IMPACT OF FOREST CONVERSION ON COMMUNITY LIVELIHOODS

A CASE STUDY OF BUDONGO SUB-COUNTY MASINDI DISTRICT UGANDA

By

IRUMBA DEZIDERIUS ATEENYI

(2016/FEB/MNRM/M219386/WKD)

A dissertation submitted to the school of Sciences, Nkumba University in partial fulfillment of the requirements for the award of a Master of Science Degree in Natural Resources Management

OCTOBER 2018

DECLARATION

I hereby declare that this submission is my own work towards the MSc. degree and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any degree of the University, except where due acknowledgement has been made in the text.

Irumba Deziderius Ateenyi: …… ……..……..

(Student) Signature Date

APPROVAL

This is to certify the dissertation entitled **''Impact of forest conversion on community livelihoods; a case of Budongo sub-county Masindi district Uganda''** being submitted by **Irumba Deziderius Ateenyi** to the school of Sciences, Nkumba University in partial fulfillment of the requirements for the award of a Master of Science Degree in Natural Resources Management is a record of bonafide work carried out by him under my guidance and supervision.

Certified by:

Ms Sanyu Kibuka …..…… ……..…….

(Name of Supervisor) Signature Date

DEDICATION

I dedicate this work to my parents Mr. Xavier Karubanga and Mrs. Joan Bagamba, my lovely wife Mrs. Justine Irumba, and my lovely children Kemigisha Winnie, Kugonza Tracy, Kusiima Carl Timothy, Austin Terry Talemwa, Daisy Noella Ninsiima and all family members and friends.

ACKNOWLEDGEMENTS

I express my profound gratitude to God the almighty, for facilitating the execution of this research work.

I am extremely thankful to my supervisor Ms. Sanyu Kibuka of the School of Sciences, Nkumba University, for her patience, guidance, encouragement and the constructive critique in making this work a success.

I am also grateful to my beloved family, especially my wonderful wife Mrs. Justine Irumba, and my lovely children Kemigisha Winnie, Kusiima Carl Timothy, Kugonza Tracy, Austin Terry Talemwa and Daisy Noella Ninsiima for their prayers, support, patience, and sacrifices made during my two-year programme at the university.

My special thanks go to Ms. Gladys Nagawa for her invaluable contributions, motivation and moral support throughout my course at the university.

I am indebted to all those who contributed in diverse ways in bringing this work into fruition, especially the managers I spoke to, those that helped to administer and react to the questionnaires particularly, Mr. Ombedra Yosse, my mother-in-law Mrs Peggy Mbabazi. I implore the blessing of God, the Almighty, to all those who offered various support in bringing this work to reality.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

ACRONYMS

CFR	Central Forest Reserve
CLAs	Communal Land Associations
DFID	Department for International Development t
DRC	Democratic Republic of Congo
FAO	Food and Agricultural Organization
GDP	Growth Domestic Product
GIS	Global information Systems
ILO	International Labour Organisation
LC	Local Council
MWE	Ministry of Water and Environment
NFA	National Forestry Authority
NFTPA	National Forestry and Tree Planting Act
SGBV	Sexual Gender Based Violence
UBOS	Uganda Bureau of Statistics
UGX	Uganda Shillings
UNICEF	United Nations International Children Education Fund
URN	Uganda Radio Network
USD	United States Dollar
UWA	Uganda Wildlife Authority
WHO	World Health Organization
WWF	World Wide Fund for Nature

ABSTRACT

In spite of their immeasurable benefits to sustenance of community livelihoods, forests in Uganda face several challenges including conversion to other land uses. Forest conversion has positive and negative consequences on environmental and social-economic livelihood patterns of the people especially the poor who depend on them. It is against this background that this study was undertaken to assess the impacts of forest conversion on community livelihoods in Budongo sub-county, Masindi district in Uganda.

The study adopted a descriptive research design in undertaking this systematic enquiry. Both primary and secondary data were collected and used for the study. The study employed both qualitative and quantitative data collection techniques and data was analyzed to determine the implications of forest conversion on community livelihoods in the study area. The respondents comprised selected households, Local Council leaders, forestry and environment staff; staff of education institutions in the study area and the Chairperson of Kinyara Sugarcane Out-Growers Association.

The study showed that over 90% of the forests on private land have been converted to commercial sugarcane growing and subsistence agriculture. The conversion of forests resulted into scarcity of forest resources and increase in resource use conflicts; drying of water sources and reduction in water quantity and quality, food insecurity at household level; loss of cultural values associated with forests; exposure of women and girls to sexual gender based violence; rape, defilement and teenage practices, early marriages and increase in school absenteeism and drop outs related to scarcity of fuelwood; increase in incidences of fires and loss of property. Other impacts of forest conversion included change in feeding habits.

The study showed that forest conversion contributed to a variety of benefits to local community livelihoods including reduction in vermin and crop raiding incidences; availability of land for agricultural investment and settlement; increase in household incomes; creation of employment opportunities and improvements in infrastructure. The study recommends development of land use plans at all levels; development and implementation of bye-law and ordinances; restoration of 50% of the converted forests and promotion of sustainable and clean energy technologies, a robust forest extension programme and creation of incentives for conservation of natural forests.

CHAPTER ONE
INTRODUCTION

1.1 Background to the study

The research focused on the impact of forest land conversion on community livelihoods in Masindi District. A forest is best defined as an ecosystem or assemblage of ecosystems dominated by trees and other woody vegetation covering a large area (American Heritage Dictionary of English Language 2016). A livelihood is a means of making a living and encompasses people's capabilities, assets, income and activities required to secure the necessities of life (WWF, Nepal 2008). Community livelihoods are therefore the means, through which a community makes a living. MWE (2016) estimated forests to cover 1.9% of Uganda's surface area. Forests play a vital role in the sustenance of community livelihoods. They provide vital wood supplies and help to combat rural poverty, ensure food security and provide decent livelihoods; they offer promising mid-term green growth opportunities; and deliver vital long-term environmental services, such as clean air and water, biodiversity, and mitigation of climate change (Bush *et al.* 2004). Global statics compiled by World Wide Fund for Nature indicate that 2 billion people rely on forests for livelihoods including shelter, water, food and fuel security, 300 million people live on forests including 60 million indigenous people while more than 13million people Worldwide are employed in the formal forestry sector.

Forests greatly contribute to the national economy and livelihoods of millions of Ugandans especially the poorest of society. Forests contribute 6% of Uganda's GDP and employ 1million people and 100,000 people in the informal and formal sectors respectively (Bush *et al.* 2004). According to MWE (2016), forests supply well over 90% of Uganda's energy requirements comprising an annual consumption of 20 million cubic metres of firewood and 400,000 tonnes. Forests contribute to provision of shelter in form building materials such as poles, timber, fibres and also sustain food production through maintaining soil fertility and water production. Bush *et al.* (2004) emphasizes that forests are a principle financial and economic safety net providing food and financial security while at the sometime playing a critical role in reducing vulnerability and cushioning the poor against shocks especially during the adverse dry seasons. Local

communities depend more on non-wood forest products such as water, fibres, vegetables, wild fruits, mushrooms, medicinal plants because they cannot afford substitutes (Banana *et al.* 1996).

Despite their importance, forests worldwide are being lost at an alarming rate. World Wide Fund for Nature points out forest land conversion as one of the main causes of deforestation and degradation. Forests conversion involves removing natural forests to meet other land needs, such as plantations, agriculture, pasture for cattle, settlements and mining. According to WWF, between 1990 and 2015, the world lost 129 million ha of forest with agriculture being the largest single cause of forest conversion. The net global forest loss between 1990 and 2015 was mainly in the tropics with the rates of forest loss recorded in low income countries (FAO 2015). Overall, WWF projects a loss of 80% of the World's forests by 2030.

In Uganda, deforestation and forest degradation has led to loss of large areas of forest cover and degradation of forest land amount to about 3.1 million hectares from 4.9 million hectares in 1990 (MWE 2016). Several factors are responsible for deforestation. Reynolds *et al.* (2003) stated that forests on private land surrounding Budongo central forest reserve in Masindi District were deforested for farming purposes including un restricted establishment of sugar cane plantations. Bush *et al.* (2004) noted that between 1980 and 2002 over 800 km^2 of natural forest were lost in western Uganda primarily on private land due to conversion to agricultural land. MWE (2016) confirmed that in Hoima and Masindi districts many forests have been turned to farmland due to their perceived fertile soils and lure of high returns from investments in agriculture.

While several studies have documented the extent of forest land conversion to other land uses; the impacts of such conversion on community livelihoods particularly in Masindi District are not very clear. The study assessed the key drivers to forest conversion and generated information on how unrestricted conversion of rich natural forest ecosystems impacts on community livelihoods in Masindi district.

1.2 Problem statement

Forests in Masindi district are being converted to other land uses at an alarming rate especially in Budongo Sub-county particularly the parishes of Kabango, Nyabyeya and Nyantonzi which used to be heavily forested. Extensive forests on private land have been converted for agriculture and

settlements. Reynolds *et al.(*2003) noted that human encroachment had taken place in the areas surrounding Budongo central forest reserve in Masindi district and deforested extensive areas for farming purposes including un restricted establishment of sugarcane plantations. MWE (2016) further confirmed that in Hoima and Masindi districts many forests have been turned to farmland due to their perceived fertile soils and lure of high returns from investments in agriculture.

On the other hand, it is a known fact that forests provide a wealth of environmental benefits and direct benefits such as medical plants, fuelwood, water, building materials, forest foods, craft materials and rainfall which support the livelihoods of many people sounding them (Bush et.al (2004). MWE (2016) reported that forests employ 1million and 100,000 people in the informal and formal sectors respectively and supply over 90% of the energy requirements in Uganda with each household using about 150 kgs (2-3m^3) of firewood per annum.

Despite the contribution of forests to community livelihoods, there has been continued destruction of forests especially on private land in Masindi district. The impacts of forest conversion on community livelihoods in Masindi have not been critically assessed, analyzed and adequately documented. This study was designed and undertaken to address the above problem.

1.3. Objectives

1.3.1 Overall objective

To assess the impact of forest land conversion on community livelihoods in Masindi district.

1.3.2 Specific objectives

i. To identify and analyze the contributions of forest resources (products and services) to the community livelihoods.
ii. To assess the key drivers of forest conversion.
iii. To determine the losses and benefits of forest conversion to community livelihoods.

1.4 Research Questions

The research questions that guided the study were developed in line with the three research objectives as shown in table 1.

Table 1: Research Questions

Objective1: To identify and analyze the contributions of forest resources (products and services) to community livelihoods.
i) What are the social contributions of forests to local community livelihoods? ii) What are the economic contributions of forests to local community livelihoods? iii) What are the cultural contributions of forests to local community livelihoods?
Objective 2: To assess the key drivers of forest conversion.
i) What are the main forest land conversion types? ii) What are the main ownership categories of the converted forests? iii) Who are the main players in forest conversion processes? iv) What is the process involved in forest conversion? v) What are the reasons for forest conversion? vi) What is the extent of forest conversion?
Objective 3: To determine the losses and benefits of forest conversion to local community livelihoods
i) What are the losses resulting from forest conversion to local community livelihoods? ii) What are the benefits accruing from forest conversion to local community livelihoods? iii) How did forest conversion affect the quality, availability, accessibility and use of forest products?

1.5 Justification and significance

The research findings will help guide decision making on investments that involve conversion of rich forest ecosystems. Given that more forest conversion is envisaged for planned and unplanned investments in Uganda, the findings of the research will provide a documented reference point to decision makers, civil society, investors and other stakeholders or resist converting forests to other land uses. The study has generated information that will guide the development of appropriate mitigation measures to deforestation. The information will also be used by government and non-governmental organizations to design and implement suitable forest restoration interventions that will provide for a fair balance between forestry and other land use types. The information generated will particularly guide Masindi District Local Government to put in place appropriate plans as part of the implementation of the 2009 Masindi District Environment Policy.

1.6 Scope

The study assessed the social, economic and cultural contribution of forest resources to community livelihoods prior to forest conversion. The research explored how forests used to contribute to the livelihoods of the different sections of society especially the vulnerable groups such as the women, youth and the elderly.

The research assessed the drivers to forest conversion in Masindi. This included assessments of the main forest types converted, the reasons for forest conversion and the different players in the conversion process.

The research explored the negative impacts of the forest conversion and analyzed the gains achieved by the local community as a result of forest land conversion. The assessments considered how forest conversion has impacted the livelihoods of various sections of the community especially the women, youth and the elderly.

The research was conducted in Masindi district, Bujenje County, Budongo Sub-county in the parishes of Kabango, Nyabyeya and Nyantonzi effective from August to September 2017.

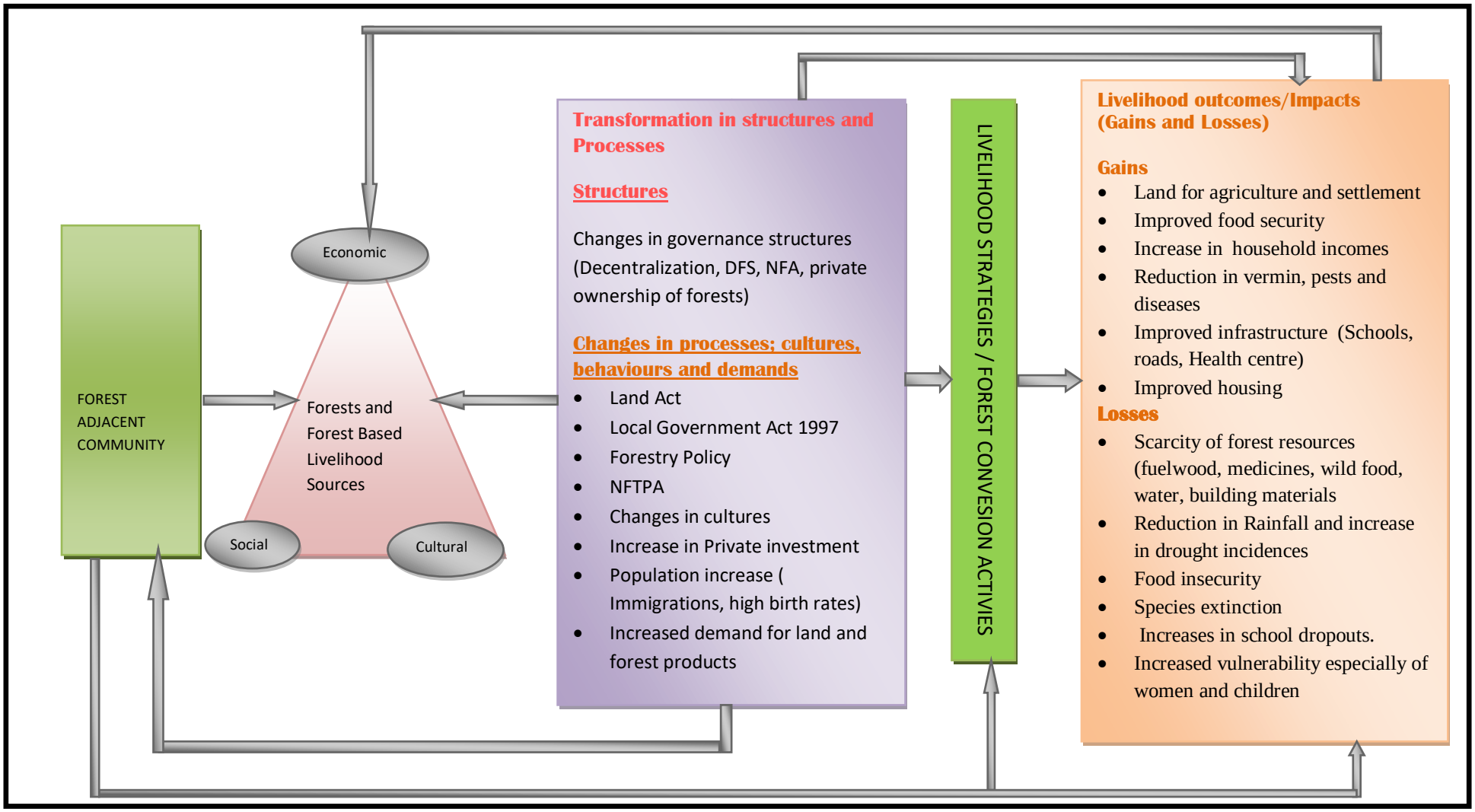


Figure 1 A conceptual framework for the impact of forest conversion on community livelihoods. Adapted from DFID Sustainable livelihood framework 2000.

Figure 1 illustrates the forest-based livelihoods of the forest adjacent communities categorized under social, economic and cultural livelihoods which according DFID (2000) form part of their financial and social capital assets. The figure further illustrates that the sustainability supply of forest based livelihoods is influenced by the changes in structures, processes and emergency of drivers which have contributed to the conversion of forests to other land uses thus impacting on community livelihoods.

The 1995 Constitution of the Republic of Uganda brought about significant changes in the governance structures of forest resources and associated processes including policy and legal reforms. According to the Constitution of the Republic of Uganda 1995, government holds in trust natural resources for the people of Uganda. Under article 237 of the Constitution of the Republic of Uganda 1995 and the Land Act 1998, land belongs to the people of Uganda and the management of forest on such land is the responsibility of the private land owners. The private land owners are free to utilize their land in the way they decide and no private forests have been registered (MWE, 2016). The 1997 Local Government Act led to the creation of district and sub-county local governments which further decentralized the management function of forests and other natural resources at local government levels. The Uganda Forestry Policy 2001 further provides for management of forests on provide land by private owners who are at liberty to register the forests for legal recognition and as commitment to manage maintain their land under forest. The 2003 Forestry and Tree Planting Act created, the National Forestry Authority and the District Forest Services dissolving the Forest Department that had full mandate to manage all forest resources both on government and private land.

The forest legal reforms left a lot of gaps especially regarding management of forests on private land. The creation of the new governance structures coupled with inadequate coordination gave leeway for the mismanagement of forests on private land by land owners including uncontrolled extraction of forest resources and conversion of forests to other land uses. This was further fuelled by promotion of agricultural private investments targeting forest land under private ownership for development. According to the 2016 state of forest report, forest conversion increased further due to population increase arising from high birth rates (3.5% population growth rate), armed conflict induced immigrations from the neighboring countries.

1.8 Definitions

A forest:

Is an ecosystem or assemblage of ecosystems dominated by trees and other woody vegetation covering a large area (American Heritage Dictionary of English Language 2016). According to the Food and Agricultural Organization (FAO, 2010), a forest is a land spanning more 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds situated naturally and uninterrupted.

Deforestation:

Is the permanent destruction of forests in order to make the land available for other uses (Bradford, 2015).

Forest conversion:

Is the change of land use from forest to other land use types such as agriculture, settlement, urban area or to another vegetation type.

Livelihood

Is a means of making a living and encompasses people's capabilities, assets, income and activities required to secure the necessities of life (WWF, Nepal 2008). The assets are defined as capitals (natural, human, financial, physical and social) and more than just being simply the means for making a living, they also give value to people's lives. This definition incorporates attributes of such as getting the basic requirement of living (food, shelter, clothing, money); capabilities or capacities, which are based on equity of resources and participatory decision making (Hiremath and Raju, 2004).

Livelihood strategies

Are dynamic processes in which people combine activities to meet their various needs at different times (DFID, 2000). Livelihood strategies comprise the range and combination of activities and choices that people make/undertake to achieve their livelihood goals. The livelihood of one household might affect the livelihood of another household.

CHAPTER TWO

LITERATURE REVIEW

The purpose of the research was to establish the impact of forest conversion on community livelihoods. The sections below provide some literature from similar studies.

2.1 Forest tenure in Uganda

Forest tenure is a broad concept that includes ownership, tenancy and other arrangements for the use and control of forests and encompasses a combination of legally defined forest tenure rights and arrangements to manage and use forest resources (MWE, 2016). The 1995 Constitution of the Republic of Uganda article 237 and the 1998 Land Act Article 3, categorized land ownership in Uganda under Customary, freehold, mailo and leasehold. Citizens own and use land under any of the four tenure systems for forestry purposes (MWE, 2016). Besides the constitution and the Land Act other polices and laws that have a bearing on forest tenure in Uganda include the Wildlife Act (1996), the Local Government Act (1997), the Uganda Forest Policy (2001) and the NFTPA (2003).

