analyzed both quantitatively and qualitatively. And the reason to why quantitative method is chosen is that it was to guide me to calculate variables like family size in a household, education level and land size a particular household owns. On the other hand, the reason to why qualitative data is chosen is also to guide me to know the people's lived experience with regard to the effects of home garden agroforestry in their areas and how they think about it in terms of how it has affected their wellbeing. It was also given me a freedom to interact with the people willingly and not follow the written interviews all the time but, also I was used informal methods like discussions to get as much information as possible. And therefore, the data from the field was analyzed progressively after every field day. And at the end of the study, it was coded and grouped accordingly to the study objectives. Microsoft Excel and SPSS will be used to generate frequency tables.

CHAPTER FOUR

RESULTS AND INTERPRETATION

4.1Demographic and socio-economic characteristics of respondents

The demographic and socio-economic characteristics of respondents are presented in Table 4.1. All the respondents were both male (25) and female (25). Few of the respondents (14%) were in 20-24 years old, while 22% were between 30 and 34 years of age. About 32% of the respondents were older than 39 years. The level of education of the respondents was generally very low though majority of them (97%) attained education. About 4% of the respondents did not go to school, 16% stopped at primary level, 24% had secondary education, 18% had tertiary education level and 38% attained education at university level. The proportion of married people (62%) were generally greater than single (30%) and widow (8.0%). Most of the respondents (74%) were peasant farmers (self-employed) entirely engaged in farming. Besides farming, about 2.0% of the respondents were civil servants working in the government. In terms of religion, majority wereMoslems (40%), Catholics (28%), Protestants (26%) and Christians (6.0%). For ethnicity, dominant tribes were Buganda's (68%), Banyankole (10% Etoset (10%) Bakiga (6%), Batoro (4.0%) and Basonga (2.0%) as shown in the Table.

Table 4.1 Demographic and socio-economic characteristics of respondents (N=50)

Gender	***Frequency***	***%***
Male	25	50.0
Female	25	50.0
Age		
20-24	7	14.0
25-29	16	32.0
30-34	11	22.0
35-39	16	32.0
Education Level		
0	2	4.0
Primary	8	16.0
Secondary	12	24.0
Tertiary	9	18.0
University	19	38.0
Marital status		
Single	15	30.0
Married	31	62.0
Widow	4	8.0

Occupation		
0	1	20.0
Civil servant	10	2.0
Self employed	37	74.0
Chairman	1	2.0
Student	1	2.0
Religion		
Catholics	14.0	28.0
Protestants	13	26.0
Moslems	20	40.0
Christian	3	6.0
Ethnicity		
Bakiga	3	6.0
Banyankole	5	10.0
Batoro	2	4.0
Baganda	34	68.0
Etoset	5	10.0
Basonga	1	2.0

4.2The demographic and socio-economic variables that influence home garden agroforestry

Table 4.2 shows that people lives in sub-county such as Nakawa division (50%) of respondents and, parishes such as Naguru (i) (26%) respondents, Mbuya (i) (2.0%) respondents, Ntinda (14%) respondents, and other parishes. Even villages Such as Naguru (26%) respondents, Unafri (10%) respondents, Mbuya (2%), Naguru katari (4%) respondents and many others all neighboring Nakawa division all influenced home garden agroforestry. Because this implies that some of the respondents in most villages their percentages were very low due to the fact that at first people around Nakawa division was influenced by environmental factors in terms of climate change as their major problem. However, agricultural management put some measures purposely to reduce on climate change influencing such home gardens like applying irrigation methods and among others as shown in the Table below.

Table 4.2 the demographic and socio-economic variables

Sub-county	***Frequency***	***%***
Nakawa Division	50	100.0
Parishes		
Naguru (i)	13	26.0
Mbuya(i)	1	2.0
Ntinda	7	14.0
Naguru(ii)	8	16.0
Nakawa	2	4.0
NaguruKatarii (iii)	1	2.0
Banda	17	34.0
Kisasi	1	2.0
Villages		
Naguru	13	26.0
Unafri	5	10.0
Mbuya	1	2.0
Nagurukatari	2	4.0
Strencher	3	6.0
Nakawa	1	2.0
village31	2	4.0
Ntinda estate	1	2.0
village k45	1	2.0
village k18	1	2.0
village k21	1	2.0
village k12	1	2.0
village k11	1	2.0
village k19	1	2.0
village k10	1	2.0
village k30	2	4.0
village k17	4	8.0
village k15	1	2.0
village 46	1	2.0
village k47	1	2.0
village k40	1	2.0
Komamboga	1	2.0
village k20	1	2.0
village k7	1	2.0
Katarii(iii)	1	2.0

4.3 Income (shs per year) of respondents

Table 4.3 shows that 90% of respondents their income(shs per year) were higher than 10% of respondents whose also their income(shs per year) were less because of some

factors such as climate change due to the fact that most crops like Beans, cassava needs constant rain fall at least once after five days. However, that's why the income of some respondents was so less compared to other respondents (Table 4.3).