The Uganda Forestry policy 2001 provides for tenure of forests on government and private land. The policy defines private land to include all non-gazetted land owned under mailo, freehold, leasehold and customary land tenure (MWE 2016). The NFTPA (2003) repealed the Forests Act (1964) Cap.246 and the Timber Export Act 1865 Cap 247. The NFTPA (2003) established legal entities for management of various categories of forests. The National Forestry Authority is responsible for the management of Central Forest Reserves while the District Forestry Services under the local governments manage Local Forest Reserves and provide advisory services to local communities and private forest owners on the management of their forests. Under Section 27 of the NFPTA (2003), Private Forest owners have the ownership of trees or forest produce on private land or forests. The Land Act (1996) provides for formation of Communal Land Associations (CLAs) for any purpose connected with communal ownership and management of land. Section 19 of the NFTPA (2003) provides for the right of local community institutions appointed by the Minister to manage a community forest registered in accordance with section 17 of the NFTPA on behalf of that community. Despite the well intentioned legal forest tenure

reforms, the rate of deforestation has continued to escalate with the highest loss being recorded on private land (MWE 2016).

2.2 Livelihoods

A livelihood comprises the capabilities, assets and activities required for a means of living. The Assets are defined as capitals (natural, human, financial, physical and social) and more than just being simply the means for making a living, they also give value to people's lives. This definition incorporates attributes such as getting the basic requirements of living (food, shelter, clothing, money); capabilities or capacities, which are based on equity of resources and participatory decision making (Hiremath and Raju, 2004).

A livelihood can be classified as sustainable, if it is resilient in the face of external shocks and stresses, if it is independent from external support, if it is able to maintain the long term productivity of natural resources and if it does not undermine the livelihood options of others (DFID, 2000). Forests form part of the key natural resources whose conversion is the focus of the study. The study will explore the extent to which community livelihoods have remained resilient in the face of forest conversion.

DFID further emphasizes principle of sustainable livelihoods and people playing a central role in sustainable livelihoods DFID explains the concept of sustainable livelihoods using the sustainable livelihood framework. The framework depicts stakeholders as operating within a context of vulnerability, within which they have access to certain assets. Assets gain weight and value through the prevailing social, institutional and organizational environment {policies, institutions and processes). This context defines and influences the livelihood strategies that people employ to pursue their beneficial livelihood outcomes. Langat *et al.* (2016) estimated that between 1.095 billion and 1.745 billion people depend on forests for their livelihoods and about 200 million indigenous communities are almost fully dependent on forests. In this context, the degree of dependency on forest resources reflects the extent of forest vulnerability.

2.2.1 Livelihoods and vulnerability context

The vulnerability context frames the external environment in which the people exist. Critical trends as well as shocks and seasonality, over which people have limited or little control, have a

great influence on people's livelihoods and on the wider availability of assets. Vulnerability emerges when human beings have to face harmful threats or shock with inadequate capacity to respond effectively (DFID 2000). CARE (2012), indicated that those who live and are dependent on adjacent natural resources including forest resources especially women and girls are considered to be vulnerable and chronically poor. The study explored how the trends in forest conversion have influenced vulnerability of forest dependent communities.

2.2.2 Policies, institutions and processes and their influence on livelihoods.

Policies, institutions and processes operate at all levels, from household, national to international arena and in all spheres from the most private to the most public. The forest sector in Uganda has undergone policy and legal reforms that brought on board new policy and legislation, institutions and processes. The policies and laws include: the 1995 Constitution of the Republic of Uganda, Wildlife Act (1996), the Local Government Act (1997), the Land Act 1998, the Uganda Forest Policy (2001) and the NFTPA (2003); the institutions that emerged as a result of the reforms include: the National Forestry Authority, the Forestry Sector Support Department, the District Forest Services, Private Forest Owners and Communal Land Associations among others. Policies, institutions and processes determine the access to various kinds of capital, (to livelihood strategies and decision making bodies and sources of influence), terms of exchange between different types of capitals and returns to any given livelihood strategy (DFID, 2000). The study assessed how the policies, institutions and processes in Uganda influenced forest conversion and consequently the community livelihood strategies.

2.3 Forests and their contribution to community livelihoods

2.3.1 The contribution of forests to global community livelihoods

Forests are very important in the livelihoods of the local people. Local people depend on forest resources for various products and services such as fuelwood, construction materials, forest foods, water, rainfall, medicine, climate moderation, soil erosion control (Langat et al. 2016). According to CARE 2014, these values are difficult to substitute.

2.3.2 The contribution of forests to food security

Forests contribute directly to the diets of forest dwellers and of many who live far off. According to FAO (2013), forest foods, such as leaves, seeds, nuts, honey, fruits, mushrooms, insects and

other forest animals, have been important components of rural diets for millennia. An estimated 2.6 billion people rely on fuelwood, including charcoal, for cooking their food. Forested wetlands and mangrove forests help protect coastal areas from flooding, thereby increasing the stability of food production in coastal lands. Forests also play vital roles in riverine and coastal fisheries, which are often particularly important to poor communities. Forests regulate local and global weather through their absorption and creation of rainfall and their exchange of atmospheric gases (Butler, 2012). The rain water supports the growing of food crops to the community. Butler (2012) further pointed out that the Amazon forest creates 50-80 percent of its own rainfall through transpiration. Cutting the rainforests changes the reflectivity of the earth's surface, which affects global weather by altering wind and ocean current patterns, and changes rainfall distribution. If the forests continue to be destroyed, global weather patterns may become more unstable and extreme and lead to food insecurity. Siderius *et al*. (2016), indicates that rainfed agriculture can cover more than 75% of the needed increase in food production by the year 2025 in the Nile Basin countries.

There are projections that show the global human population will grow from 7 billion to an estimated 9 billion people by 2050. Recent estimates from the Food and Agriculture Organization (FAO) suggest that around 1.6 billion people will rely on forests and other natural systems in some way for their diets, health and wider livelihoods. Forests, and the wider landscapes in which they occur, potentially have a considerable role to play in the emerging strategies to achieve global food security. The effective integration of forests into agricultural, economic and development schemes carefully planned according to local needs and circumstances has great potential for increasing food security for present and future generations. On the other hand, the continuing loss of vital forest resources causes damage that is, in many cases, irreversible (FAO).

2.3.3 Economic contribution of forests to community livelihoods.

For rural people, especially those with little or no land of their own, forests may provide the main source of cash income. This income comes from harvesting wood and non-wood forest resources which often generate greater, more sustainable incomes than can be gained from the same land when used for agriculture (FAO, 2016). World trade in rattan, for instance, is worth

US$2 000 million annually. In India alone, forest-based industries support 30 million people. In Uganda, forests employ 1million people and 100,000 people in the informal and formal sectors respectively (Bush et.al 2004). The World Bank 2016 indicates that rural households living near forests, as much as 22 % of their income comes from timber and non-timber forest resources, a contribution larger than wage labor, livestock or self-owned businesses. Forests also provide a crucial safety net for rural people, especially indigenous peoples, in times of economic distress, helping them to offset agricultural income lost due to weather shocks, crop failure, or changes in commodity prices (Langat *et al.* 2016).

2.3.4 The supportive role of forests to livestock and pastoral communities

Forests provide fodder and rangeland for 30 to 40 million pastoralists worldwide who herd some 4 000 million cattle, goats and sheep. Trees help to protect pastoral rangelands, providing shade for cattle and crops and thereby supporting livestock production. Nonetheless, while livestock are increasing in number, the area available for grazing is being reduced because of forest conversion to crop production (FAO, 2016).

2.3.5 The ecological roles of forests and their contribution to community livelihoods

A livelihood is a means of making a living and encompasses people's capabilities, assets, income and activities required to secure the necessities of life (WWF, Nepal 2008). Community livelihoods are therefore the means, through which the community makes a living.contributing to maintaining the ecological balance. The integration of trees within agricultural schemes sustains crop production by improving soil fertility (FAO, 2016). Forests provide soil and water protection services including soil stabilization, reduction of soil erosion, maintenance of soil organic matter, increasing water filtration and storage (MWE, 2016). In this way forests contribute to water availability in springs and wells for domestic consumption. The protected soils also contribute to increased food yields and productivity cushioning the communities against famine.

2.3.6 Forests and their contribution to the health sector

According to the World Health Organization (WHO) Traditional medicine continue to play an essential role in health care, especially in primary health care. Traditional medicines are estimated to be used by 60% of the world's population and in some countries are extensively

incorporated into the public health system. In the developing countries, 75 to 90% of the people use natural products from forests as the only source of medicine (WWF). Some 120 prescription drugs sold worldwide today are derived directly from rainforest plants. The active ingredients found in 25 percent of prescription drugs come from medicinal plants. Nearly all of the so-called alternative medicines are also based on plant extracts. The estimated value of plant-based drugs is nearly US$45 000 million a year.

2.3.7 Forests as an import source of energy for local communities

Wood energy is drawing increasing attention as an environmentally friendly source of energy. Fuelwood is still people's main source of fuel for cooking, processing and preserving food accounting for 97 percent of total energy consumption in many developing countries (FAO 2016). Worldwide, 2 000 million people depend on wood for cooking, a basic step in ensuring proper nutrition and food availability in a home. In Uganda, forests supply well over 90% of Uganda's energy requirements comprising an annual consumption of 20million cubic metres of firewood and 400,000 tonnes of charcoal (MWE, 2016). This implies that without forests the majority of Ugandans would not afford to cook their food.

2.3.8 Sustenance of culture through forestry

Traditionally, the importance of forests and trees has been clearly recognized by cultures worldwide. Forests serve a variety of cultural and symbolic functions. They are intimately linked with ancestry and cultural heritage. Forest symbols provide social structure and cultural identity (Falconer, 1990). According to Falconer, forests provide a range of products for traditional ceremonies ranging from food and beverages to costumes and musical instruments. Omeja *et al. (*2005) reported that drums are important cultural instruments in Uganda obtained from trees in the forest. Forest foods also feature in many cultural ceremonies: marriages, funerals, initiations, installation of chiefs, and birth celebrations (Falconer 1990). In Nigeria, for example, palm wine is of paramount importance at most social functions. It is used in pouring libations, offering prayers, and heralding events.

2.4 Deforestation and Forest Land conversion trends

Deforestation is the permanent destruction of forests in order to make the land available for other uses (Bradford, 2015). Forests conversion is a process that involves removal natural forests to

meet other land needs, such as plantations, agriculture, pasture for cattle settlements and mining (WWF). In this respect therefore deforestation is synonymous with forest conversion.

2.4.1 Global deforestation/ Forest land conversion trends

FAO (2010) reported that the annual rate of deforestation between 2000 and 2010 had fallen to 5.2m hectares, compared with 8.3m hectares a year between 1990 and 2000 with some countries, including China, Sweden, Norway and India, having increased their forest covers between 2000 and 2010. FAO pointed out some countries especially in sub-Saharan Africa such as Nigeria, which had been chopping its forests down at a rate of 3.7% a year. FAO (2015) estimated an annual loss of 18 million acres (7.3 million hectares) of forest per year. According to (World Wildlife Fund (WWF) about 36 football fields (90 hectares) worth of trees lost every minute. In the Amazon, around 17% of the forest has been lost in the last 50 years, mostly due to forest conversion for cattle ranching.

2.4.3 Deforestation trends in Uganda

According to Uganda's Forestry Policy, in 1990 forests covered 24% (4.9 million hectares) of Uganda's' total surface area. The area covered by forest reduced to 9% equivalent to 1.8 million hectares between 1990 and 2015 with an average annual loss of 122,000 hectares (MWE, 2016). MWE 2016 also indicated that the forest estate outside protected areas reduced from 68% of the total forest area in 1990 to 61% in 2005 down to 38% in 2015 translating into a total loss of 2.6 million hectares.

2.5 Key drivers for forest land conversion

2.5.1 Population

Population expansion is one of the key drivers of forest land conversion. The land is usually converted for settlement and agricultural expansion to feed the ever expending population. During the last two decades, agricultural expansion, logging, development, and other human activities caused the deforestation of more than 120,000 square kilometers each year globally (Meyerson 2004). However, in a few large Asian countries, aggressive forest policy in the recent past has more than offset losses of forest cover from agricultural expansion and development. In spite of significant human population increases during the 1990s, India added 381,000 hectares (net) through tree plantation programs (FAO, 2000). In Uganda, however, the situation is

different. Population growth is one of the factors influencing the forestry sector (FAO, 2000). The rapid population growth in Uganda has led to increased deforestation in peri-urban areas and the densely populated fragile highlands in the east and south west (MWE, 2016). The increase in urban population corresponds to the increase in the demand for charcoal of 6% per annum. This has serious implications on deforestation. Charcoal production accelerates deforestation because unlike firewood, which is mostly got from dead branches and stems in rural areas, charcoal production involves the felling of live trees.

2.5.2 Conversion to Agriculture

Agriculture is the largest single cause of deforestation and severe forest degradation (WWF, 2012). Of the 16 million km^2 of tropical rainforests that once existed around 1990, just around 9 million km^2 exists today, with forests in South East Asia disappearing most rapidly (Bennett & Saunders, 2010). As the human population continues to grow, there is an obvious need for more food. In addition, there is an ever increasing demand for agricultural products, such as Sugarcane, soy and palm oil that are used in production of animal feed and biofuels. In Uganda, MWE (2016) indicated that there are over 300,000 encroachers in central forest reserves. Reynolds *et.al* 2003 noted that, human encroachment in the area surrounding Budongo Central Forest Reserve had led to conversion of some forest areas for farming purposes including sugarcane plantation establishment. MWE (2016) further reported that many forests in Masindi districts have been turned into farmland due to their perceived fertile soils and the lure of high returns from investments in agriculture especially sugarcane growing and by the provision of inputs such as tractors and seeds by Kinyara sugar works and further perpetuated by immigrants from West Nile and the Democratic Republic of Congo.

2.5.3 Illegal Logging and corruption

Illegal logging is one of the activities in the forest conversion process. It is a violation of the National laws that regulate the production and trade of timber products at all stages, from harvesting to processing to sales. It involves taking wood from protected areas, harvesting more than is permitted, harvesting protected species and using illegal tools. According to Hermosill (2000), the lack of control of illegal activities is either deliberate often as a result of corruption or determined by lack of administrative capacity. This destruction threatens some of the world's

most famous and valuable forests, including rainforests in the Amazon, Congo Basin, Indonesia and the forests of the Russian Far East. In 1980s, the Philippines lost about USD 1.6 million per year to illegal logging while in 1993 Malaysian log exports were under declared by as mush 40% (Hermisill, 2000). In Uganda illegal logging is a key contributor to forest degradation and deforestation involving removal of the most precious trees and setting a stage for follow on activities like charcoal burning and subsequence conversion of the area for agriculture (MWE 2016).

2.5.4 Fires

According to WWF (2017) fires are a natural and beneficial element of many forest landscapes, but they are problematic when they occur in the wrong place, at the wrong frequency or at the wrong severity. Each year, millions of acres of forest around the world are destroyed or degraded by fire. The same amount is lost to logging and agriculture combined. Fire is often used as a way to clear land for other uses such as planting crops. These fires not only alter the structure and composition of forests, but they can open up forests to invasive species, threaten biological diversity, alter water cycles and soil fertility, and destroy the livelihoods of the people who live in and around the forests.

2.5.5 Fuelwood Harvesting

Wood is still a popular fuel choice for cooking and heating around the world, and about half of the illegal removal of trees from forests is thought to be for use as fuelwood (WWF). In Uganda, forests supply well over 90% of Uganda's energy requirements comprising of an annual consumption of 20million cubic metres of firewood and 400,000 tonnes of charcoal (MWE, 2016). The charcoal production kilns are so wasteful with only about 15% recovery and the rest (75%) of the wood is burnt into ashes (MWE, 2016). This therefore forces charcoal producers to cut more trees to produce the required quantity of charcoal.

2.5.6 Limited funding to forestry sector

Limited funding is one of the key drivers to forest conversion (CARE, 2011). Limited funding to the forestry sector has made it difficult to employ enough staffing to monitor activities in natural forests. In the financial year 2010/11, the Uganda's Forest Sector Support Department that is charged with monitoring forest activities including forest land conversion in the forest sector

budgeted for UShs 169 million and received only half of the budget (CARE, 2011). The Forest Sector Department expects a budget of UShs 5.4billion per year in order to get fully operational (CARE 2011). According to Tomaselli (2006), lack of funds has been a critical matter especially for developing countries and tropical natural forests and investments have been below the estimated needs. There is low expectation that proper incentive mechanisms to invest in sustainable forest management particularly for tropical natural forests will be available in the next years and natural forests will continue to be less competitive than other land uses (Tomaselli 2006). This accounts for the high forest conversion and deforestation rates recorded in most tropical countries.

2.6 Forest cover loss and its impacts

2.6.1 Reduced Biodiversity

About 80% of the world's documented species are found in tropical rainforests which are vulnerable to deforestation. According to the World Health Organization, human health ultimately depends upon ecosystem products and services (such as availability of fresh water, food and fuel sources) which are requisite for good human health and productive livelihoods. Biodiversity loss can have significant direct human health impacts if ecosystem services are no longer adequate to meet social needs. Indirectly, changes in ecosystem services affect livelihoods, income and local migration.

2.6.2 Increased Greenhouse Gas Emissions

According to WWF forests help to mitigate carbon dioxide and other greenhouse gas emissions, but they become carbon sources when they are cut, burned or otherwise removed. Deforestation adds more atmospheric CO2 than the sum total of cars and trucks on the world's roads. The Union of Concerned Scientists estimates that U.S. forests absorb between one million and three million metric tons of carbon dioxide each year, perhaps offsetting between 20 percent and 46 percent of the country's greenhouse-gas emissions (Johnson 2009). This implies that deforestation releases the Green House Gas Emissions into the atmosphere.

2.6.3 Disruption of Water Cycles

Trees store great quantities of water, especially in rainforests (Meredith, 2013).Trees play a key role in the local water cycle by helping to keep a balance between the water on land and water in

the atmosphere. But when deforestation or degradation occurs, the water they store is lost. Deforestation in the long run results in the lowering of water tables and drying of springs, rivers and bore holes that provide water to the local community.

2.6.4 Increased Soil Erosion

According to WWF, without trees to anchor fertile soil, erosion can occur and sweep the land into rivers. Scientists have estimated that a third of the world's arable land has been lost through soil erosion and other types of degradation since 1960. And as fertile soil washes away, crop yields decline, agricultural producers move on, clearing more forest and continuing the cycle of soil loss (Butler, 2012). Erosion is extremely costly for developing countries. Butler (2012) further reported that in the late 1980s the Indonesian Island of Java lost 770 million metric tons of topsoil every year at an estimated cost of 1.5 million tons of rice, enough to fulfill the needs of 11.5-15 million people. As a result of deforestation, Costa Rica loses about 860 million tons of valuable topsoil every year, while the Great Red Island, Madagascar, loses so much soil to erosion (400 tons/ha) that its rivers run blood-red, staining the surrounding Indian Ocean. Soil erosion therefore results in reduced food production, floods, destruction of water sources thus affecting the livelihoods of vulnerable communities.

2.6.5 Disruption of Livelihoods

Currently, up to 2 billion people depend on forest goods such as fruits, game meat, fibers, medicines, fuelwood to meet their basic needs (Specht *et al.* 2015). But deforestation disrupts the lives of these people, sometimes with devastating consequences. According to CARE (2015), the conversion of forest land has resulted in the loss of forest products, income and associated goods and services and livelihood benefits to some members of the community, especially the vulnerable communities. Egaru et al. 2013 indicated that fuelwood collectors especially Women in Eastern Uganda spend 1-10 hours with an average of 3 hours per day in fuelwood collection activities as they have to walk long distances in search of fuelwood.

CHAPTER THREE
STUDY AREA AND METHODS

Introduction

This chapter describes the processes and methods used in conducting the study. It constitutes the research design type used for the study, sampling and sample size determination, type and sources of data, and the methods of data collection, processing, and analysis. This chapter also contains the profile of the study area such as the geographical location, climatic conditions, vegetation and population characteristics.

3.1 Research Design

This study was designed to be a descriptive study that correlated the contribution of forest resources to community livelihoods before and after their conversion. A descriptive design was used to describe characteristics of a population or phenomenon that was being studied. It focused on answering the question '' what'' and this is true with the proposed research as judged by the research questions under each objective. Correlation which is part of the descriptive design compares two things or situations. In this study the contribution of forest resources to community livelihoods before and after the conversion was compared so as to deduce the impact created by forest land conversion on community livelihoods. The research employed the use of questionnaires and interview guides as major tools to collect data from selected households and key informants in the study area.

3.2 The Study area

3.21 Location

The study was conducted in Masindi which is located in Mid-western Uganda 01^0 41N and 31^0 44E (figure 2). The Masindi district is bordered by Nwoya District to the north, Kiryandongo District to the east, Nakasongola District and Nakaseke District to the southeast, Kyankwanzi District to the south, Hoima District to the southwest and Buliisa District to the northwest. The district is comprises of 8 sub-counties including Pakanyi, Karujubu, Mirya, Bwijanga, Budongo, Kimengo, Nyangaya and Masindi Town Council which has been upgraded to a Municipal council. The study was conducted in Budongo sub-county in the parishes of Kabango, Nyabyeya and Nyantonzi.

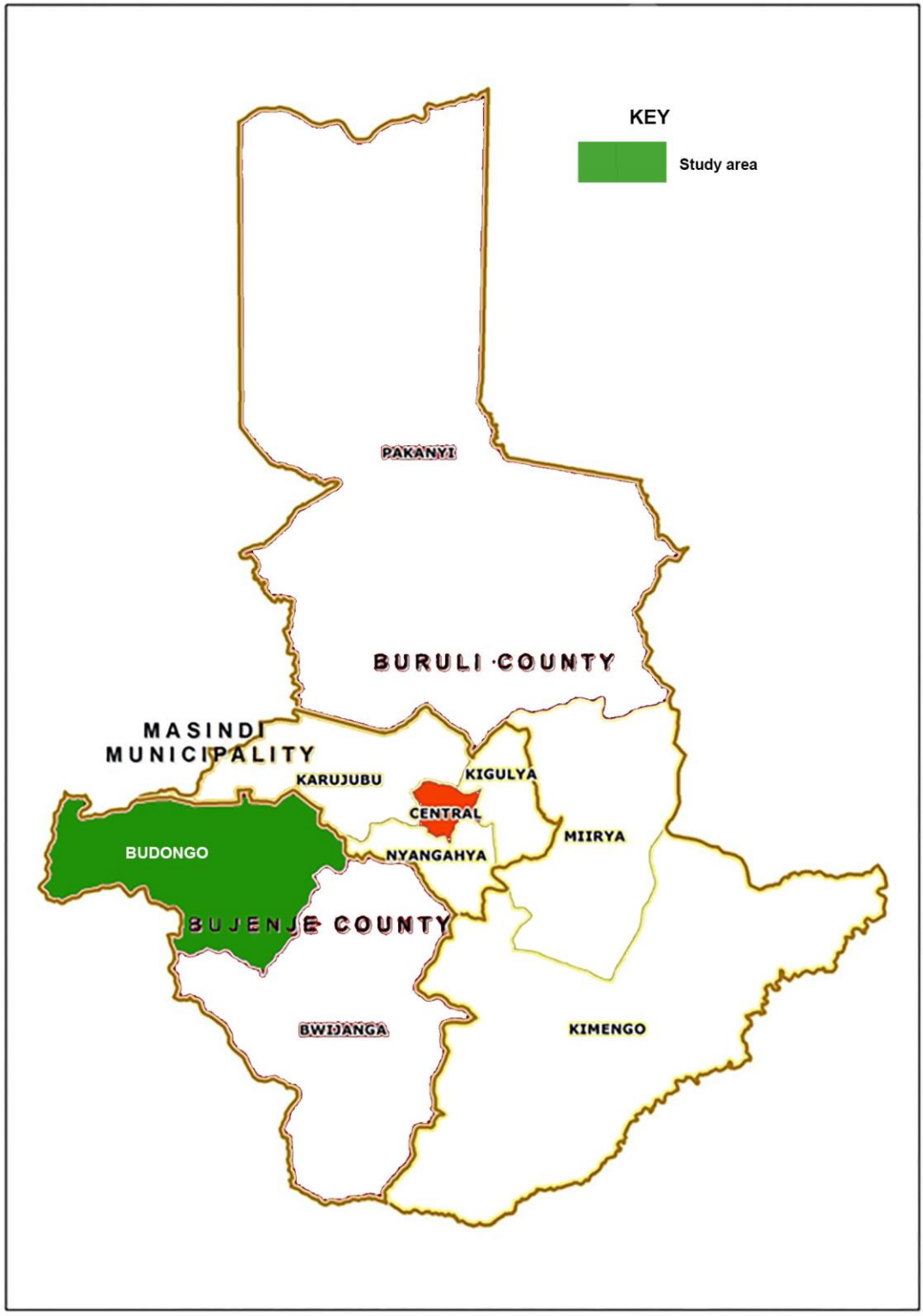


Figure 2: Map of Masindi district showing the study area. ***Source: UBOS***

3.2.2 Climate

According to the Masindi District Environment Policy 2009, Masindi district has a fovarable climate and a bimodal rainfall pattern. The district recieves an annual average rainfall of 1,304 milimetres with three main climatic zones according to rainfall levels: (i) the high rainfall zones covering Budongo, Karujubu and Nyangahya sub-counties receive more than 1000mm of rainfall per annum; (ii) medium rainfall zones covering Bigando and Isimba parishes in Miya sub-county receive a total amount of rainfall ranging from 800 mm – 1,000 mm of rainfall per annum; iii) lower rainfall zones covering Kimengo sub-county receive less that 800mm of rainfall per annum.

3.1.2 Vegetation.

The vegetation of Masindi comprises of tropical forest, wetlands, savanna grassland and savanna woodland (Masindi District Local Government, 2009). The Savanna vegetation is predominant in the East and North East of the district towards Nakasongola, Kyankwanzi, Nakaseke district and Kiryando Districts. Wetlands occupy the area along rivers. The Western part of the district especially Budongo Sub-county is dorminated by tropical forests both on private, communal and gazzetted forests. The gazzetted natural forests include Rwensama and Budongo central forest reserves which cover parts of Budongo, Karujubu and Pakanyi Sub-counties. The majority of forests on private and communal land have been converted for agriculture and settlements by both indigenous and immigrant communities. The known remaining private forest is the Keith Bitamazire Forest. Communal forests include Tengele, Ongo, Motokai and Ewafala which are also faced with encroachment for agriculture and severe degradation for resource extraction.

3.3 The Study population and sample size

Masindi district has a total population of 291,113 people with 150,522 males and 140,591 females (UBOS, 2014) and a total of 64,935 households. Budongo Sub-county has a total population of 34566 people with a total of 6914 households. The population of the parishes is as follows: Kabango (6558 people 1,312 Households; Nyabyeya 5930 people, 1186 Households; Nyantonzi 5370 people 1074 Households.

The research focussed on the local community living in Kabango, Nyabyeya and Nyantonzi where most forest conversion has taken place. Former private forest owners, opinion leaders,

community forest associations and non-forest owners were among the key informants of the study. The study covered other key stakeholders on the process of forest conversion such as local leaders, private investors, companies, education instutions such as Nyabyeya Forestry College, Nyabyeya primary school, Research Institutions such as Budongo conservation field station and District forest services.

3.4 Sampling frame.

The parishes of Kabango, Nyabyeya and Nyantonzi in Budongo sub-county, Masindi district formed the study population while the selected villages formed the sampling frame. Within each parish two villages were selected through purposeful sampling based on villages that used to have the biggest forest cover. The total population of the six selected villages formed the target population (N). The villages sampled included: Ewafala and Kapeeka in Kabango Parish; Nyabigoma and Kadukulu/Nyabyeaya in Nyabyeya parish; Karakaveni and Nyantonzi in Nyantonzi parish. The total population for the six villages (population size N) was estimated to be 2064 people derived from local council records of the respective villages as shown in table 2.

Sample size

The sample size for each village was selected using Krejcie & Morgan's (1970) table which was derived using the formula:

$$S = \frac{X^2NP(1-P)}{d^2(N-1) + X^2P(1-P)}$$

Where:

S = Required Sample size

X = Z value (e.g. 1.96 for 95% confidence level)

N = Population Size

P = Population proportion (expressed as decimal) (assumed to be 0.5 (50%)

d = Degree of accuracy (5%), expressed as a proportion (.05); which is margin of error

Table 2 shows how the sample size was derived using Krejcie & Morgan's (1970) table.

Table 2: Target Village, Population and sample size

Sub-county	Parish	Villages	Population
Budongo	Kabango	Kapeeka	301
		Ewafala	215
	Nyabyeya	Nyabigoma	344
		Kadukukulu/Nyabyeya	396
	Nyantozi	Karakaveni	395
		Nyantonzi	413
Total Number of people (N)			**2064**
Population Sample Size (S)			**322**
Household Sample Size (S/4.3)			**75**

Source: Krejcie & Morgan, 1970

Subjecting the 2064 total population N to the Krejcie & Morgan's sampling table, the required sample size (S) for the study was 322 people. However both the total and sample population included people of all ages including the children. According to the population census report of 2014, the average household size for Masindi is 4.3 people per household. Since both the population and the sample size includes the children, the study focussed on the household in order to capture the views. By subjecting the sample size to the household size, the sample size was therefore equivalent to 75 households distributed among six purposefully selected villages. The number of households sampled per village was determined by the following formula:

$$75 \times \frac{\text{population of village}}{2064} = \text{Number of households to participate in the survey per village}$$

From the formula the number of household sampled per village are as shown in table 3.

Table 3:Sample of households per village

Village	Kapeeka	Ewafala	Kadukulu/ Nyabyeya	Nyabigoma	Karakaveni	Nyantozi
Number of Households	11	10	14	13	13	14

Source: Researcher 2017

Individual households to participate in the survey in each village was determined using purposeful sampling whereby only those that had forests on their private land were selected. In addition a total of 18 key informants, selected through purposeful sampling participated in the study. These included repreenttives of different stakeholders such as opinion leaders, forestry technicl staff, District local government, National forestry Authority, Sugar cane outgrowers, Kinyara Sugar Company Ltd, academic and reseach institutions,

3.5 Study tools/Instruments

The reaserch employed tools that enabled the collection of primary and secondary information. Primary information was collected through the use of questionaires, interview guides and cameras. Global Information System was used to assess the forest conversion trends covering the periods 1990, 2005, 2010 and 2015. Reviewing of literature related to the study was used to generate secondary data.

3.6 Data Sources and Collection Methods

Data for this study was obtained from both primary and secondary sources. Both the secondary and primary data comprised of quantitative and qualitative data.

3.6.1 Primary data collection methods

3.6.1.1 Household interviews

House hold interviews were conducted in a total of 75 households spread over 6 villages in the study area. The villages were selected through purposeful sampling because they used to have the biggest acreage of forest cover. The 75 households were selected using the Krejcie & Morgan's table. Individual households from each village were selected through purposeful sampling to represent the various household categories such as women headed households, the elderly, youthful households and ethnic groups. This was intended to minimize on bias in the responses and capture information from the various gender categories and ethnicities. The number of households sampled per village is shown in table 3. Interviews guided by structured questionnaires were used at household level. Two research assistants were used to administer the questionnaires with support from the researcher.

3.6.1.2 Focus group discussions

Focus group discussions were conducted with one women and one youth group using an interview guide. This was intended to gather views from these specialized groups regarding the forest conversion which would have been difficult if they were mixed up together with men. This method helped to counter the cultural norms where youth and women cannot talk freely in the presence of men especially elders.

3.6.1.3 Key informant interviews

Key informant interviews were conducted with 18 key informants using an interview guide. The key informants included the Local council one chairpersons of the target villages; one elder from each targeted parish who has been in the area for more than 30years; District Forestry Officer, the manager for Kinyara out growers Association, Kinyara Sugar estates manager, the chairperson of Ewafala communal forests, the Principal Nyabyeya forestry college, the estates manager for Nyabyeya Forestry College, staff of Budongo Biological field station, NFA Sector and Range Managers for Budongo.

3.6.1.4 Observations and Photography

The researcher and his research assistants used observations to validate the information from group discussions, household and key informant interviews. Among the key observations made included the tree stumps on farmland that were indicators that the area was formerly a forest; dry wells and water points, gulleys on steep slopes and economic activities on converted forest land. Cameras were used to capture photographs that re-enforced information from the respondents and the researcher's observations and provided evidence of the effects and impacts of forest conversion.

3.6.2 Secondary Data collection methods

3.6.2.1 Literature Review

The researcher reviewed literature to find out more facts about the study findings from similar studies, books, journals and publications by various scholars and authors which are related to forests, forest conversion and associated impacts on community livelihoods. The literature helped the researcher to discuss his findings in the light of what was known about the subject matter from other researchers and writers as listed reference section.

3.6.2.2 Global Information System

Arcview Global Information System data from the NFA Biomass centre was used to deliniated the study area and assess the forest conversion and Land Use Cover trends covering the periods 1990, 2005, 2010 and 2015 and to produce land use cover maps illustrating the trends as shown in figures 8-12. The information gathered from GIS data sources was used to establish the extent of forest land conversion from 1990 to 2015 and to triangulate the observed the changes related to forest conversion in the study area.

3.7 Data Managament and Analysis

3.7.1 Data Managementt

The researcher together with the research assistants verified and edited the data collected at the end of every day's work to ensure that there were no mistakes. The data was shorted according to gender, coded and entered into the computer on excel sheets. Qualitative information was extracted from the questionaires and recorded under appropriate headings in the computer ready for interpretation.

3.7.1 Data analysis

The data was analysed using excel sheets and SPSS and presented in the form of graphs and pie charts. The pie charts and graphs were further interrupted in the light of qualitative information collected at the time of data collection. Descriptive analysis was used to analyze the data and then interpreted to give meaning to the data collected.

3.8 Quality Assurance

In order to ensure quality in data collection, the reasearch assistants were trained to internalise the research context, objectives and methods to be applied to collect data. The tools were pre-tested and final versions produced basing on the tests. Photographs were taken to illustrate the various findings of the research.

3.9 Ethical considerations

The objectives of the research were explained to each respondent followed by a request to participate in the research. Prospective respondents who turned down the request to participate were not coaeced. The resarcher was mindful of fair representation and ensured the participation

of men, women and youth. In order to build confidence in respendents, the researcher promised to keep secret the source of information in situations where the respondents preferred anonymity. The researcher and his assitants moved with copies of introductory letters which were presented especially to key informants and to Local council chairpersons where household interviews were conducted.

3.10 Limitations

The reasercher faced the problem of language barrier given that the study area is inhabited by people from different ethnic groups. To address this limitation the researcher selected and used research assistants who were conversant with swahili which is the common language spoken in the area. The researcher also used a mixture of Runyoro and Swahili languages to collect information from respondents at household level and during group discussions.

Given that the researcher had in the early 2000s worked in the area as a forestry staff, some respondents were skeptical in providing information thinking that he was gathering information for apprehending them for destroying forests. This limitation was mitigated by presenting a copy of the letter from the university which indicated that the researcher was a student and the information being collected was purely for academic purposes. The researcher also selected research assistants who had a lot of trust among the respondents. The researcher also avoided the company of government forestry law enforcement staff during data collection.

Given the mitigation measures, the limitations did not influence the results presented in this thesis but there were delays caused by interpretations from English to Swahilli especially during the focus group discussions.

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Introduction

This chapter focuses on analysis and discussions of the data that was gathered from the field. The analysis encompasses the data that was collected from household interviews in 75 households, focus group discussions and from 18 key informants which included the Local council one chairpersons of the target villages; one elder from each targeted parish who has been in the area for more than 30years; District Forestry Officer, the manager for Kinyara out growers Association, Kinyara Sugar estates manager, the chairperson of Ewafala communal forests, the Principal Nyabyeya forestry college, the estates manager for Nyabyeya Forestry College, staff of Budongo Biological field station, NFA Sector and Range Manager for Budongo and Budongo Good Neighbors Conservation Association. The analysis also covers the drivers and the extent of the forest conversion and its impacts on the social, cultural and economic livelihoods of the community in the study area.

4.2 Background of the respondents

This section looks at the demographic characteristics of the respondents interviewed during the study and provides useful information that complements the findings of the study. The sex, age classes and marital status of respondents is shown in table 4 and briefly described in the sections thereafter.

Table 4: Sex, age classes and marital status of respondents

Profile of household respondents	**Age classes of respondents**				**Total respondents**	**% age respondents**
	15-18	19-35	36-60	61+		
Male	4	15	32	6	57	76
Female	0	6	10	2	18	24
Widows	0	0	1	2	3	4
Single	4	2	0	0	4	8
Married	0	21	41	6	68	88

Source: Field survey 2017

4.2.1 Sex of the respondents.

The household respondents comprised 76% males and 24% females as shown in table 4. Discussions with the respondents indicated that key decisions especially related to access, control and conversion forest resources are made by men. All respondents 100% testified that the

male compared to their female counterparts are the key players in forest conversion. Men dominate activities such as logging, charcoal production and land clearing for commercial farming activities which according to MWE 2016 are among the key drivers of forest conversion.

4.2.2 Age of respondents and the period they have spent as residents in the study area

The study focused on respondents who were fifteen years of age and above since at this age many young-stars are active in many forestry related livelihoods especially those involving access to resources such as fuel wood. Thus the study focused on the age groups including 15-18years; 19-35years, 36-60years and 60+ years. The distribution of household respondents in the various age groups is shown in table 5. The age classes are closely related to the period the respondents have spent in the study area as residents and were therefore able to tell the story on the forest based livelihoods before and after the forest conversion. Table 5 indicates that 66 respondents representing 88% of the respondents have been residents of the study are for over 20years. This percentage also represents respondents who are in the age bracket of 19-35, 36-60 and above 60 years. They were therefore able to articulate the trends in forest cover changes and how this has impacted on community livelihoods over the years.

Table 5: A cross tabulation of respondent age groups and period spent in the study area.

Age group (Years)	**Period spent in the study area (years)**				**Total**
	1-10	**11-20**	**21-30**	**30+**	
15-18	1	3	0	0	4
19-35	0	5	15	3	23
36-60	0	0	10	30	40
60+	0	0	0	8	8
Total	**1**	**8**	**25**	**41**	**75**

S*ource: Field survey 2017*

4.2.3 Marital status of respondents

It was found that 88% of respondents were married, 8% single and 4% widowed as shown in table 4. Given the fact that the majority of the respondents are married, it is appropriate to infer that they are quite settled compared to those who are single. The widows were found to be people in advanced age who are also not likely to migrate to other areas. Thus the livelihoods of

both the married and widowed depend on the forest resources within the area and any form of forest conversion has an impact on their lives.

4.2.4 Ethnic composition of the respondents

The survey found that only 16% of the respondents were the indigenous Banyoro tribe while 84% were from different ethnic groups including Lugbara 37%; Alur 29%; Lendu 15%; Itesot 2% and Bagika 1% as shown in table 6. This indicates that 84% of the respondents were immigrants from other parts of Uganda and beyond who came and converted forested areas for settlement and other economic activities such as agriculture.

Table 6: Ethic composition of respondents

Ethnic Group	Number of respondents	Percentage(%) representation
Alur	22	29
Bakiga	1	1
Banyoro	12	16
Lendu	11	15
Lugbara	28	37
Itesot	2	2

Source: Field survey 2017

This finding is in line with Reynolds *et.al* 2003 who noted that, human encroachment in the area surrounding Budongo Central Forest Reserve had led to conversion of some forest areas for farming purposes including sugarcane plantation establishment. MWE (2016) further confirmed that many forests in Masindi district have been turned into farmland and perpetuated by immigrants from West Nile and the Democratic Republic of Congo.

4.2.5 Education level and occupation of respondents

Education level of the people determines the level of skills and knowledge they have which also has a bearing on their occupations and the extent they understand the value of forests. The highest level of level of education recorded during the survey was secondary level. The majority of respondents equivalent to 61% had attained primary level education, 36% attained secondary level education while 3% never went to school. These levels of education in the Ugandan setting cannot enable the respondents to attain highly specialized employments and therefore they have to depend on natural resources such as land for farming and forests for other forms of livelihood.