Table 4.3 Demographic and socio-economic variables

Income(*shs *per year)	***Frequency***	***%***
0	5	10.0
3,600,000/=	45	90.0

4.4Practice, Maintenance and contribution of home garden agroforestry

Responses to question on home garden agroforestry and their view on whether FAO should continue to promote home garden agroforestry are presented in Table 4.4. And results indicated that 90% of the respondents agreed that home gardens should be maintained while 10% did not agree. Furthermore, 88% of respondents agreed that home gardens should be practiced and while 12% did not agree. However, 82% of respondents agreed that there has been contribution of home gardens. While 18% did not agree (Table 4.4).

Table: 4.4preferred Practice, Maintenance and contribution of home garden agroforestry

Variables	***Frequency***	***%***
Practice of home garden agroforestry		
Yes	44	88.0
No	6	12.0
Maintenance of home gardens		
Yes	45	90.0
No	5	10.0
Contribution of home gardens		
Yes	41	82.0
No	9	18.0

4.5 Contribution of home garden agroforestry

Table 4.5 shows that 78% of food productions were very higher than all other contributions of home gardens. This was followed by income generation with (75.6%), attraction of visitors (48.8%), promotion of markets (46.3%), and protection of soil 26.8% and among others .This implies that there were contributions of some crops in the area as indicated in the table below.

Table 4.5 Contribution of home garden agroforestry

Variables	***Responses***	***%***
Supporting people in farming	1	2.4
Provision of space for farming	1	2.4
Income generation	31	75.6
Food production	32	78.0
Provision of manure	3	7.3
For saving money	2	4.9
Attraction of visitors	20	48.8
Provision of Shade	9	22.0
Source of firewood	2	4.9
Conducive environment	5	12.2
Protection of soil	11	26.8
Employment	7	17.1
promotion of markets	19	46.3
Traditional medicine	2	4.9
Act as wind break	1	2.4
Protection of pollution	2	4.9
For research	1	2.4
Shelter	1	2.4

4.6Trees grown in home garden agroforestry

Table 4.6 shows that (82%) of mango trees were grown in home gardens, (72%) of ovacado trees, (66%) orange trees, (48%) of pawpaw trees, (26%) of guava trees and among other trees. This implies that the area were so fertile because of having a big percentage of fruit trees than other trees in home gardens as indicated in the table below.

Table 4.6: Trees grown in home garden agroforestry

Variables	***Response***	***%***
Mango	41	82.0
Jack fruit	5	10.0

Ovacado	36	72.0
Guava	13	26.0
Orange	33	66.0
Lemon	2	4.0
Pawpaw	24	48.0
Passion fruits	1	2.0
Pine	11	22.0
Timber trees	2	4.0
Acacia	2	4.0
Neem	1	2.0
Palm tree	1	2.0
Eucalyptus	2	4.0
Podocarpus	1	2.0
Jacaranda	1	2.0
Musizi	1	2.0
Citrus	1	2.0
Fruit trees	1	2.0

4.7Products in home garden agroforestry

Table: 4.7 shows that majority of home garden products (98%) were fruits, followed by firewood with (84%), manure (58%), charcoal (40%), timber (18%), Traditional medicine (16%), food (14%) and among others as indicated in table below.

Table4.7products in home garden agroforestry

Variables	***Responses***	***%***
Fruits	49	98.0
Firewood	42	84.0
Medicine	8	16.0
Charcoal	20	40.0
Manure	29	58.0
Poles	2	4.0
Food	7	14.0
Timber	9	18.0
Money	3	6.0
Seeds	3	6.0
Flowers	1	2.0

4.8 Agricultural crops grown together with the trees in home gardens

Table: 4.8 shows that (63%) were cassava, followed by (58.7%) beans, (41.3%) soya beans, (41.3%) vegetables, (34.8%) maize and plus other crops grown in home gardens as indicated in the table below.