Table 7 indicates that 65 respondents representing 87% of the respondents engage themselves in farming which involves converting forest landscapes into agricultural land.

Table 7: A cross tabulation of education levels and occupation of respondents

Education level	**Occupation**				**Total**
	Farmer	**Casual employee**	**Business**	**Government official**	
No formal education	2	0	0	0	2
Primary school	38	8	0	0	46
Secondary school	25	0	1	1	27
Technical/college	0	0	0	0	0
University	0	0	0	0	0
Total	**65**	**8**	**1**	**1**	**75**

Source: Field surveys 2017

4.3 Contribution of forest resources to community livelihoods.

From the survey, it was found that prior to their conversion, forests in the study area played key roles socially, culturally and economically.

4.3.1 Social and non-cash contribution of forest resources to community livelihoods.

The study found that forests contributed greatly to non-cash and social community livelihood as a source of energy (fire wood), water (springs, rivers and rainfall), building materials (poles, fibres), community health insurance in form of herbal medicine, source of food (fruits, mushrooms, yams, wild game) and craft materials for making households items. Forests therefore contributed to four basic life necessities namely food, water, shelter and health. Figure 3 indicates 100% of the respondents acknowledged that the forests were a very important source of fuelwood, water, rainfall and building materials. Seventy percent (70%) and 60% of the respondents indicated that forests highly contributed to household livelihoods in terms of medicine and forest foods respectively.

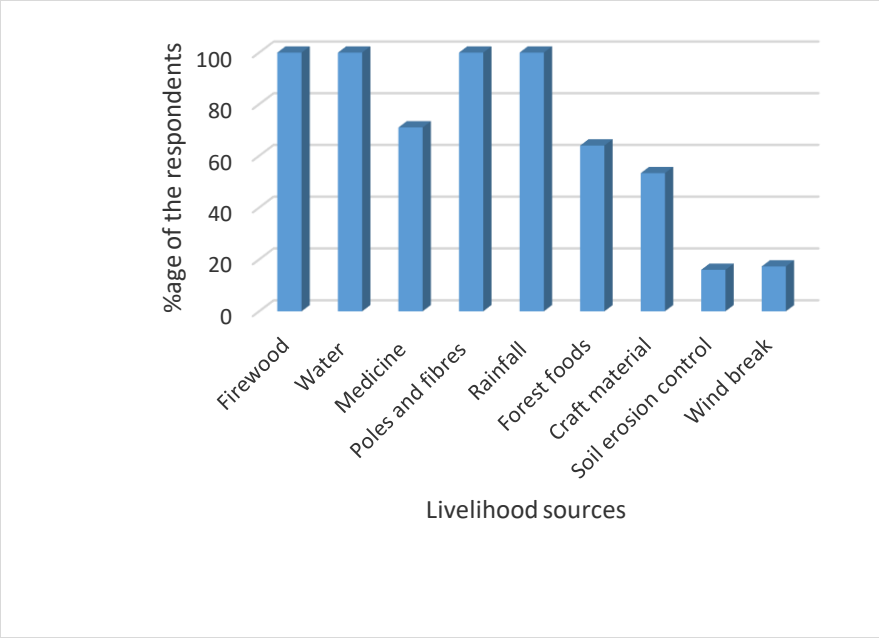


Figure 3: Responses to the contribution of forest resources to non-cash community livelihoods. ***Source: Field survey 2017***

4.3.1.1 Forests as a source of energy and its contribution to social-cultural livelihoods

All household respondents (100%) agreed that the forests were major source of energy in form of fire wood in the study area. By 1990 fire wood in the study area was abundant, easy to access at any time. Due its abundance, it was possible for the women and girls to save time for other household activities. According to the household respondents, the abundance of fire wood provided opportunities to families to prepare at least three meals per day thus contributing to food availability at household level. In recent years, fire wood is still known to be main source of fuel for cooking, processing and preserving food, accounting for 97% of total energy consumption in many developing countries (FAO, 2016).

According to the female respondents (24% of the respondents), firewood collection was a social event that provided an opportunity for women to meet and share family life experiences including provision of advice to each other on how to manage their families. In some instances however, the activity also promoted rumor mongering that in some cases escalated into conflicts and hatred among families.

The results of the survey indicated that availability of firewood enhanced the culture of the local communities. According to respondents in the age category 61+ years, representing 6% of the respondents, families would prepare fire places every evening which provided parents with opportunities to interact and educate their children about their cultures through songs, parables and proverbs. The study found that availability of fire wood played a crucial role in supporting bereaved families as a source of light, heat for the mourners and as source of energy for cooking throughout the days of mourning and during the last funeral rights. Furthermore, culture discouraged the use of certain tree species such as *Erythrina abyssinica* for firewood and *Teclea nobilis* which were reserved for non-destructive uses such as medicine which involved utilization of just part of the tree instead of cutting a whole tree.

4.3.1.2 Contribution of forests to water security

During the study 100% of the respondents confirmed that all their water sources were located in areas that were once forested and therefore attributed the availability of water to existence of forests. From the study both household respondents and key informants revealed that prior to the conversion of forests, the rivers, springs, wells and bore holes had abundant and clean water throughout the year. Some of the rivers pointed as examples included Rivers Siiba, Nyamagita, and Sonso; the wells and springs included Bonkere, Masikini, Tokala and Kyempunu which were located in and protected by riparian forests as catchments. The rivers, springs and boreholes were sources of water for domestic use in homes and schools in the study area. MWE (2016), recognizes the crucial roles forests play in sustenance of the water cycle through facilitating water filtration and storage which is made available in form of springs, wells and rivers.

4.3.1.3 Forests as a source of building materials

Forest products make a significant contribution to the shelter of at least 1.3 billion people, or 18 percent of the world's population (FAO, 2014). In Africa alone 150 million people live in homes where forest products are the main materials used for walls, roofs or floors. The study confirmed this fact whereby 100% of respondents reported that prior to the conversion of forests all building materials such as poles and fibers were obtained from the forest. Building materials were abundant, of high quality and easy to access from the nearby forests. Forests provided opportunities for the youth and immigrants to construct their semi-permanent residential houses

at no cost using durable and termite resistant poles from tree species like *Teclea nobilis (*Enzo in Runyoro) that were common in forests. The availability of building materials helped to promote the culture where mature youth would construct their own huts and start an independent life. Socially and culturally a man in Bunyoro was respected and recognized if he was able to build his own house which was made possible and easy with availability of poles.

4.3.1.4 Forests as a source of medicine

From the study, 70% of the household respondents described the forest as key source of medicine for various ailments some of which cannot be cured by modern medicine. Some of the ailments pointed out by the respondents included impotence and epilepsy. Study respondents said the forest was a major a source of medicine for treatments of the common sicknesses such as cough, flue and malaria. The study found that villages in the study area were far from medical facilities where mothers would access reproductive health services. Given the scarcity of modern antenatal and reproductive services, the forest provided herbal medicine that was used by traditional birth attendants to support mothers. Each village at least had one traditional birth attendant. According to FAO (1997), medicinal plants form the basis of traditional or indigenous health systems which are managed by medicine men and women who are knowledgeable in treatment of common diseases.

4.3.1.5 Forests as a source of food

House hold respondents amounting to 60% of the study sample acknowledged that the converted forests used to play a key role in supplementing households' diets especially during the time of food scarcity. FAO (2013), reaffirmed that the most direct way in which forests and trees contribute to food security is through contributions to diets and nutrition forest foods – wild leaves, fruits, roots, tubers, seeds, nuts, mushrooms, saps, gums, and forest animals and their products, such as eggs and honey – supplement the foods produced by agriculture and obtained from other sources. Arnold *et al.* (2011) pointed out that forest foods can assist in coping with seasonal food shortages due to extreme weather events, natural disasters, human-made conflicts and other shocks.

4.3.1.5 Forests a source of craft materials

From the field survey, 50% of the respondents said that forests were the main source of craft materials for making crafts such as baskets and mats for household use. Some of the key craft materials pointed out included palms and rattan cane. The craft materials were used to impart craft making skills in young children. The forests also made it possible for schools to train students in handwork which skills would later be further developed into enterprises by some students. All these materials were obtained at no cost from the forest.

4.3.2 The eco-system service roles of forests that supported community livelihoods

4.3.2.1 Forests as wind breakers

According to the Uganda Environmental Information Network, the Albertine Graben including Masindi district experiences moderate to strong and gusty winds, increasing in the afternoon. Key informants and household respondents reported that the forests used to control the speed of these winds and through process of condensation rainfall would occur in this area. However, following the conversion of forests especially on private land the area experiences strong winds that have a devastating impact on crops and physical infrastructure such as schools. The survey learn't from local leaders that in 2007, Ikoba boys' primary school and surrounding homesteads were blown off by strong winds. These incidences were not common prior to the destruction of the dense forest cover.

4.3.2.2 The role of forests in controlling of wild fires

During the study all respondents testified that natural forests used to buffer crops and households from fierce wild fires. Following the conversion of forests to sugarcane growing, wild fires had become a major threat to the community. According the Chairperson of Masindi Sugarcane Growers Association, every year out-growers lose 20% of the cane to fires, while Kinyara Sugar Works Company loses over 30% of the cane annually in fires. Not only do the fires affect sugarcane, they are also destructive to household property. During the study, 50% of the respondents reported devastating effects of fires involving burning of homesteads, household property and banana plantations which happen annually at different magnitudes.

3.2.3 Control of soil erosion

Plate 1: Gulley erosion on a deforested steep slope in Kapeeka village Kabango parish Masindi district. ***Source: Field survey2017***

Respondents (16%) indicated that forests play a critical role in the control of soil erosion especially on slopes along rivers and valleys. Through field observations, the study found that riverine forests that used to play the role of protecting the soils from erosion were converted living the steep slopes more susceptible to soil erosion. Development of gulleys was observed in Kapeeka village as shown in plate 1, signifying that soils have been washed down the valleys. Soil erosion is identified as one of the impacts of deforestation which the Masindi District Environment Policy (2009) will address.

4.3.2.4 Habitat for wildlife

While forests were reported as harboring vermin that were destructive to crops, respondents also acknowledged that forests were important habitats for plants, animals and birds that were useful to human life. For example, the Horn bills were useful as seed dispersal agents while wild bees were useful for pollination. The forest was also habitat for dangerous animals and reptiles and

would thus help to confine them in their habitat. Although, the conversion of forests had several negative impacts, 100% of the household respondents said the conversion helped in elimination of vermin which was causing a lot of losses in crop yields.

4.3.2.5 Climate amelioration

Forests provide opportunities where important processes take place, including shading, evaporative cooling, and rainwater interception, storage and infiltration. Although the study did not establish data on temperatures and rainfall before the conversion of forests, 88% of the respondents from their stock of indigenous knowledge reported that Budongo Sub-county used to experience rainfall throughout the year coupled with cool temperatures. The indigenous Banyoro that formed 16% of the respondents revealed that the study area was named Budongo (which in the indigenous Runyoro language means 'muddy') because it was muddy through the year due to rainfall. Following the destruction of the forests, the area is now characterized by high temperatures, prolonged dry seasons and dusty conditions.

4.3.3 Economic contribution of forests

4.3.3.1The contribution of timber to revenue generation and employment

The formal forestry sector employs some 13.2 million people across the world and at least another 41 million are employed in the informal sector (FAO, 2014). According to the Masindi district forest officer, Masindi was the main source of high quality timber in Uganda during the 1990s. Timber was also the main source of revenue to Masindi district. The revenue from timber however declined from UGX 34,452,903(9570USD) in 2004/5 to UGX 7,409,200 in 2016/17 as shown in figure 4. The decline is attributed to the reduction of the forest resource base resulting from conversion of forests to other land uses especially sugarcane and tobacco growing.

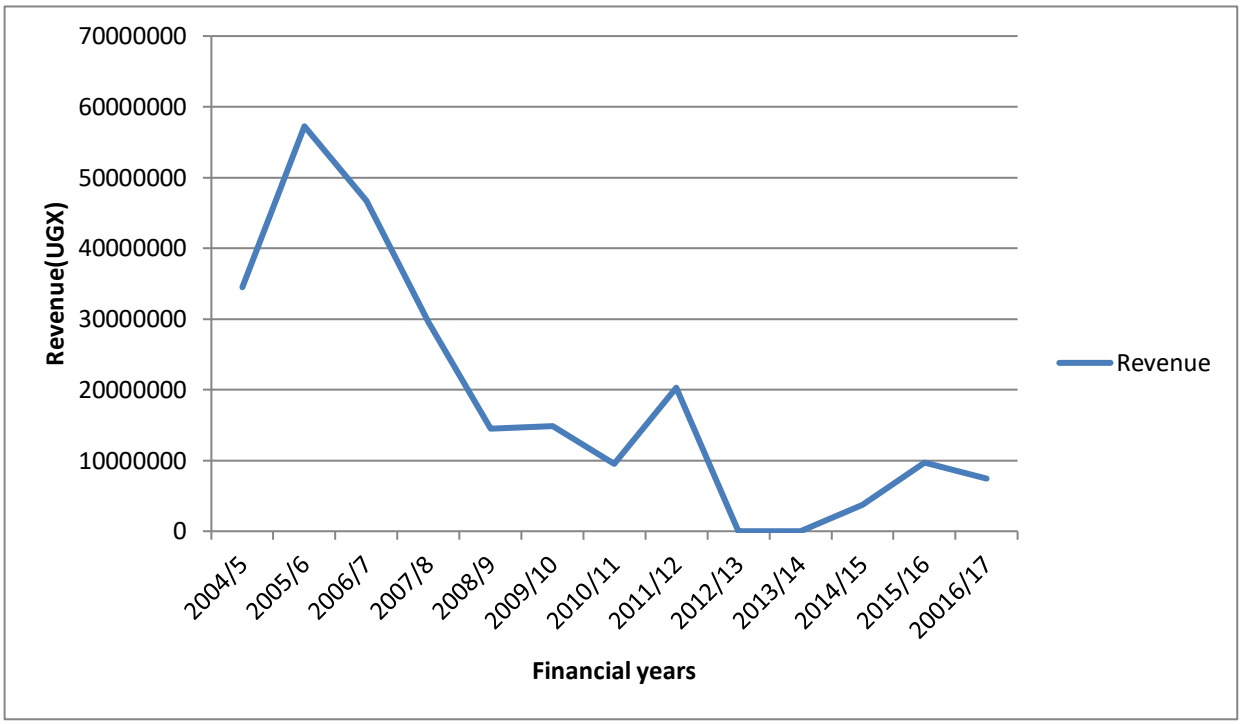


Figure 4: Revenue generated from timber in Masindi district 2004/5 to 2016/17 financial years.
Source: Masindi district forest office

Not only were the forests a major source of revenue to the district; they were also a source of employment especially for the youth who were involved in timber cutting and charcoal production. Some people were employed as casual workers to carry timber from the pitsawing sites in the forest to the most accessible loading sites for transportation to the market. Information obtained from the District Forest Office in Masindi indicated that on average 40 people (youth) were directly employed per year in licensed timber cutting as timber cutters between 2004 and 2010. This number has dwindled to zero due to conversion of forests to other land uses. At the time of the study no timber license was issued in Masindi district due to scarcity of trees for timber consequently the youth lost employment. Figure 5 shows the timber licensing and employment trends between 2004/5 and 2016/17finacial years in Masindi district.

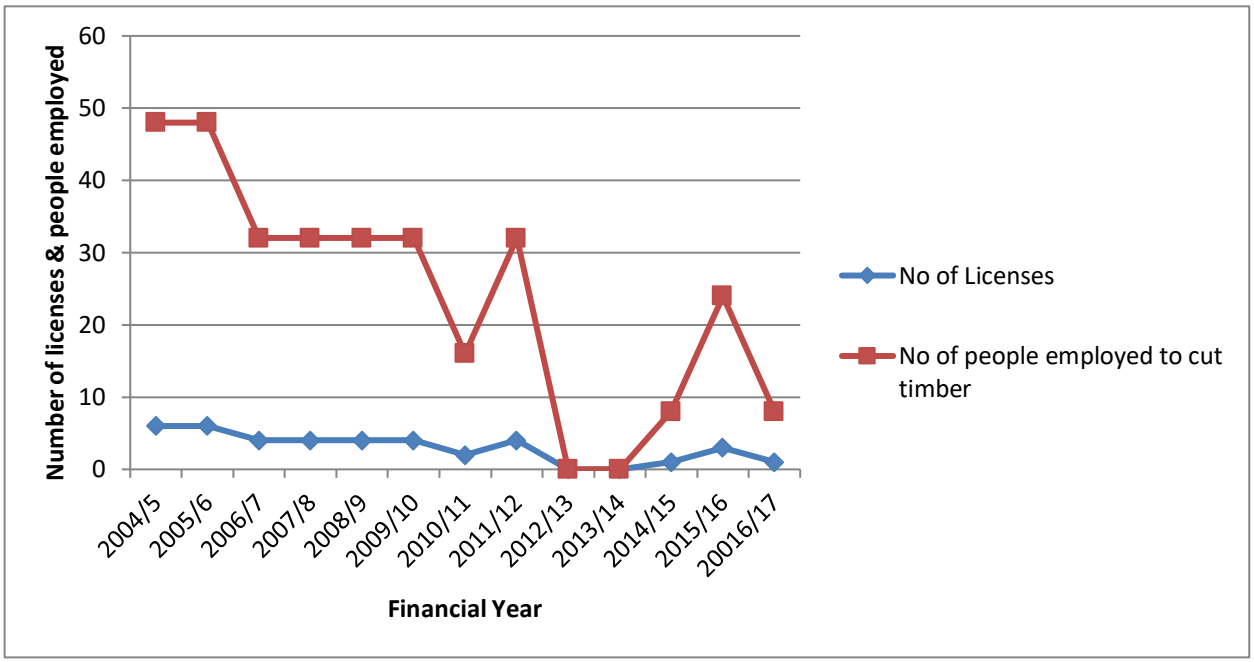


Figure 5: Timber harvesting licensing and employment trends for Masindi District between 2014/15 and 2015/17. Source: ***Masindi district forest Office***

4.3.2.2 Charcoal

According to the District Forest and Senior Environment Officers of Masindi district, between 2005 and 2010 Masindi District was one of main producers of charcoal in Uganda. The majority of charcoal produced in Masindi district came from private lands which fall under the jurisdiction of the district forest services *Shively et al. (2010).* Charcoal was the main revenue source to Masindi district but this has drastically reduced due to forest conversion as indicated in revenue collection trends from charcoal in figure 6. *Shively et al (2010)* further indicated that charcoal production was mostly done by the poor including people with low agricultural capacity and few productive assets; the landless refugees and internally displaced people from northern Uganda. These people often turned to charcoal production as their only means of survival because they lacked the skills, capacity or opportunities for diversifying into other livelihood activities.

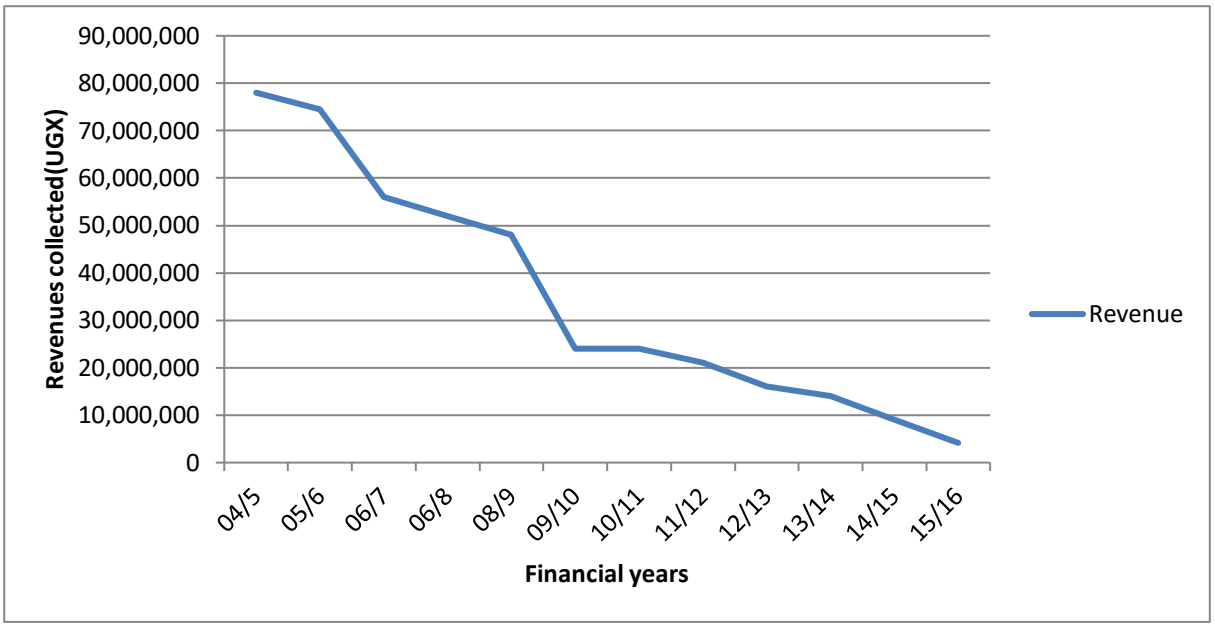


Figure 6: Charcoal revenue collection trends for Masindi District 2004/5-2016/17. ***Source: Masindi District forest Office***

4.3.2.3 Poles and firewood

Findings from the 97% of the household respondents indicated firewood and poles obtained from forests were both for domestic use and sale to townships such as Kabango and fishing villages such as Butiaba, Wanseko and Buliisa. The trade in poles and firewood provided a source of income especially to men and youth who were able to collect, transport and or establish linkages with buyers in these town-ships.

4.3.4 Forests and their contribution to the social-cultural set up of the study area.

Forests provide the venue for religious, social, and healing ceremonies (FAO). From the study, 6% of the respondents reported that forests in Bunyoro had sites for worship and appeasing their gods ahead of certain events. Some of the circumstances under which gods would be appeased included making sacrifices in order to have rainfall after along dry season; to get blessings during a hunting expedition. The selected Banyoro clans used to offer sacrifices under big trees and rocks in form of eggs and beans and soon after it would rain. These sites have been destroyed as the forests have been converted to agriculture.

4.4 Forest categories in study area between 1990 and 2017 and their status.

4.4.1 Forests on public land.

Before the 2001 Uganda Forestry Policy, forests on public land included all forests outside forest reserves. These included riparian or riverine forests, forests on communal land holdings and forests on land owned by individuals. The study identified Rivers Siiba, Nyamagita and Ewafala as some of the rivers that had thick riverine forests. While it was the mandate of government to manage these forests, the local community had free access to forest resources for domestic use. Following the 1995 Constitution, the Land Act 1998, the Uganda Forestry Policy of 2001 and the National Forestry and Tree Planting Act 2003, the mandate to manage forests on private land reverted to the land owners with support of the District Forest Services. The land use cover maps from the NFA Biomass unit indicate that by 2015 over 95% of these forests had been converted to other land uses.

4.4.2 Communal forests

These are forests that are owned by the local community on land owned communally in accordance with Uganda's 1998 Land Act which allows communities to form Communal Land Associations (CLAs) in order to own and manage land, including forests, as a community. Three communal forests including Ewafala in Kabango parish, Tengele in Nyantonzi parish and Motokai in Nyabyeya parish were identified. The study established that these forests are heavily degraded with Ewafala completely converted into growing of sugarcane and other crops.

4.4.3 Private forests

The only surviving private forest identified in the study area was Keith Bitamazire's forest. The forest is privately owned in accordance to provisions of the 2001 Uganda Forestry Policy and the 2003 National Forestry and Tree Planting Act. The forest is contiguous with Budongo Forest and forms part of the River Siiba catchment. Being one of the few remaining forests, the study established that forest is under pressure due to the high demand for forest resources by the neighboring local community in Nyantonzi village.

4.4.4 Institutional forests

These included forests owned by Bunyoro Kitara Kingdom and Kinyara Sugar Company. The study has revealed that Kabaseke forest located in Kapeeka Kabango Parish was owned by

Bunyoro Kitara Kingdom and supported community based livelihoods. At the time of the study Kabaseke forest could not be traced because it was completely converted into sugarcane plantation. Kinyara Sugar estate also had forests scattered all over the estate and these supported forest based community livelihoods of the surrounding community. The study discovered that these forests have been degraded due to over exploitation for fuelwood, charcoal and timber by the community. The Estates Manager of Kinyara Sugar Limited revealed that while Kinyara has capacity to protect the forests, this has not happened for fear of malicious fires on the sugarcane estate that might occur if people are blocked from accessing the forests.

4.4.5 Riparian forests

These are riverine forests along major rivers and streams in the study area. The study has learned that communal, private and institutional forests were riparian forests that are part of the water catchments of river system in the study area. There was no need for permission to access products; it was free access, free entry and at any time. The only exception was timber that involved getting permits from forest department staff. At the time of the study, these forests had completely been degraded with rivers such as Siiba and Nyamagita exposed to siltation arising from soil erosion.

4.4.6 Central forest reserves

These include Budongo, Rwensama and Nyabyeya Central Forest Reserves. These are protected areas where resource access is restricted. Twenty five years ago, these forests were relatively under very low pressure for extraction of resources because they were buffered by forests on private and communal land which were within reach of the community and with almost no restrictions. All household respondents revealed that they would access forest resources in less than 1kilometre from the homes and there was no need to walk long distances to the central forest reserves to access resources. By the time of the study key informants including the NFA staff, the Principal Nyabyeya Forestry College confirmed that central forest reserves were under high pressure for resources. Rwensama central forest reserve was ranked as the most degraded because of its close proximity to the local community.

4.5 Drivers of forest conversion

4.5.1 The main forest conversion types

Forest conversion in Masindi is related to the main livelihood sources. FAO (2013) indicated that in Masindi household livelihood income comprised of 23 percent forest; 60 percent agriculture; 14% livestock; and 3% off-farm employment. From the study, 95% of the respondents indicated that their livelihoods depend on agriculture while 5% on harvesting of forest resources for sale and for domestic use. Agriculture was pointed out as one of the major forest conversion types involving the growing of sugarcane, tobacco and food crops with 85% of the study respondents reporting sugarcane growing as the main reason for forest conversion, 10% said it was food crops while 5% reported tobacco as indicated in table 8.

Table 8: Forest conversion types in Masindi district

Conversion type	Sugarcane	Tobacco	Food crops
Number of respondents	63	4	8
%age respondents	85	5	10

Source: Field survey2017

While excessive harvesting of forest resources such as timber, charcoal, firewood, building materials was reported as a key forest conversion type, further discussions with household respondents and key informants indicated that this was a means of ground preparation and opening up of land to make it conducive for agriculture.

4.5.2 Key players in conversion of forests and their roles

The study found that there are several players in forest conversion comprising residents within and outside the study area playing different roles all of which contribute to forest conversion. The key players and their roles are summarized in the table 9.

Table 9: Key players in conversion of forests and their roles

Key players	Roles
Land owners	• Make decisions to sell, hire out forested land for agriculture. • Sell trees for timber, charcoal and poles.
Local Leaders/ Councils	• Authorize settlement of immigrants in the marginal forest areas. • Extort money for their personal gain from immigrants as a basis for allowing them to settle in the area. • Deliberately supported unlawful forest conversion practices to gain political support during elections. • Authorize illegal forest extraction activities in their areas of jurisdiction • Used their power to participate directly in illegal forest resource harvesting activities
Local Government forestry staff	• Abet forest crimes through extorting money from illegal forest resource harvesters and dealers. • Participate directly in illegal harvesting of forest resources • Focus more on revenue collection from forest resources than forest conservation
Kinyara Sugar limited	• Promotes sugarcane out-growers scheme on forested private land currently the Sugarcane out-growers scheme covers 25000 hectares; most of which was formerly forested. • Produces molasses a raw material for local brew which utilizes a lot of fuelwood from forests.
Charcoal producers and Timber cutters	• Timber cutters remove all big trees from the forest including the seed trees curtailing the ability of the forest to successfully regenerate itself. • Charcoal producers employ non-discriminative tree harvesting and low recovery methods for charcoal production for example traditional earth kilns whose recovery is only about 15%.
Sugarcane and Tobacco growers	• Push down forests to establish tobacco and sugar plantations • Tobacco growers too degrade forests through excessive removal of samplings and firewood for stitching and curing their tobacco respectively.
Men	• Most land owners are men who make key decisions related to forest conversion including sale of forest land, hiring of land to sugarcane out-growers and or directly participating in cutting down of forests for agriculture, timber and charcoal.

Source: Field survey 2017

4.5.3 The forest conversion process in Masindi

Forests in Masindi which have been converted into other land uses constituted what was formerly called public land before the 1995 constitution and land Act of 1998. These forests were managed by government under the Forest Department. Following the enactment of 2001

Forestry Policy and the National Forestry and Tree Planting Act of 2003, the management of these forests reverted to private land owners, communal land associations and the District Forest Services. The change in management affected forest resources because the new the duty bearers focused more on revenue from the forests and trees than conservation. At district level there was no plough back of revenue to finance sustainable forest management activities. This situation provided a conducive environment for the forest conversion process.

The conversion of forests was a gradual process involving the degradation phase and complete removal of the forest. The findings from key informants such as the district forestry and Environment officers indicate that the degradation phase involved selective removal of big and high value tree species such as *Milicia excelsa, Khaya anthotheca, Maesopsis, eminii, Cordia* species for timber using hand saws. This was followed by indiscriminate cutting of big trees including less value species due to increased demand for timber especially in Northern Uganda and Southern Sudan. Timber harvesting left the formerly closed forests with open canopies characterized by small trees, shrubs and trees with poor forms that could not be converted into timber. Charcoal production was then introduced to convert the branches left behind by timber harvesting, shrubs, small trees and trees with poor forms that could not be converted into timber. Charcoal burning opened up the forest areas for clean slashing and burning of the trash in preparation for planting crops such as tobacco and maize during the 1990s. Sugarcane growing was introduced in the early 2000s leading to complete removal of forests and trees in areas where it was being grown.

The study found that forest conversion for tobacco and sugarcane growing targeted prime arable land which would have otherwise been used for growing of food crops. This forced households to encroach on wetland and river banks for food production. Encroachment of wetlands and river banks is the last stage in the complete conversion of the once luxurious riparian forests on private land in Masindi. Table 10 shows forest conversion timeline.

Table 10: Forest conversion time line and events in Masindi district

Period (years)	Forest conversion events
1990-1995	i) Removal of prime tree species such as *Milicia excelsa*, *Khaya anthotheca*, *Maesopsis*, *eminii*, *Cordia* species for timber on public land. ii) Kinyara sugar factory refurbished and sugarcane growing started on the main Kinyara sugar estate.
1996-2000	*i)* Removal of secondary or lower value tree species such as *Antiaris toxicaria*, *Newtonia buchananii*, *Morus lactea*. ii) Conversion of some forest areas for tobacco growing. iii) Sugarcane out-growers scheme started and some forest areas were converted to sugarcane to growing.
2001-2005	i) The 2001 Uganda Forestry Policy put in place and creates a policy of ownership of private forests by land owners. ii) The 2003 National Forestry and Tree planting Act put in place and provides for ownership of forests on private land by land owners. iii) Indiscriminate cutting of trees for timber took place. iv) Charcoal burning from of all trees that could not converted into timber. v) Sugarcane growing intensified in degraded forest areas.
2006-2010	i) Timber cutting from remnant scattered tree using chainsaws. ii) Charcoal burning continued. iii) Expansion of sugarcane growing in the degraded private and riparian forests in Kabango, Nyabyeya and Nyantonzi parishes.
2011-2017	i) Conversion of forest patches to sugarcane growing continued ii) Scarcity of land for food crops set in iii) Increased incidences of prolonged drought in the study area iv) Invasion of river banks and wetlands for food growing

Source: Field survey

Information from the Chairperson of Masindi Sugarcane Out-growers indicates that the above was the general trend. Between 2006 and 2010 sugarcane growing was so lucrative that process above could not be followed instead forests were being pushed down by tractors to establish

sugarcane plantations, then charcoal producers followed later to convert trees pushed on the sides by tractors.

4.5.4 Main reasons for forest conversion

4.5.4.1 Changes in the forestry policy and legal framework

The 2001 Forestry Policy and 2003 Forestry and Tree Planting Act devolved the management of forest on private land to owners of private land owners and the District Forest Services which was charged with responsibility of providing technical oversight to private forest owners. According to the District Forest Officer Masindi, since the forest reforms, the District Forest Services were not facilitated with sufficient budget to employ enough staff to provide forest extension and monitoring services. This gave leeway to private forest owners to destroy forests on their land. Secondly, the National Forestry and Tree Planting Act was not explicit on the powers of forestry staff to deter any land owner who wished to convert forests to other land uses. Therefore the decision to maintain a forest as a form of land use or to change was entirely left in the hands of the land owner.

4.5.4.2 Lack of incentives to motivate private forest owners to conserve their forests

MWE (2016) indicated that total timber and non-timber livelihood value of private natural forests in Uganda was UGX 30,346 per hectare. This is low compared to other land use types and does not provide enough incentive to motivate private forest owners to conserve their forests. Besides, the members of local community still considered natural forests to be God given and subject to free resource access. Under this scenario, the forests were not profitable to land owners. Respondents testified that there was no incentive from government to motivate private forest owners to conserve them. In line with this, the study found that people preferred to convert their forest to maize growing, tobacco, sugarcane and eucalyptus woodlots that were perceived to bring in high returns compared to the natural forest.

4.5.4.3 The scramble for individual land ownership

The land tenure system of the vast area formerly under forest was considered to be customary and 80% of the household respondents reported having access to the forest without hindrances. Individuals could not claim ownership of the forests. In order to demonstrate ownership of the

land people resorted to converting forests to other land uses. In that way the converted forest area was also converted from communal to individual ownership. This left a few forest patches which were turned into Communal Land Associations such as Ongo and Motokai and managed as community forests. Respondents revealed that until recently, immigrants could not build permanent homesteads because they were not sure of the land ownership status.

4.5.4.4 The rehabilitation and expansion of Kinyara

During the political turmoil in the 1970s and 1980s Kinyara Sugar works collapsed. During that time people took advantage to settle on the estate land and other land that belonged to Indians in Budongo Sub-county. During the late 1990s and 2000s the Kinyara Sugar Estate and Sugar factory were rehabilitated. People who had settled in the estate lands were pushed out and this forced them to settle in areas that were forested and regarded as communal land.

4.5.4.5 Population increase

The study found that the key factors for population increase were importation of labor force for Kinyara and immigrations from northern Uganda, DRC and South Sudan as a result of civil unrest. Kinyara Sugar Company employs over 2000 people on permanent pay roll and 8000 people on short term contracts with 90% of them coming from northern Uganda and West Nile. When Kinyara sugar factory is in recess for purposes of maintenance, this labor force engages in agriculture in the surrounding areas instead of going back to their home districts. These end up invading forest areas for settlement and agriculture. The study also revealed that following privatization of Kinyara in 2005 the new managers abolished the policy of accommodating workers in camps at the estate. This prompted the workers who come from far districts to acquire land in forested areas for permanent settlement.

Besides the importation of labor, the study found that Masindi in general is a host of immigrants from Northern Uganda, Rwanda, Kenya, Democratic Republic of Congo and Southern Sudan as a result of civil wars that force people to flee their home areas in search for peace. These people found their way in forested areas causing degradation.

4.5.4.6 Promotion of commercial crops

Among the key crops pointed out as driver for forest land conversion are tobacco, sugarcane and maize. Tobacco was introduced in Masindi during the 1970s when then President Idi Amin promoted the double production campaign to boost agricultural production. During that time people from West Nile settled in Budongo Sub-county to grow tobacco. During the study, respondents in Nyantozi parish in Budongo sub-county revealed that part of Budongo forest reserve which is currently Busaju village was converted to tobacco growing. Since that time tobacco became a key factor in forest conversion because it requires fertile virgin land and utilizes a lot of wood for construction of stores and firewood for curing. The introduction of the sugarcane out-growers scheme further contributed to forest land conversion because the crop grows in an open field free of any trees.

4.5.4.7 Renting and sale of prime land to sugar cane out-growers

Discussions with the chairperson of the out-growers indicated that the acreage under sugarcane out-growers is about 25000 hectares and 90% of this is land that was formerly forested. The promotion of Sugarcane growing introduced an element of renting land from the vulnerable poor who cannot afford to invest in sugarcane growing. The study found that 1acre of land was rented at UGX 150,000/= per year for the 6years cycle of sugarcane growing. Through land rent arrangements, vulnerable poor households have been exposed to land grabbers who have deprived them of their land. Others decided to completely sell off their land rendering them landless. These landless people resorted to encroachment and degradation of the fragile wetland and riparian ecosystems for food production.

Related to sugarcane growing is the production and distillation of molasses to produce a local gin known as waragi. The process of distillation requires a lot of fire wood. Key informants and household interviews reported that several patches of forests have been depleted for collecting fuel wood to supply breweries scattered along rivers and wetlands in the study area and beyond.

4.5.4.8 Elimination of vermin

Forests are a habitat of wildlife including vermin such wild pigs and baboons and problem animals such as chimpanzees. All the respondents revealed that vermin and chimpanzees inhabiting the forests used to raid crops and were the main cause of famine in the study area. The need to eliminate vermin was therefore one of the main reasons for the conversion of forests to other land uses.

4.5.4.9 High demand for forest products

According to MWE (2016), 90% of Uganda's energy requirements are derived from fuelwood. The demand for fuelwood in the study areas was also influenced by the increase in human population as a result of immigration. During the study the Masindi District Environment Officer said that Masindi at one time was ranked as the highest producer of good quality timber and Charcoal. However, harvesting of these resources was not controlled, contributing to high levels of forest degradation.

4.5.4.10 Corruption by government officials

Discussion with local leaders revealed that the forest reforms were not effectively communicated to the citizens. This provided an opportunity to corrupt government officials (both political and technical) to manipulate the local community for their own selfish gains. In line with this information gap, corrupt government officials participated directly in timber and charcoal transactions on the pretext of working for government. Politicians abetted forest crimes as a means of soliciting for political support and votes from the citizens at the expense of sustainable forest conservation. High ranking politicians were reported to have fraudently acquired and converted prime forests in Nyabyeya Parish sparking off disagreements from the local community.

4.6.1 Extent of forest conversion

Respondents indicated that over 95% of the forests on private has been converted to other land uses mainly sugarcane plantations. The remaining 5% comprising a few wetlands and riverine vegetation are also being removed to create land for agriculture due to scarcity of land coupled with prolonged dry seasons. The once blossoming natural forests are represented with a few remnant trees widely scattered in some areas which are not occupied by sugarcane. The GIS data

for the period 1990 to 2015 indicate decreasing woodland and forest cover and increasing commercial agriculture. The data show that forest cover outside protected areas decreased from 183.53 hectares to 95.01 hectares in 2015; woodland vegetation decreased from 704.33 hectares in 1990 to 179.64 hectares 2015; grassland vegetation decreased from 1180.91 hectares to 97.59 hectares while the area under commercial farming increased from 0 hectares in 1990 to 2161.38 hectares 2015 as shown in Figure 7 and Annex 2. The overall decrease in acreage of forests, woodland and grassland can be attributed to the increase in the acreage of commercial farming. The changes in land use cover are illustrated by the land cover maps of 1990, 2000, 2005, 2010 and 2015 in Figures 8, 9, 10 11 and 12 respectively. The land use cover map of 2015 shows that all the riparian forests have been destroyed living streams and rivers exposed to high evaporation rates, pollution from soil erosion and siltation.