Table 4.8 Agricultural crops grown together with the trees in home gardens

Variables	*Responses*	*%*
Cassava	29	63.0
Simsim	9	19.6
soya bean	19	41.3
Irish potato	10	21.7
Beans	27	58.7
Maize	16	34.8
Sweet potato	9	19.6
Sugarcane	9	19.6
Banana plantation	5	10.9
Vegetables	19	41.3
passion fruits	8	17.4
Pumpkins	1	2.2
Pineapples	2	4.3
Tobacco	1	2.0
cow peas	1	2.0
Pawpaw	1	2.0
Neem	1	2.0

Plate 1: Some of the home gardens in Nakawa Division

Plate 2: some of the home gardens in Nakawa Division

Plate 3: some of the home gardens in Nakawa Division

Plate 4: some of the home gardens in Nakawa Division

4.9 Challenges faced with keeping and managing agroforestry home gardens

Table: 4.9 shows that (60%) of climate change were a big challenge in home gardens, followed by (54%) pest and diseases, (42%) limited finance, (32%) scarcity of water, (32%) theft, and among others. This implies that, majority of some challenges faced by home gardens were generally very few because the area is in the tropics of Kampala that receives enough rain fall to reduce a big percentage of climate change. As indicated in the table below.

Table 4.9: Challenges faced with keeping and managing agroforestry home gardens

Variables	***Responses***	***%***
Domestic animals damaging home gardens	8	16.0
Limited tools and equipments	8	16.0
Limited land	14	28.0
Limited finance	21	42.0
Pest and diseases	27	54.0
Climate change	30	60.0
Scarcity of water	16	32.0
Wild animals damaging home gardens	8	16.0
Pollution	7	14.0
Theft	16	32.0
Infertile soil	4	8.0

Limited skills and knowledge	6	12.0
Intruders	4	8.0
Consumes time	1	2.0
Limited transport	3	6.0
Poor quality of seeds	1	2.0
Limited market	1	2.0
Limited labour	3	6.0
Scarcity of food	1	2.0
Limited manure	2	4.0
Limited light	2	4.0

4.10Possible Solutions for addressing the challenges of home gardens

Table 4.10 shows that majority of (52%) respondents were educated about the importance of applying irrigation methods in home gardens to solve scarcity of water, 52% respondents out of 26 responses spraying chemicals and have been benefited possibly to solve pest and diseases that attacks home gardens, 40% respondents out of 20 responses lend loans from the bank to improve on their home gardens. 34% respondents out of 17 responses fenced their home gardens to reduce on theft and other challenges interfering them. as shown in the Table below.

Table 4.10: Possible Solutions for addressing the challenges of home gardens

Variables	***Responses***	***%***
Borrowing loan from the bank	20	40.0
Buying more tools and equipments	9	18.0
Buying more fertilizers	6	12.0
Applying irrigation methods	26	52.0
Implementation of laws and regulations	14	28.0
Spraying with chemicals	26	52.0
Applying animal fumes	3	6.0
Hiring more laborers	5	10.0
Constructing of more roads	3	6.0
Training of more skilled personnel's	4	8.0
Planting of more trees to filter pollution	5	10.0
Fencing of home gardens	17	34.0
Buying of more land	13	26.0
Sensitization of local people about home gardens	5	10.0
Buying of quality seeds	2	4.0
Improvement of markets by Government	1	2.0
Construction of bore holes	12	24.0
Standby generator	1	2.0

CHAPTER FIVE

DISCUSSION

5.1 Inventory of home garden agroforestry trees and crops

The results of this study indicate that home garden agroforestry is invented in the following ways: The Soil and Water Assessment Tool (SWAT) is a process-based hydrological and water resources assessment model that was developed to determine the effects of various management scenarios on trees and crops basing on water resources at the watershed scale and such inventory measure are in line with earlier studies of (Arnold et al., 1998; Arnold and Forher, 2005; Gassman et *al.*, 2007). The plant growth model currently embedded in SWAT assumes a uniform, monotypic plant stand (Krysanova and Arnold, 2008). Agroforestry simulations by SWAT would be improved by the incorporation of a plant growth model capable of simulating competition and dynamic vegetation changes over time (Arnold and Forher, 2005). Agroforestry plant communities are complex systems composed of taller wood species competing with shorter grass or crop species for light, water, and nutrients. Realistic watershed scale simulations of hydrological processes in these systems require a comprehensive, realistic process-based model capable of simulating competition for light, water, and nutrients on species growth and development, and effective at partitioning biomass among and within trees, crops, and grasses. Herein we describe just such a robust model, the Agricultural Land Management Alternatives with Numerical Assessment Criteria Model (ALMANAC; Kiniryetal., 1992).ALMANAC has been successfully applied to a large number of crop, grass, and tree species, as well as diverse managed and unmanaged communities. Part of the reason for the wide use of ALMANAC is the ease with which parameters may be derived from existing parameters for other, similar species, or developed with straightforward field work. With species-appropriate physiologically based parameters, ALMANAC's simulations of biomass production and seed yields have been validated at various locations across North America under a variety of climatic conditions.