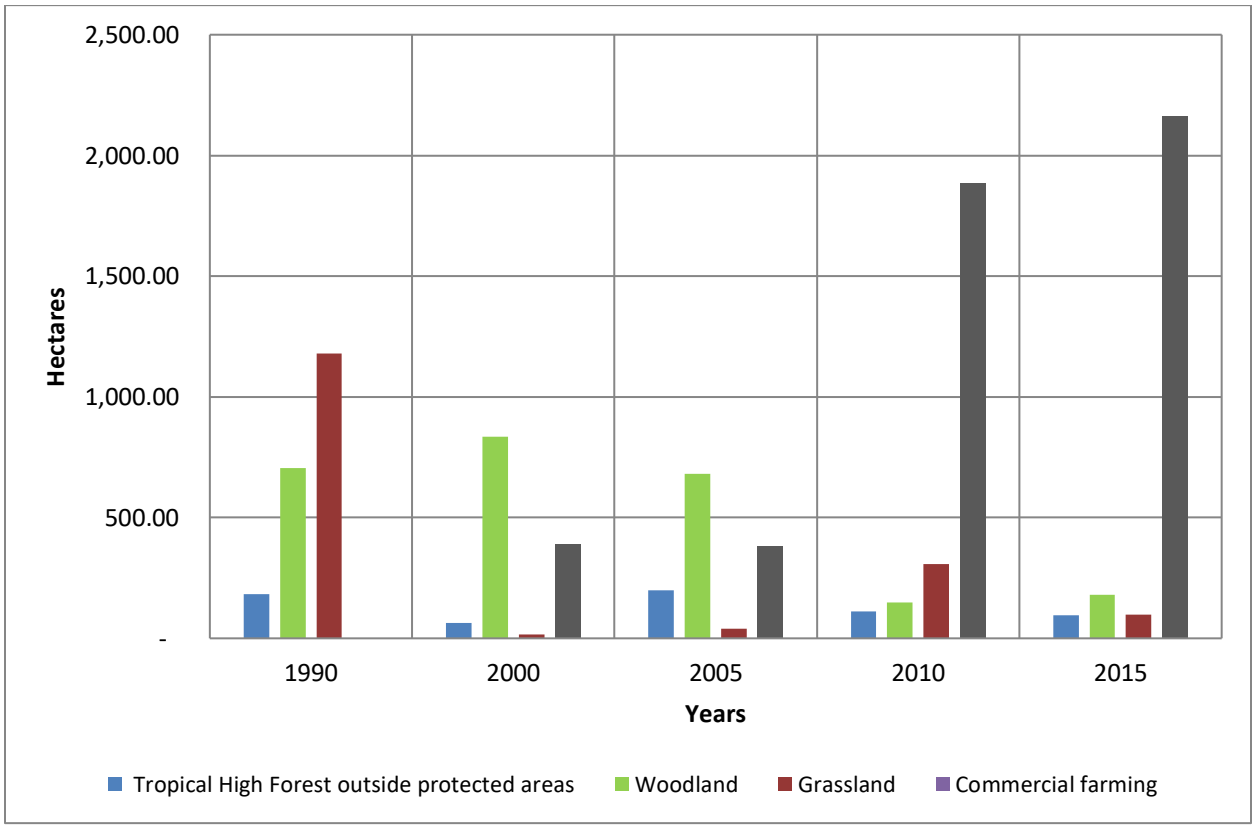


Figure 7: Land use and change in Kabango, Nyabyeya and Nyantonzi parishes Budongo Sub-county, Masindi district 1990-2015. ***Source: Field survey***

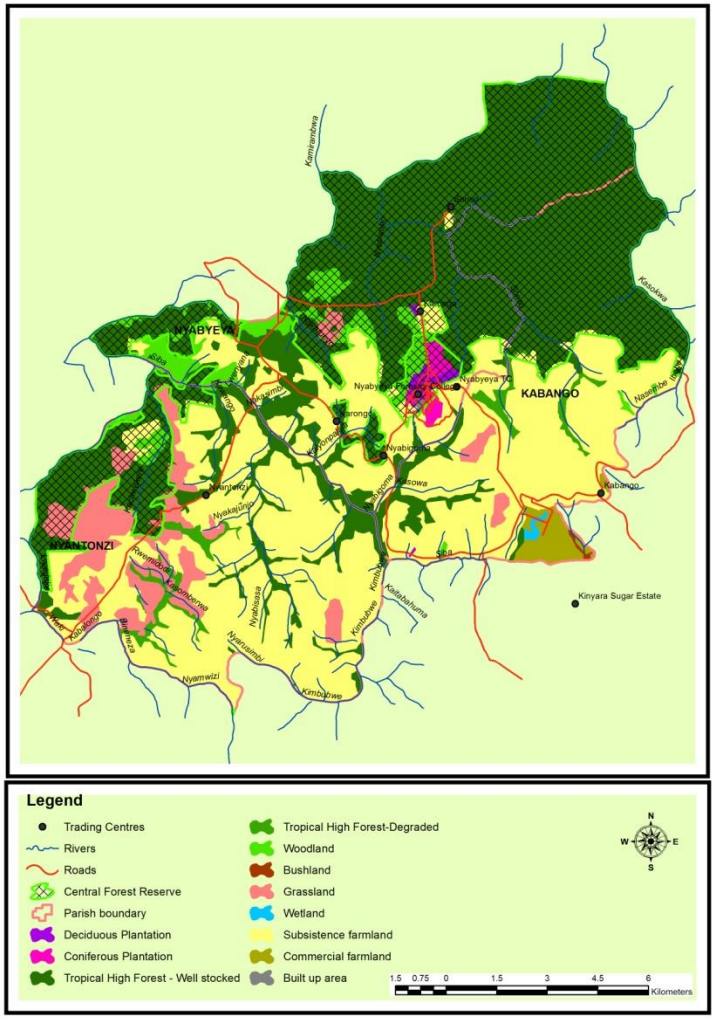


Figure 8: Land use Cover Maps for Kabango, Nyabyeya and Nyantonzi parishes in 1990:
Source: NFA Biomass Unit

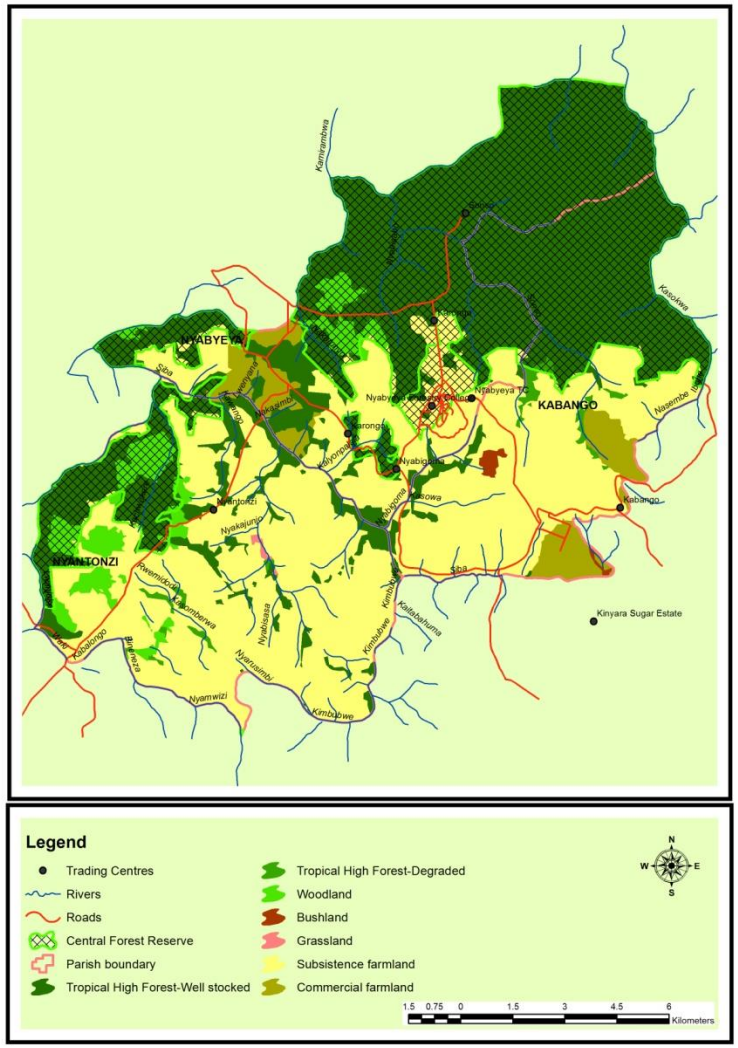


Figure 9: Land use Cover Maps for Kabango, Nyabyeya and Nyantonzi parishes in 2000.
Source: NFA Biomass Unit

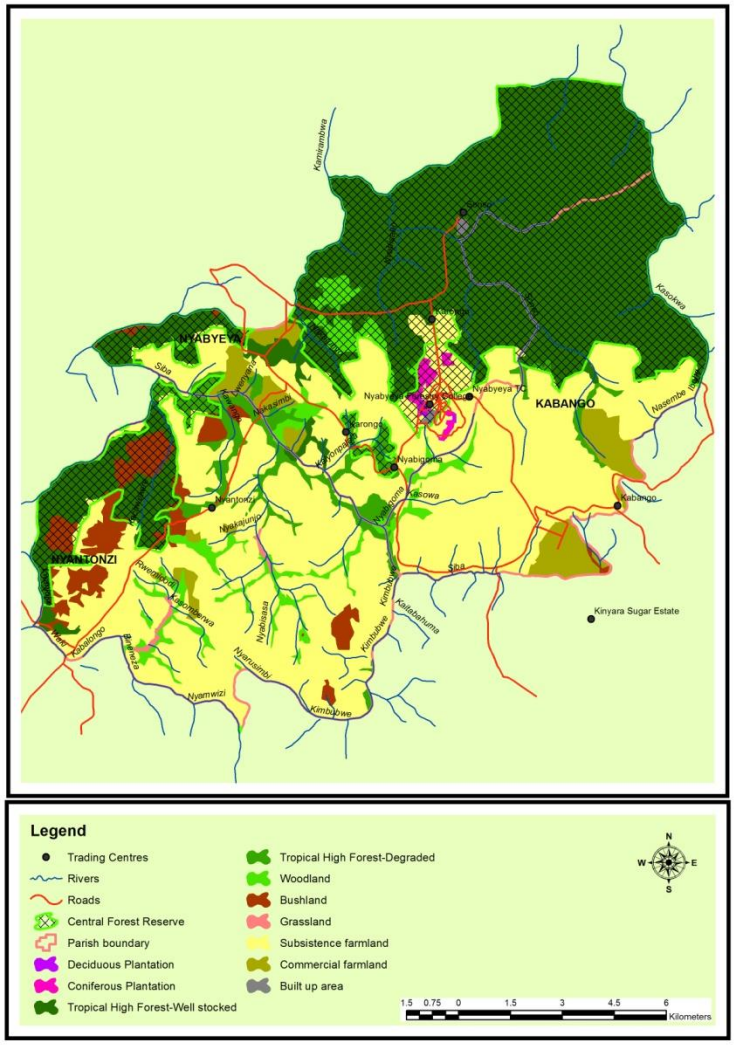


Figure 10: Land use Cover Maps for Kabango, Nyabyeya and Nyantonzi parishes in 2005. ***Source: NFA Biomass Unit***

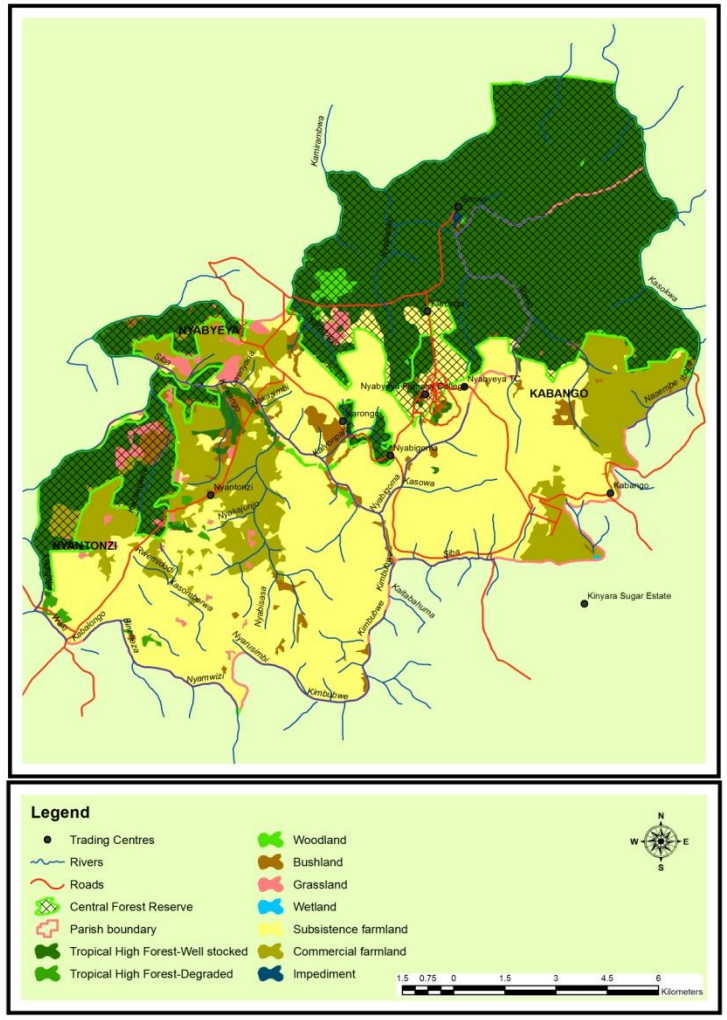
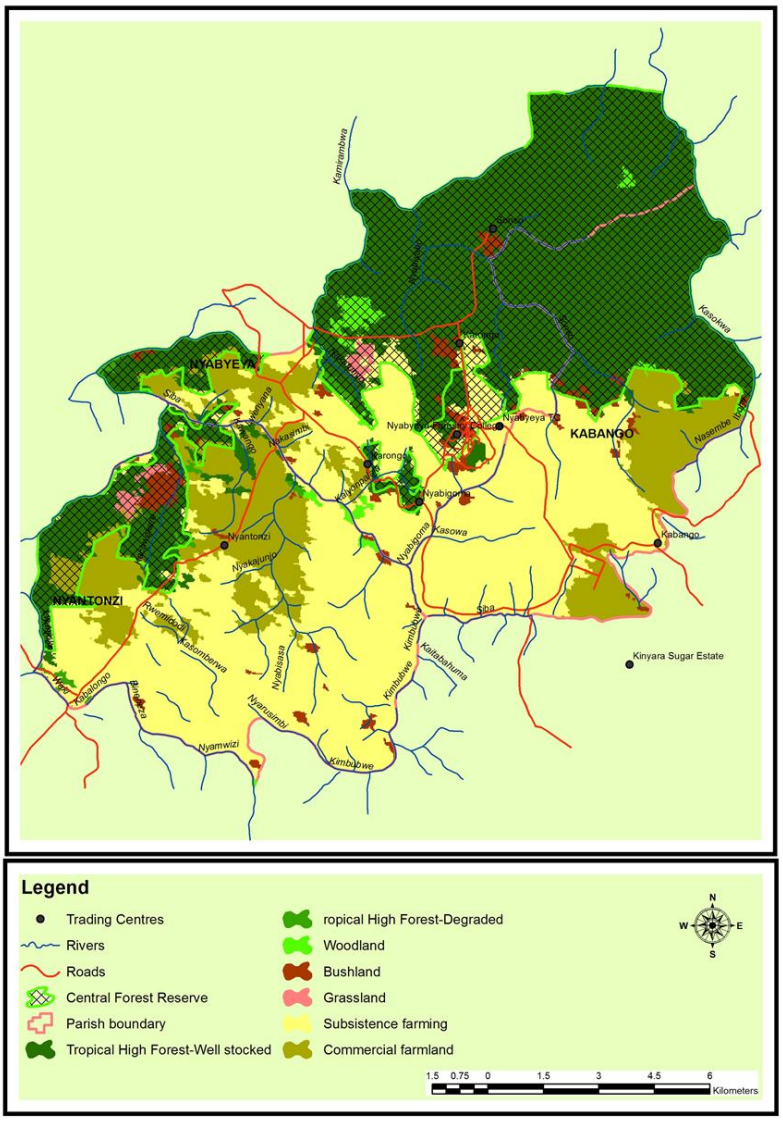


Figure 11: Land use Cover Maps for Kabango, Nyabyeya and Nyantonzi parishes in 2010. ***Source: NFA Biomass Unit***



4.7. Losses from forest conversion.

4.7.1 Scarcity of fire wood

All respondents and key informants acknowledged the prevailing scarcity of fire wood following the conversion of the forests to other land uses. Respondents revealed that residents especially women and girls from the study area walk between 5-10 km in search of firewood. Table 11 shows estimated distances which residents trek as they look for firewood. The women spend more productive time looking for firewood instead of investing their time in developmental activities.

Figure 12: Land use Cover Maps for Kabango, Nyabyeya and Nyantonzi parishes in 2015. ***Source: NFA Biomass Unit***

Table 11: Estimated Distances people move to look for firewood in the study area

Parish	Villages	Nearest Distances for firewood in 1997	Nearest distances to access firewood in 2017	Nearest Forest
Kabango	Kapeeka	≤ 1km	≥ 5km	Budongo
	Ewafala	≤ 1km	≥ 5km	Budongo
Nyabyeya	Kadukulu/ Nyabyeya	≤ 1km	≥ 8km	Budongo
	Nyabigoma	≤ 1km	≥4km	Rwensama
Nyantonzi	Karakaveni	≤ 1km	≥ 10km	Budongo-Busaju block
	Nyantonzi	≤ 1km	≥ 5 km	Budongo (Busaju block)

Source: Field survey 2017

The study findings indicated that on average, households in the study area move 6km in search of firewood compared to less than 1 km in the early 1990s. Women respondents mentioned that they are using trash from sugarcane and other crop remains for cooking. Women in Nyabigoma village also reported the emerging conflicts and harmful threats between women as they struggle for firewood in Rwensama central forest reserve. Respondents indicated that there was no more dry firewood in Rwensama Forest Reserve and the women had resorted to cutting live trees for firewood which they either carry home in its green state or live it in the forest for some time to dry. According to Section 33 sub-section 1 of the National Forestry and Tree planting Act 2003, this practice is illegal. During the group discussions, the women further reported that they were getting eye and chest infections due to smoke resulting from the use of green wood for cooking. The women expressed fears of arrest by forestry staff and possible rape by men who might waylay them as they search for firewood from far off forests. ‘‘The scarcity for fuel wood is real! I now buy and take a sack of charcoal to the village from Masindi town which used to be the reverse in the 10 years ago’’ said Mr. William Nsimiire, the District Environment Officer for Masindi.

4.7.1.1 Change of cooking and feeding habits

Study has revealed that on average, 74% of the respondents depend on one meal per day (supper) due to scarcity of fuelwood. The study findings indicate that Kadukulu/Nyabyeya and Ewafala are the most affected villages with 86% and 80% of the households depending one meal respectively as shown in table 12. Fuelwood scarcity affects women’s cooking habits; women do

not boil enough water for drinking, they cook food with low nutritional value that require less cooking time (Waris et al; 2014). According to respondents from the two villages, people especially women have to move over 8 to10 km in search of fuelwood. As a result of scarcity of fuelwood, household respondents indicated that they depend on sugarcane for lunch. According to the chairperson of the Masindi Sugarcane Out-growers Association, sugarcane farmers especially those near the main roads incur losses of sugarcane due to people who depend on it for lunch. Human beings have replaced vermin (wild animals) which were a major problem in the past. Human beings are difficult to control because imposing stringent measures against eating of sugarcane may result into revenge through malicious fires. Fires were reported to be destroying 2000 hectares of sugarcane per year in Kinyara.

Table 12: Percentage of households that depend on one meal per day in the study area

Village	**Kapeeka**	**Ewafala**	**Kadukulu/ Nyabyeya**	**Nyabigoma**	**Karakaveni**	**Nyantozi**
Number of Households	11	10	14	13	13	14
No of Households respondents depending on one meal per day	6	8	12	10	12	10
%age households depending one meal	55	80	86	77	77	71

Source: Field surveys 2017

4.7.1.2 Exposure of women and girls to Sexual Gender Based Violence related to scarcity of fuelwood

The findings indicated women and girls were exposed to sexual gender based violence during the collection fuel wood as well as at household level. Study findings indicated that the scarcity of fuel wood and long distances and hours involved in the searching fuel wood exposed women and girls to sexual assaults including rape. A related study by Bizzarri *et al* (2009) indicated that, sexual assaults and raping of women and girls during firewood collection were a common occurrence in Nakivale refugee camp and Karamoja because of the long distances women trekked to reach firewood collection areas without any protection.