5.2 Contribution of home garden agroforestry to households' food security and incomes

Also results indicated that home gardens are contributed in the following ways, for example in supporting people's livelihood in many diverse ways, including

provision of food, fuel wood, building materials, and fodder for livestock, and income. They are regarded as source of income diversification and also play crucial cultural and social role in rural communities and such contributions are in line with earlier studies of (Fernandes and Nair, 1986; Bonifasi, 2004; Guuroh*et al*., 2011) defined home gardens as land use practices involving deliberate management of multipurpose trees and shrubs in intimate association with annual and perennial agricultural crops and invariably, livestock, within the compounds of individual houses, the whole crop tree animal unit being managed by the family labour. Agroforestry home gardens are primarily used for subsistence purposes by people's livelihood; as they are increasingly being used to generate income (Mendez et al., 2001). The quantity of Agroforestry home gardens production that actually gets sold is highly variable, differing from one household to another. Hoogerbrugge and Fresco (1993) reported that between 9% and 51% of production is sold in Indonesia
In most tropical home garden Agroforestry, food production is the first function and role.

One major aspect of significant role of food production in home gardens is to hold up continuous production throughout the year (FAO, 2004a, b; Kebebew*et al.*, 2011) reported that in Southern Ethiopia 88.8% of the surveyed households were food secured throughout the year. Home gardens also can solve the problem of land scarcity by using a small land the households have by integrating various components in the same piece of land hence food security and income generation (Devendra and Thomas, 2002; Abebe, 2005).The combination of crops with different production cycles and rhythms results in a relatively uninterrupted supply of food products (Nair, 2012). Depending upon the climate and other environmental characteristics, there may be peak and slack seasons for harvesting the various products, but generally there is something to harvest daily from most home gardens (Nair and Kumar, 2004). Most of this production is for home consumption, but any marketable surplus can provide a safeguard against future crop failures and security for the interval between the harvests (e.g. rice in Java and Sri Lanka, coffee and maize in Kampala, coconut and rice in southwestern India, and so on). Additionally, these harvesting and maintenance operations require only a relatively small amount of labor from the

members of the family (Krishnal *et al*., 2012). Hence home gardens are among the best solutions of people's livelihood food security and income generation to smallholder farmers due to their diversity (Kebebew*et al*., 2011; Lulandala, 2011). This is especially in all areas of the tropics under pressure from increasing populations and unsystematic deforestation.

5.3. Challenges faced by households practicing home garden agroforestry

It was found that home gardens have the following challenges such as: Limited food Security. The challenges of Agroforestry home gardens to people's livelihood food security and income generation has been affected by different factors including the home gardens productivity, shortage of irrigation water, incidence of pests and diseases, markets and lack of extension services and such challenges are in line with earlier studies as reported by Mariro (2009).Home gardens productivity**,** Home gardens productivity is an essential aspect to be viewed out of home gardens fertility (Nair, 1993). High fertility results into high crop productivity as well as high quality livestock fodder resulting into healthier animals. The fertility of Agroforestry home gardens, which are usually more intensively cropped than other field systems is usually maintained with farmyard or pen manure, household manure, kitchen waste, compost, crop residues and sometimes toilet waste (Jensen, 1993b; Thorne and Tanner, 2002; Hailu, 2008). The productivity of home gardens is constrained by factors like drought and loss of fertility that are attributed by deforestation which lead to serious erosion especially along river banks and steep slopes. Home gardens Agroforestry as composite systems have the potential for increasing land use intensity while maintaining the productivity of the natural resources base. It enables the land to support much higher population densities than the traditional agriculture (Hailu, 2008).

Home gardens and people's livelihood Home garden agroforestry plays a vital role in contributing to people's livelihoods. Maroyi (2009) and Guuroh et al. (2011) reported that home garden agroforestry improves the family's nutritional status, health, and food security. Agroforestry home gardens therefore, is part of a people's livelihood strategy and has gained prominence as a natural asset through which sustainable use of resources, particularly for the livelihoods of the poor, may be achieved. Homestead gardening and Agroforestry systems provide an important contribution to

sustainable agricultural production because of their potential to meet economic, social, ecological, and institutional conditions for sustainable livelihoods (Nair,2006).

Shortage of irrigation water is a basic natural resource required to sustain life and provide various social needs as well as for economic development (URT, 2002). Many parts in Nakawa division in Kampala district depend on rain fed agriculture resulting into crop failure and hence people's livelihoods food insecurity. Water resource is of importance for food production not only because of its direct effects on yields and the size of cultivated area, but also reliable water supplies induce farmers to invest in other essential crop inputs, such as improved germ plasm, fertilizers, and capacity building for better resource management (Rose grant, 1997). And incidences of pests and diseases.

In some African countries, pests' impacts have been estimated on average of about 30% of the total subsistence production loss annually (Makundi, 1996). In Nakawa division, a shortfall in crop production especially cereal productions close to or around this figure threatens food security of practically the entire Nation. Pests and diseases together with low agricultural input supply are the major cause of production declines which lead to household food insecurity (SUA, 2006).

Lack of extension services Lack of agriculture extension services to farmers lead to poor knowledge of farming practices that leads to low yields, hence food insecurity. Moreover, majority of rural people depend on the surplus farm produce that they sell to get income for other needs. Therefore, failure of farm produce may lead to low income earnings. Agricultural extension service has been defined as the transfer of agricultural technology from experts (including progressive farmers) to farmers, livestock keepers and other stakeholders(URT, 1997). While experts are the link between the farmer,/ livestock keepers and research where agricultural technologies are developed, tested and modified. The research extension farmer/ livestock keeper linkage also provides a framework for planning research and extension activities, developing new technologies arising from research and extension experts, and from indigenous knowledge (URT, 1997). Therefore, lack of linkages between research extension and farmers/livestock keepers may lead to poor farmers/livestock keepers' problem solving and technologies dissemination (Tesha, 1996).

Lack of credit facilities and reliable markets. Availability and accessible credit facilities to farmers enhance production improvement by easily accessing the required inputs at right times (Mrindoko, 2012). Majority of smallholder farmers depend on farm products to get their food and incomes. Unreliable markets of their produce lead them to sell their produces by farm gate prices. These resulted into low earnings and food insecurity (IFAD, 2012). Empowerment of farmers through credit provision will improve their production status as well as their well beings as reported by Smale et al. (2009) who reported that empowered farmers through provision of agricultural inputs, upgraded the staple food production in Washington DC. Also Doward et al. (2008) reported that provision of subsidy fertilizers improves the production quantities of farmers and hence livelihood sustainability. On the other hand, lack of access to reliable markets and prices leads to people's livelihoods food insecurity and low income. A study by Lyimo-Macha et al. (2005) indicated that the unreliability of markets and low prices (farm gate prices) of the products were among the most common problems affecting marketing and farmer's income in relation to actual production costs. Moreover, inefficient markets and seasonal variations in market prices affect the contribution of home garden agroforestry technologies .Land shortage Land shortage is among the hindering factor in production to rural communities. Fernandes *et al*. (1984) reported that in Nakawa division average land size hold per household is 0.68 ha of which needs a strategic plan to improve their productivity and such measures are in line with earlier studies of Uganda.

CHAPTER SIX
CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Based on the objectives of this study, the following conclusions can be drawn:

i. Home garden agroforestry are genuine multi-purpose combination of tree species, crops and some livestock that can provide a wide range of local uses ranging from the provision of timber, fire wood and charcoal which can also generate cash income in addition to improve the high stands of living for the households staying near Nakawa division.

ii. Challenges related to the keeping and managing of home garden agroforestry *include* ignorance about its management, limited finance, pest and diseases, poor irrigation methods that make it difficult to sustain the wellbeing of the households.

iii. Attempt has been made to improve on home gardens such as by applying irrigation systems during the dry seasons as households have been depending on their Agricultural crops such as potatoes, cassava, mattok, millet, beans and among others at the expense of home gardens or on any other agricultural business. However, the households maintain home gardens such as by applying irrigation of their crops in order to harvest more food security.

iv. The strategies suggested by the agricultural management to keep and manage home garden agroforestry include, community sensitization, Training of farmers, Radio talks, good application of irrigation methods, good application of fertilizers and effective implementation and appropriate laws governing the management of home garden agroforestry like taking action to illegal deforestation, controlling fires in the dry seasons set by garden trespassers and finally removing the idea that home garden agroforestry exist naturally through creation awareness.