During the focus group discussion, women reported cases of gender based violence at household level and marriage breakages resulting from allegations that women were getting involved in adulterous behavior during firewood collection. Another dimension of gender based violence was related to the inability of women to fulfill their sexual obligations due to exhaustion after trekking long distances and hours in search of fuel wood in addition to other household chores. The women reported that this explanation is interpreted by men as infidelity by women during the collection of fuel wood and usually resulted in fights between husbands and wives. A total of 28 cases of known sexual gender based violence in homes related to scarcity of fuel wood were reported in the study area covering a timeframe of 3 months amounting to an average of about 9 cases per month. The distribution of reported cases of sexual and gender based violence cases in each village is shown in table 13.

Table 13: Reported cases of sexual and gender based violence in the study area

Village	**Kapeeka**	**Ewafala**	**Nyabigoma**	**Karakaveni**	**Nyantonzi**	**Nyabyeya**
Reported SGBV cases	3	4	6	7	3	5

Source: Field survey 2017

According to Bizarri *et al;* (2010), fire wood scarcity creates tensions at the household level and the related gender based violence cases are real but rarely reported for fear of reprisal, being stigmatized and/or abandoned by their families and communities and lack of trust in the legal system and a feeling that their complaints will not be sufficiently addressed.

Furthermore, 50% of the respondents reported increased unrest in homes resulting from gossiping which the women engage in during collection of firewood. This is because the scarcity of resources created platforms for women to gossip as they walk for long distances in search for fuelwood and water. According to the male respondents, the women ill-advise each other on matters related to their homes which cause misunderstandings between husbands and wife resulting into domestic violence and break down of marriages.

4.7.1.3 Fuelwood scarcity and its effects on education

Discussions with staff of primary schools in the study area indicated that scarcity of fuelwood was impacting on the education of children. Masindi district state of environment report of 2005 estimated that about 10-15 thousand children were engaged in child labour among which 2

children per tobacco growing family between the age brackets of 5-17 provided labour in tobacco growing. This contributed greatly to school dropouts and absenteeism. The findings of the study however indicted that absenteeism of children from schools was now attributed to scarcity of firewood. At Nyabyeya Primary school, the Headmaster and his deputy reported 10% absenteeism of school girls in a term attributed to scarcity of fuelwood at household level. The girls search for fuelwood during school days or are kept at home to look after the young ones as their mothers walk long distances in the search for firewood. The study found that another 10% of the girls who report to Nyabyeya Primary school on a given day only attend the morning sessions and when they go for lunch they proceed to search for firewood and miss the afternoon sessions. These findings are in line with Waris *et al,* (2014) who found that an increase in the fuelwood collection time may force girls to drop out of schools to assist their mothers in households and other chores, thus hindering their education. This trend comes at a time after the International Labour Organization in 2010 set 2016 as the year for the elimination of all worst forms of child labor (ILO, 2010).

4.7.1.4 Increased vulnerability of girls to defilement and teenage pregnancies

Related to the scarcity of fuelwood and absenteeism of the girl child from school, the staff also reported cases of defilement and child pregnancies. The practice of fire wood collection exposes boys and girls to early sexual relations as they move alone in search for firewood without protection from the parents. The exposure of young girls to sexual assaults and rape during fire wood collection amounts to defilement as well (UNICEF (2015), Bizzarri *et al;* (2009).These practices further expose girls to child pregnancies and early marriages. The headmaster of Nyabyeya Primary School reported that in 2015 three girls from the school were married off through relationships that were initiated during the long hours girls spent in the far off bushes looking for firewood. In 2016, another two girls were reported to have been defiled and impregnated because of such exposures. The impacts of fire wood scarcity has not spared the boy child. According to the deputy head teacher of Nyabyeya primary school, the boys have also taken up habits such as early sex with their fellow young girls, drinking of alcohol and smoking of marijuana. The boys are employed to collect fuelwood by some people. The money paid for their labor is used to buy alcohol, marijuana and to lure girls into sex.

4.7.1.5 Increase in costs of procuring firewood in schools

The provision of cooked meals is not only a strong incentive to send children to school, but also enhances their learning (WFP, 2009). Study findings showed that before forest conversion, pupils in the study area used to participate in preparation of their meals by collecting and bringing fire wood for cooking at their schools. According to the Head teacher of Nyabyeya primary school, each pupil would bring one piece of fire wood from home every month. With the scarcity of firewood, the head- teacher reported that parents are not willing to support the school with firewood. The school at the time of the study was spending UGX 200,000 per term on fuelwood that used to be free.

4.7.2 Scarcity of timber

Timber records obtained from the Masindi District Forestry Office indicated that by 1995, Masindi district used to license a total of 30 pit-sawyers annually. In 2017, the number of licenses issued by the district had reduced to zero because there were no trees for converting into timber as a result of forest destruction. The scarcity of timber has consequently affected people who used to dependent on timber businesses. The Masindi Pit-sawyers and Wood Users Association has since collapsed because they do not have the raw material to convert into timber. Masindi district whose biggest revenue source was timber in the 1990s amounting to UGX 32million in 2004/5 financial year has since lost out on revenue collections from timber as illustrated by decreasing revenue trends in Figure 4 in section 4.3.3.1.

4.7.3 Increased pressure on forest reserves

From study findings, forest conversion on private land has resulted in increased pressure on central forest reserves. Key informant interviews with the National forestry indicated that Budongo forest reserve is under pressure from the community for forest resources including timber, poles, charcoal. This was attributed to conversion of forests on private land that used to buffer the forest from resource extraction pressures from the community. The principal Nyabyeya Forestry College also reported that Rwensama Central Forestry Reserve which is a research forest for the college also has been degraded by illegal timber cutters, charcoal burners. The college Eucalyptus plantation is also under pressure for fuelwood by the neighboring community who do not seek permission from the college authorities. According to the Masindi

District forest Officer, 90% of the timber in the stores in Masindi is illegally obtained from Budongo and Rwensama Central Forest Reserves.

4.7.4 Reduction of water quality and volumes in rivers, streams and wells.

The study indicated that conversion of the water catchment forests has resulted into soil erosion and siltation, reduction of water quality and volumes in rivers and open wells. Discussions with Nyabyeya Forestry College Estates Manager indicated that as a result of converting the catchment forest, Nyamagita River which is the water supply source to the college is affected by soil erosion from the surrounding agricultural lands, causing siltation and production of dirty water. During the dry season, the college experiences shortage of water due to reduced water levels in the river. Plate 2 shows a cross-section of Nyabyeya Forestry College water pump on River Nyamagita.

Plate 2: A cross-section of Nyabyeya Forestry College water supply. ***Source: Field survey 2017***

Forests play a key role in the local water cycle by keeping a balance between water on land and water in the atmosphere (FAO 2013). Deforestation in the long run results in the lowering of water tables and drying of springs, rivers and bore holes that provide water to the local community. The study found that in areas where deforestation had occurred, water collection points or unprotected wells, protected springs and boreholes had dried. At the time of the study

four open wells namely: Masikini, Tokala, Bonkere and another well near Nyabyeya Forestry College Guest house all located in Nyabyeya village had dried up while in Kapeeka three wells and one bore hole shown in plate 3 had dried up.

Plate 3: A dry borehole at Kapeeka Village. ***Source: Field survey 2017***

This consequently increased the distances which the local communities have to move to look for water. The Headmaster of Nyabyeya Primary school reported that the school children have to move a distance of 3kilometres to look for clean water as a result of drying up of Bonkere well which used to serve the school with water. Although the school has installed two tanks water tanks with a total capacity of 10000litres, this water is not enough to supply the school especially during prolonged dry season. The study found that the drying up of water sources created more hardships to women and girls in addition to those of fuelwood scarcity. This is because collection of fire wood and fetching of water is the role of women.

4.7.5 Food insecurity at household level

All respondents reported that agriculture in the study area is rain fed which normally is distributed in two seasons March to Mid-June and August to December with an average rainfall of 1000mm per annum (Masindi District Environment Policy 2009) However, all household respondents reported frequent occurrences of prolonged dry seasons and highly unpredictable rainfall patterns which they attributed to forest conversion. Forests regulate local and global weather through absorption and creation of rainfall and their exchange of atmospheric gases (Butler 2012). Respondents also said although the rainfall was highly unpredictable, the local community was still stuck to their traditional seasons. This has affected food production planning at community level and consequently contributed to food insecurity. This situation was reported to be compounded by limited land for food production as a result of sugarcane growing, scarcity of fuelwood and water for cooking. Respondents also attributed food insecurity to increased incidences of pests such as the army worms which are destructive to crops. Food insecurity in the study area is manifested in the form of 77% of the households depending on one meal per day and eating sugarcane for lunch. The respondents also reported that their children delay to come back home after school because they spent a lot of time eating sugarcane along the way. Forests act as safety nets in the form forest foods, such as leaves, seeds, nuts, honey, fruits, mushrooms, insects and other forest animals during times of hardships (FAO 2013). This role has been lost through forest conversion.

4.7.6 Loss of cultural values associated to forests

Plate 4: A stump of a big tree after forest conversion. ***Source: Field survey 2017***

The study found that there are several aspects of the indigenous culture of the Banyoro that are associated with the existence of the forest which have been eroded due to forest conversion. In the Kinyoro culture and indeed other cultures, it was common for families to gather every evening around a fire place before going to sleep. These gatherings were used by parents as platforms to transfer cultural norms and practices to their children through parables and songs. These occasions enhanced bonds among family members. The study found that due to scarcity of fuelwood, it is longer possible to make camp fires and it is likely to affect the transfer of cultural norms and practices from one generation to another.

Big trees and other forest areas were considered as sacred places of worship among the Banyoro. In two of the villages (Karakaveni and Kapeeka), there were sites with big Mvule trees where

sacrifices would be made to appease the gods following a long dry season to make rain. These trees have long been cut down by immigrants who do not understand the value of such trees to the indigenous Kinyoro culture. Plate 4 illustrates a stump of one of the big trees that used to be a cultural site. Cultural beliefs that were being used to conserve forests and trees have been lost due to scarcity of resources. For example among the indigenous Banyoro in the study area, *Erythrina Abyssinica* dry wood is not supposed to be used for cooking because it represent sons' in-laws in a home. With the scarcity of firewood, the study found that this tree species has been cut down. Although the Wildlife Act discourages hunting, culturally families especially the poor used to access animal protein from wild game through hunting. With the conversion of the forest there are no more animals to hunt, depriving the poor households of their source of proteins.

4.7.7 Increased incidences of fires and loss of property

Natural high forests are more resistant to fires than grass dominated vegetation types. Prior to the conversion of natural forests to sugarcane plantations; incidences of fire and the related loss of property and lives were rare in the study area. All the household respondents (100%) acknowledged increased incidence of fire, loss of sugarcane investments and property that take place every year. In 2011, 3,000 hectares of sugar cane were burnt to fires according to reports by the (Uganda Radio Network (URN). The Daily Monitor of 14th February 2014 and January 22 2018 reported 620 hectares and 270 hectares sugarcane that were burnt respectively. Respondents reported that February 2017 one school boy child from Nyabigoma village was burnt to death as he tried to escape a wild fire using a foot path through sugar plantations. They also reported that in 2013 ten homes in Nyabigoma village were burnt down when a fire attacked sugarcane plantations of outgrowers in the area. The loss of a child and 10homes to fires was further confirmed by the Chairperson LC1 of Nyabigoma village. Related to fires, 50% of the respondents said that there are dangerous reptiles especially poisonous snakes which find their way into people's homes as they escape fierce fires in sugarcane plantations.

4.7.8 Increase in Resource use and wildlife conflicts

Fifty three percent (53%) of the respondents comprising of household heads who have stayed in the study area for over 20years, said the forests were owned and used communally before their conversion. The conversion of forests to other land uses resulted into individual ownership of the

land and the remaining adjacent forest patches. Land conflicts have increased as people try claim to ownership of the once public/communal forests. The study found out that Ewafala forest that was managed and used communally under communal land association (CLA) was divided up among individuals and converted into sugarcane plantations. The former chairperson of the CLA reported that there were a lot of land conflicts between CLA members over the ownership of the land. For those areas whose communal ownership status such as Ongo and Tengele has been maintained, there are wildlife conflicts between the CLAs and the neighboring households. The forests are habitats for vermin (monkeys, baboons) and problem animals such as chimpanzees which cause crop destruction through raiding. Wild animals such as Red tail, white and black colobus monkeys which were hitherto non-destructive to crops were reported to raid crops of forests adjacent households adjacent. This was attributed to scarcity of food for the animals in the remaining forests.

4.8 Benefits accruing from converting forests

4.8.1 Reduction in vermin and crop raiding incidences

All respondents acknowledged that vermin such as baboons, monkeys and wild pigs reduced drastically as a result of cutting down the forest which was their habitat. This resulted in increased crop yields other factors constant. The time that people used to spend guarding their crops against crop raiding is used for other economic activities. The study found that 70% of the women in the study area used to spend full days guarding the crops against vermin. These women are able to participate in other economic activities such as going to the market on designated days to sell some of their farm produce. The reduction of vermin also provided an opportunity to children who were being kept at home to guard gardens to go to school. However, some of the time that was used to guard crops is used in fuelwood which has become scarce because of forest conversion.

4.8.2 Increased land for agricultural investment and settlement

The conversion of forest availed extensive land for agricultural production for crops such as sugarcane, tobacco and maize. At the time the study the records from the Sugarcane Out-growers Association showed that the sugarcane acreage stood at 25000 hectares 80% of which was

formerly forest and woodlands. In addition, the conversion of forest availed land for settlement. The study area is occupied by immigrants who occupy areas that were formerly forests.

4.8.3 Increased household income

While the study was not able to ascertain the annual average income per household, respondents said that there has been increase in household income as result of agricultural investments especially sugarcane growing in areas that were formerly forests. Some of the indicators for improved household incomes included increase in number of iron roofed permanent houses, the number of motorcycles bought per village and the number of children per village studying in good schools in Masindi town as shown in Table 14.

Table 14: Indicators of improved household incomes at household level in the study area.

Village	**Kapeeka**	**Ewafala**	**Nyabigoma**	**Karakaveni**	**Nyantonzi**	**Kadukulu/ Nyabyeya**
Number of Permanent Houses	12	15	25	18	14	30
Number of Motorcycles	7	8	7	5	4	10
Children in good secondary schools	4	6	5	3	3	7

Source: Local council1 Chairpersons of villages 2017

The study found that the baseline for all the above indicators were at zero around 1990 when the area was still forested. Plate 5 shows the newly built homes in Kadukulu/Nyabyeya village

Plate 5: Permanent houses in Kadukulu Village Nyabyeya Parish. ***Source: Field survey 2017***

4.8.4 Employment opportunities for people

The conversion of forests created more employment opportunities for the youth in form of casual jobs in sugarcane estates. According to the information from the Estates Manager, Kinyara sugarcane limited employees a total of 10,000 people out of which 8000 people are employed as casual workers while 2000 people are employed on a permanent basis. This far exceeds employment levels of about 40 people which the forest was use to employ directly per year through licensed timber harvesting. The conversion of forests has further led to scarcity of forestry resources and boosted the demand for the scarce resources; thus improving the economic value of the few available forestry resources. For example forest resources such as fuelwood and fencing posts that were not commercial are now on high demand; providing employment to those who own trees or are able to get permits from the National Forestry Authority to trade in such forestry products.

4.8.5 Development of trading centres and markets

The development of commercial agricultural investments and the resultant improved incomes has contributed to the development of trading centres, markets and businesses. Each of the villages sampled during the study was found to have a trading centre with shops stocked with essential household items. The three key markets identified included Kinyara market that operates once a month on the day the company pays its workers, Karongo market that operates every Monday and Thursday, Pumuzika Market that operates on Wednesday and Saturday every week. These trading and market centres have provided opportunities for people especially

women and youth to invest in retail and whole sale businesses. The women are involved in the sale of food items, management of restaurants and bars.

4.8.6 Improved infrastructure

All study respondents acknowledged improvements in infrastructure such as roads, schools and health centres. This was associated to sugarcane growing which was identified as a major driver of forest conversion in the study area. Kinyara Sugar Company Limited invested in the construction and maintenance of rural roads in order to ensure easy access to sugarcane produced by out-growers farmers. The study area has three secondary schools and 10 primary schools compared to one secondary and three primary schools in 1990. Kinyara Sugar Limited has a Health Centre 1V well stocked with drugs and accessible to both the workers and general public. This health centre was not operational in 1990.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter provides a summary of the results of the study discussed in detail in the previous chapter. The summary presentation is done in line with objectives of the study and recommendations are made thereon. The recommendations are aimed at giving possible measures that could assist reduce forest conversion and the resultant impacts on community livelihoods.

5.2 Summary of findings

The major findings on the impact of forest conversion on community livelihood patterns are summarized under subheadings and in line with the objectives of the study.

5.2.1 Social-cultural, economic and ecological contributions of forests to community livelihoods

5.2.1.1 Social cultural contributions of forests to community livelihoods

The study showed that prior to their extensive conversion, forests contributed significantly to the socio-cultural and economic livelihoods of the community. This contribution reflected the basic necessities of life including food, water, shelter, and health. Specifically the forests were a source of energy in form of fuelwood; water from springs, wells and rainfall; building materials in form of poles and fibres; food in form of fruits, mushrooms, yams and wild game; craft materials and community health insurance in form of herbal medicine. Forest resources also played a key role in enhancing the culture of the community through providing sites for worship. Firewood availability supported cultural aspects of the community including provision of heat to families in the evening during which parents would pass on cultural knowledge to the young generation.

5.2.1.2 Economic contribution of forests to community livelihoods

Economically, forests provided employment, records from Masindi District Services indicate that, licensed timber harvesting alone used to provide annual employment to about 40 local people as pitsawyers, 30 businessmen and 100 casual workers involved in timber carrying from the pitsawing sites to the loading site. The study indicates that Masindi district forest services

benefitted from timber and charcoal revenue amounting to over UGX 100million in 2004/5 financial year alone.

5.2.1.3 Eecological roles of forests in support of community livelihoods

The key eco-system service roles identified by the study included control of wind speed as natural wind breaks; contribution to the rainfall regime of the study area through the hydrological cycle, control of soil erosion and silting of the water bodies; modification of the study area microclimate and control of wild fires.

5.2.3 The key drivers of forest land conversion to other land uses

The major drivers of forestland conversion established by the study include the new reforms in the forestry policy and legal framework which did not provide for adequate control measures to guard against forest conversion especially on private land giving leeway to the massive conversion of forests on private land. The National Forestry and Tree Planting Act does not provide punitive measures on individuals who convert forests on private land to other land uses. The study has learnt that for a long time the local community experienced agricultural losses due to vermin that was harbored by the extensive forests which forced land owners to convert forests on their land. The lack of incentives to motivate private forest owners to conserve their forests prompted private forest owners to convert their forests to commercial farming which was considered to be more profitable than forests. Relatedly, the study has established that the rehabilitation and expansion of Kinyara Sugar Estate in the 1990s was a key factor that promoted forest conversion to sugarcane plantations. The increase in population arising from the influx of immigrants and job seekers in Kinyara Sugar estate contributed to forest conversion to provide land for settlement and Agriculture. Additionally, the increase in population created increased demand for demand for forestry products which further degraded the remaining forests. The study also identified corruption by government officials as a key driver to forest conversion. Government officials including Local Council leaders and forestry staff were involved in transactions for selling of forest land to immigrants, participating in and abetting illegal and excessive harvesting of forests products such as timber and charcoal.

5.2.4 Losses resulting from forest conversion

The study established that forest conversion has resulted in negative impacts that have affected community livelihoods especially the poor households that cannot afford other alternative livelihoods.