6.2 Recommendations

The following recommendations have been made from this study:

a. To inventory home garden agroforestry trees and crops in the study area. Basing on the first specific objective for the topic, home garden agroforestry trees and crops were invented through walking and gathering data in each household family about the status of their home gardens in terms of physical management and encouraging them on how to keep and manage home garden trees and crops like beans, cassava and other kinds of agricultural crops.

b. Again there is need for the government and agricultural stalk holders to come up with alternative technology of inventorying home garden agroforestry trees and crops. Alternatively like educating the households that have a shorter mind on how to manage and keep home gardens.

c. To examine the contribution of home garden agroforestry to food security and incomes of the households. Also basing on the second specific objective for the topic, People in home garden agroforestry should engage in agricultural crops such as rice, fruits like mangoes, tomatoes and among others in order to improve on their food security and their incomes.

d. Again to improve on home garden agroforestry by households, there is a need to carryout proper technical analysis on agricultural food crops and tree medicinal potential of home garden agroforestry and further research on value addition techniques for agricultural conservation. This is anticipated to increase on the food security market value and facilitate extension programs geared towards promoting the expansion and management of home garden agroforestry hence their contribution to the household at large.

e. To examine the challenges faced by households practicing home garden agroforestry in Nakawa Division. In addition, there is a need for all agricultural stalk holders to keep and manage home garden agroforestry trees and crops through solving the challenges faced by home garden agroforestry such as shortage of irrigation water systems, Incidence of pest and diseases, lack of extension services, lack of credit facilities and reliable markets and land shortage, and this may be one of the most

effective avenues for enhancing such challenges through emphasizing some measures like,adequacy of extension services, and knowledge provision to farmers on home garden agroforestry management**.**

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Appendix

Questionnaire

Dear respondent, **I am Muriisa Benson**, a student of Makerere University pursing a Bachelor of Science Degree in Conservation Forestry and Products Engineering. Am carrying out a study on **EFFECTS OF HOME GARDEN AGROFORESTRY ON PEOPLE'S LIVELIHOODS IN PERI-URBAN AREAS OF KAMPALA: CASE STUDY OF NAKAWA DIVISION.** The information you will give me will be treated with maximum confidentiality and it will be used for academic purposes only.

SECTION A: DEMORGRAPHIC CHARACTERISTICS

1. Gender:

a) Male b) Female

2. Age: a) 20-24 b) 25-39 c) 40-44 d) 45+

3. Sub-county_____

4. Parish_____

5. Village_____

6. Education Level:

a) Primary b) Secondary c) Tertiary d) University

7. Marital status:

a) Single b) Married c) Divorced d) Widow

8. Occupation:

a) Civil servants b) Self employed

Others please specify_____

9. Religion:

a) Catholics b) Protestants c) Moslems

Others please specify_____

10. What is your ethnicity?

a)Bakiga b)Banyankore d)Batoro e) Baganda (f) Etoset

Others please specify_____

11. Income (shs per year) _____

SECTIONB: EFFECTS OF HOME GARDEN AGROFORESTRY ON PEOPLE'S LIVELIHOODS IN PERI-URBAN AREAS OF KAMPALA

12. Do you think home garden agroforestry in Nakawa Division should be practiced?

a) Yes b) No

13. Do you think home garden agroforestry should be maintained in Nakawa Division?

a) Yes b) No

14. Is home garden agroforestry contributing to household incomes in Nakawa Division?

a) Yes b) No

15. If yes, in what ways are home garden agroforestry contributing to household incomes in Nakawa Division?

a) _____

b) _____

c) _____

d) _____

16. Which trees do you grow in your home gardens?

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17. What products do you get from the trees?

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18. Which agricultural crops are grown together with the trees?

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……. …….. …….

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19. What challenges do you face with keeping and managing agroforestry home gardens?

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…….

20. How have you been addressing the challenges?

Challenge	**Solution**
…….	…….
…….	…….
…….	……..

THANK YOU VERY MUCH FOR YOUR TIME