5.2.4.1 Negative impacts associated with scarcity of firewood

The survey established that the study area is faced with scarcity of fire wood which has had several impacts on community livelihoods. The distance for accessing firewood increased from just a few metres from the household to an average 5-10kms in search for firewood. This has consequently resulted into change of cooking and feeding habits at household level where 77% of the household respondent reported having one meal per day to save on scarce firewood. The study discovered that women and girls were spending a lot of productive time searching for firewood. In addition the scarcity of firewood exposed women and girls to the risk of Sexual Gender Based Violence such as rape while searching for firewood in distant places. The study established increased vulnerability of girls to defilement and teenage pregnancies. Scarcity of firewood was reported to have been responsible for 10% of absenteeism in primary schools in the study area involving mostly girls who culturally have the duty to collect firewood. Additionally, Nyabyeya primary school reported increased costs of procuring firewood for preparing meals for pupils that stood at UGX 200,000 per month at the time of the study. Prior to forest conversion, pupils used to bring firewood to school free of any cost to the school.

5.2.4.2 Scarcity of building materials

Forest conversion resulted into scarcity of building material such as poles, grass thatch and timber. These products used to be obtained cheaply or even free of any cost thus supporting livelihoods of the poor community member. This trend changed once the forests were destroyed. Findings of the study indicate that timber is scarce and cannot be afforded by the poor in the study area.

5.2.4.3 Loss of social-cultural values associated to forestry and emergence of resources use conflicts

The existence of a forest had a bearing on the social-cultural context of the adjacent local community which was lost after forest conversion. The key values lost included the traditional

worship and offering of rituals to sacred trees in the forest, conducting hunting expeditions, holding prolonged funeral and wedding ceremonies and evening household camp fires which required a lot of firewood. From the study all these cultural values have been lost due to scarcity of forest resources that used to support them. Socially and culturally, local community members used to live in harmony due to the abundance of forest resources. Following the conversion of forests, household respondents reported increase in competition and forest resources related conflicts at community level.

5.2.4.3 Perpetual annual fires and loss of property

Household respondents reported property losses in annual wild fires which spread over wide areas without any natural barrier. According to the respondents forests used to act as natural barrier for fires and winds.

5.2.4 Community livelihood gains and positive impacts from forest conversion

From the findings of the study it is clear that forest conversion resulted to significant gains with positive impacts on community livelihoods. These included reduction in vermin and crop raiding incidences with resultant increases in crop yields. Forest conversion opened up more land for agricultural investments as demonstrated by the land use cover maps between 1990 to 2015 that woodlands, natural forests and grasslands were turned to land for Agriculture with Sugarcane taking over 2500 hectares 80% of which was formerly forest. Commercial agriculture created employment opportunities for the people and at the time of the study Kinyara was employing a total of 10,000 people on permanent and causal basis. These factors contributed to improvements in household incomes and purchase power demonstrated by the development of trading centres and markets in the study area that were formerly non-existent. Other indicators identified for improved household incomes included the existence of an average of 19 permanent homesteads constructed per village, the increase in the number of children studying in schools with better standards which stood at an average of 7 per village and the existence of an average of 7 motorcycles in the sampled villages in study area. All these were achieved after conversion of forests to other land uses. The local community has also gained from improvement in infrastructure especially roads, schools and health centres. Kinyara Sugar Limited has been able to open up roads leading to the formerly remotest villages thus enabling the community to easily

transport their produce to the market. The study identified three secondary schools and 10 primary schools compared to one secondary and three primary schools in 1990. Kinyara Sugar Limited established a Health Centre 1V well stocked with drugs and accessible to both the workers and general public. This health centre was not operational in 1990.

5.3 Conclusion

The study established that forest conversion positively and negatively imparts on community livelihoods. Positively forest conversion has contributed to commercial agriculture investments resulting into provision of implement and improvements of incomes at household level, infrastructural developments including roads and schools in the study area.

Despite the positive developments, forest conversion has contributed to enormous negative impacts which are jeopardizing positive developments. Many vulnerable poor households are more susceptible to food insecurity to due to inadequate fuelwood for cooking, land for food production is limited as a result of investments in commercial sugarcane growing; the food safety nets which the forests used to provide are no more; the local community is already experiencing water shortages as water sources dry up resulting from the destruction of the forest catchments.

The study has revealed increase in social problems which are linked to forest land conversion. These include gender based violence, defilements and school drop outs especially among girls. These negative impacts continue to affect the great majority of the vulnerable households shielded by the positive economic developments. The study revealed that the district forestry and environment offices are aware of consequences of forest land conversion but they are incapacitated in terms of funding and staffing to put in place mitigation measures. Given the critical role forests play in the sustenance of community livelihoods, it is imperative that pragmatic measures are adopted to mitigate the negative impacts of forest conversion.

In this regard the study recommended development of land use plans at all levels to cater for the different land use types including forestry; development and implementation of bye-laws and ordinances related to regulate forest conversion and environmental degradation; establishment of effective forest governance structures to oversee sustainable forest activities, put in place a mechanism for incentives to motivate members of the local community to conserve natural

forests and establishment of a robust forest extension programme including promotion of sustainable energy saving and clean energy technologies.

5.4 Recommendations

Based on the findings of the study, a number of recommendations are being proposed to balance the negative and the positive impacts of forest conversion. The recommendations have been offered to Masindi district and other stakeholders serve as explicit examples of strategies and measures to reduce forest conversion and its negative impacts on community livelihoods.

a) Government especially Masindi district and Budongo sub-county local governments should:

i) Spearhead the development of land use plans at all levels starting with the household, local council, parish, Sub-counties up to district levels showing land set aside for forestry and other activities.
ii) Develop bye-laws and ordinances promote to balanced development between forestry and other investments especially agriculture.
iii) Embark on restoration of atleast 50% of converted forests especially the river banks of rivers as Siiba, Nyamagita and Ewafala/Sonso as well as safeguard the remaining forests against further degradation.
iv) Put in place a stakeholder platform to promote continuous dialogue on issues related to forestry and investments that impact on conservation ecosystems.
v) Put in place incentives that will motivate forest owners to conserve their forests instead of converting them to other land uses.
vi) Put in place and strengthen forest extension programmes in order to support communities in management of their forests and promotion of agroforestry.
vii) Promote the use energy saving technologies at household level in order to reduce consumption of firewood and vulnerabilities women and girls face during firewood collection.

b) Nyabyeya Forestry College should initiate an outreach programme to educate the surrounding community on the need for conservation of the water catchment areas especially the catchment for river Nyamagita supplies water to the college.

5.4.1 Areas for further research

This study was confined to the impact of forest conversion on community livelihoods. It did not explore other aspects such as the coping mechanisms of vulnerable community members negatively impacted upon by forest conversion. I therefore recommend additional research on the following areas:

i. Coping mechanisms of vulnerable community members negatively impacted upon by forest conversion.

ii. Assessment of the magnitude of gender based violence and vulnerability of women and girls arising from the forest conversion impacts in comparison to other causes.

iii. Optimum forest cover and optimum agricultural based investments that can co-exist without disrupting the ecological functions and community livelihoods.

REFERENCES

Alex Meredith, 2013. The effect of deforestation on the water cycle.

Alina Bradford, 2015. Deforestation: Facts, causes and effects.

American Heritage® Dictionary of the English Language, Fifth Edition, Copyright © 2016 by Houghton Mifflin Harcourt Publishing Company. Published by Houghton Mifflin Harcourt Publishing Company.

Anthony Egeru, Eseza K., Gilbert J., Mwanjololo M. 2013. Coping with the firewood scarcity in Soroti District of Eastern Uganda.

Arnold M., Powell, B., Shanley, P. & Sunderland, T.C.H. 2011. Forests, biodiversity and food security. *International Forestry Review,* special issue 13(3).

B. Belcher, Ramadhani A. and S. Dewi, 2015. Forest Based Livelihood Strategies conditioned by market Remoteness and Forest Proximity in Jharkhand, India. World Development Vol.66. pp 269-279. Elsevier Ltd.

Bennett, A. & Saunders, D. (2010). Habitat fragmentation and landscape change. *In Sodhi,* N.S. & Ehrlich, P.R., editors, *Conservation biology for all*. *Oxford University Press, UK*

C. Siderius, P.E.V. Van Walsum, C.W.J. Roest, A.A.M.F.R. Smit, P.J.G.J. Hellegers, P. Kabat,

CARE .2015. Study on the Impact of Forest Land Conversion on food security for households adjacent forest estates in Uganda. 63P

CARE. 2011. Drivers of deforestation in Kibaale district.

CARE.2012. Women Empowerment in Natural Resources Governance Programme Document.

D. Carney, (1998). Implementing the sustainable Rural Livelihoods Approach. Sustainable Rural Livelihoods: What contribution can we make? D. Carney. London. DFID: 3-23.

DFID (2000). Sustainable Livelihoods Guidance Sheets. Department of International Development E.C. Van Ierland. The role of rainfed agriculture in securing food production in the Nile Basin. Vol 61, Pp 14–23

DK Langat, E, K Maranga, A.A Aboud and J.K. Cheboiwo. 2016. The role of forest resources to Local Livelihoods. The Case of East Mau Forest Ecosystem, Kenya. International Journal of Forest Research. Vol 2016. 10p

FAO 1997. Non-Wood Forest Products. Medicinal plants for forests conservation and health care Vol 11. 1-165pp

FAO 2000. Global Forest Resources Assessment.

FAO 2013. Contribution of forests to food security and nutrition needs more attention.

FAO 2013. Forests for Food Security and Nutrition.

FAO 2013. Forests, food security and gender: Linkages, disparities and priorities for action

FAO 2013. Forests, livelihoods and poverty alleviation: the case of Uganda

FAO 2014. Forests and trees – a source of shelter, food, energy and employment for millions

FAO 2015. Dynamics of global forest area: Results from the FAO Global Forest Resources Assessment. Vol 352, PP 9–20.

FAO 2015. Global Forest Resources Assessment

Frederick A.B. Meyerson, 2004. Population Growth and Deforestation: A Critical and Complex Relationship

G. Shively, P. Jagger, D. Sserunkuuma, A. Arinaitwe and C. Chibwana 2010. Profits and margins along Uganda's charcoal value Chain. Vol.12 (3), pp. 270-283

Hiremath, B.N. and Raju, K.V. 2004. Livelihood Security: A prerequisite for Sustainable Natural Resources Management ON srivastava (ed.)Management of Natural Resources for Sustainable

Ivan Tomaselli. 2006. Brief study on funding and finance for forestry and forest based sector in Brazil

Julia Falconer 1990. The Major Significance of 'Minor' Forest Products: The Local Use and Value of Forests in the West African Humid Forest Zone.

Livelihoods and Poverty Alleviation, Volume 1 I Hyderabad: National Institute of Rural Development, pp95-111.

Maria Joana Specht Severino Rodrigo Ribeiro Pinto, Ulysses Paulino Albuquerque, Marcelo Tabarelli, everino Rodrigo Ribeiro Pinto, Ulysses Paulino Albuquerque, Felipe P.L. Melo, 2015. Burning biodiversity: Fuelwood harvesting causes forest degradation in human-dominated tropical landscapes.

Mariangela Bizzarri, Catherine Bellamy, Erin Patrick and Christa Roth, 2009 Safe Access to Firewood and an Alternative Energy in Uganda. An appraisal report.

Mariangela Bizzarri, Catherine Bellamy, Erin Patrick and Christa Roth, 2010 Safe Access to Firewood and an Alternative Energy in Kenya. An appraisal report.

Masindi District Local Government, 2005. District state of environment report

Masindi District Local Government, 2009. Masindi District Environment Policy

Ministry of Water and Environment (MWE), 2001. The Uganda Forestry Policy

Ministry of Water and Environment (MWE), 2016. Forest Landscape Restoration Opportunity Assessment for Uganda. 39p

Ministry of Water and Environment (MWE), 2016. Status of Uganda's Forestry. 138p

P. Omeja, J. Obua and A.B. Cunningham 2005. Demand and supply of wood for drum making in central Uganda. Vol. 7 (1), pp. 21-26

Rhett Butler, 2012. Soil Erosion and Its Effects

Toni Johnson, 2009. Deforestation and Greenhouse-Gas Emissions

Varinder Singh Waris1 and Dr. Prakash C. Antahal, 2014. Fuelwood Scarcity, Poverty and Women: Some perspectives. Volume 19, Issue 8, Ver. II (Aug. 2014), PP 21-33

Vernon, Janette and Richard Kyamanywa .2003. Fragments, Sugar and Chimpanzees in Masindi District Western Uganda. PP 309-320.

WFP. (2009). Two minutes to learn about school meals.

World Bank, 2016. Enhance Livelihoods of Forest Communities

WWF NEPAL, 2008. Livelihoods Outcomes. Study and Analysis of Changes in the Livelihoods of Bottleneck Level Community Forest Users, TAL. 48PP

WWF, 2017. Forests Ablaze. Causes and effects of global forest fires.

APPENDICES

Appendix 1: Research Questionnaire

A) Household Questionnaire

Particulars of Respondents

A	Name of Respondent	
B	Location (village, parish, S/county, County District)	
C	Gender	☐Male, ☐Female
D	Age range	☐15-18 years, ☐19-35years, ☐36-60 years , ☐60+ years
E	Marital status	☐Married ☐Single ☐Widow ☐Widower
F	Tribe	
G	Years spent in the area	☐1-10 years, ☐11-20 years, ☐21-30 years, ☐over 30 years
h	Occupation	☐Government official, ☐Employed ☐Business, ☐Farmer, ☐Others(specify)
I	Highest education level	☐None, ☐Primary school, ☐Secondary school, ☐Technical/college, ☐ University

CONTRIBUTION OF FOREST RESOURCES TO COMMUNITY LIVELIHOODS

i) What were the non-cash (social) forest based livelihood sources 25 years back?

☐Fire wood ☐water ☐poles ☐fibers ☐Timber ☐Medicine ☐rainfall

☐forest foods ☐Others (Specify)

ii) What are the current social/non cash forest based livelihood sources?

……
……

ii) What was the cash (economic) forest based livelihood sources 25 years back?

☐Fire wood ☐Water ☐Poles ☐Fibers ☐Timber ☐Medicine

☐Forest foods ☐Employment ☐Others (Specify)

ii) What are the current economic forest based livelihood sources?

What were the cultural contributions of forests to your livelihoods 25years back?

……

c) i) What were the other economic community livelihood sources 25years back?

ii) What are the other economic community livelihood sources currently besides forestry?

What forest categories were the main forest based livelihood sources 25 years back? (Record the names forests where applicable)

☐Communal forests ☐Private forests ☐Forest reserves

What distances did you have to move in order to get the resources 25years back?

☐Less than a km ☐1 km ☐2-3kms ☐above 3kms

What processes were involved in order to access the forest resources?

_____

_____

_____

Did you have to get permission from anybody every time you wanted resources? YES /NO

If yes who was responsible for giving permission?

☐Forest owner ☐LCs ☐forestry staff ☐Communal forest committee

h) How often did you access the resources?

☐Any time ☐Once a week ☐Once a month

Besides Forestry what were other sources of livelihoods 25 years back and now?

ASSESSMENT OF DRIVERS OF FOREST LAND CONVERSION

What are the main forest land conversion types?

☐Agriculture e.g sugarcane and tobacco and food crops

☐Settlement

☐Excessive harvesting of forest resources (charcoal, timber, firewood, building materials)

What are the main ownership categories of the converted forests?

☐Private forests ☐Communal forests ☐Forest reserves

Who are the main players in forest conversion processes?

☐Land owners ☐Local councils ☐Sugarcane out growers ☐Forestry staff ☐ Charcoal and timber cutters ☐investors ☐Others (specify)

d) What are roles of each of the above in the forest conversion process?

Main players in forest conversion	Their roles in conversion
Land owners	
Local councils	
Sugarcane out growers	
forestry staff	
Charcoal and timber cutters	
Tobacco growers	
others (specify	

What is the process involved in forest land conversion?

_____

_____

What are the reasons for forest land conversion?

vi) What is the extent of forest land conversion?

LOSSES AND BENEFITS OF CONVERTING FORESTS

In your view what losses, problems or challenges are you experiencing as a result of converting the forests?

☐Scarcity of fuelwood ☐scarcity of building materials ☐Drying of water points

☐Prolonged dry seasons ☐Food scarcity ☐Species extinction ☐ increased vulnerability of women and children ☐Others

What are the benefits accruing from converting forests?

☐Reduction in vermin ☐Land for food production ☐Land for settlement ☐Land for Sugarcane growing ☐Increased household income ☐employment opportunities for the youth ☐improved infrastructure (Roads, schools, health centres) ☐reduced pests and disease ☐ Improved housing ☐Others specify

B) FOCUS GROUP DISCUSSIONS (MEN WOMEN AND YOUTH):

DISCUSSION QUESTIONS:

Gender Category:_____Village_____Parish_____

Name of Interviewer_____Date_____

CONTRIBUTION OF FOREST RESOURCES TO COMMUNITY LIVELIHOODS

i) What were the non cash (social) forest based community livelihood sources 25 years back?

ii) What are the community non-cash forest based livelihood sources currently?

iii) What were the other non-cash community livelihood sources 25years ago?

iv) What are the other non-cash community livelihood sources currently?

i) What were the economic forest based community livelihood sources 25 years back?

ii) What are the economic forest based community livelihood sources currently?

iii) What were the other economic community livelihood sources 25years back?

iv) What are the other economic community livelihood sources currently besides forestry?

What were the cultural contributions of forests to your livelihoods 25years back?

……
……

i) What forest categories were the main forest based livelihood sources 25 years back? (Record the names forests where applicable)

☐Communal forests ☐Private forests ☐Forest reserves

ii) What forest categories are the main forest based livelihood sources currently?

i) What distances did you have to move in order to get the resources 25years back?

☐Less than a km ☐1 km ☐2-3kms ☐above 3kms

ii) What distances do you have to move in order to get the resources currently?

What processes were involved in order to access the forest resources?

_____

Did you have to get permission from anybody every time you wanted resources? YES /NO

If yes who was responsible for giving permission?

☐Forest owner ☐LCs ☐forestry staff ☐Communal forest committee

f) How often did you access the resources?

☐Any time ☐Once a week ☐Once a month

ASSESSMENT OF DRIVERS OF FOREST LAND CONVERSION

What are the main forest land conversion types?

☐Agriculture e.g sugarcane and tobacco and food crops

☐Settlement

☐Excessive harvesting of forest resources (charcoal, timber, firewood, building materials)

What are the main ownership categories of the converted forests?

☐Private forests ☐Communal forests ☐Forest reserves

Who are the main players in forest conversion processes?

☐Land owners ☐Local councils ☐ Sugarcane out growers ☐Forestry staff ☐ Charcoal and timber cutters ☐investors ☐Others (specify)

d) What are roles of each of the above in the forest conversion process?

Main players in forest conversion	Their roles in conversion
Land owners	
Local councils	
Sugarcane out growers	
Forestry staff	
Charcoal and timber cutters	
Tobacco growers	
others (specify	

What is the process involved in forest land conversion?

_____
_____

What are the reasons for forest land conversion?

……

vi) What is the extent of forest land conversion?

LOSSES AND BENEFITS OF CONVERTING FORESTS

In your view what losses, problems or challenges are you experiencing as a result of converting the forests?

☐Scarcity of fuelwood ☐scarcity of building materials ☐Drying of water points

☐Prolonged dry seasons ☐ Food scarcity ☐ Species extinction ☐ increased vulnerability of women and children ☐ Others

What are the benefits accruing from converting forests?

☐Reduction in vermin ☐Land for food production ☐Land for settlement ☐Land for Sugarcane growing ☐Increased household income ☐employment opportunities for the youth ☐improved infrastructure (Roads, schools, health centres) ☐reduced pests and disease ☐ Improved housing ☐Others specify

C) KEY INFORMANTS

CONTRIBUTION OF FOREST RESOURCES TO COMMUNITY LIVELIHOODS

How do forests contribute to peoples livelihoods?

How has this been affected by forest conversion?

What changes peoples livelihoods have you observed and or experienced during you interaction with the community?

DRIVERS OF FOREST LAND CONVERSION

What are the main forest land conversion types?

What are the main ownership categories of the converted forests?

Who are the main players in forest land conversion processes?

What is the process involved in forest land conversion?

What are the reasons for forest land conversion?

What is the extent of forest land conversion?

LOSSES AND BENEFITS OF CONVERTING FOREST

What are the losses resulting from conversion of forest land on community livelihoods?

What are the benefits accruing from converting forest land on community livelihoods?

How did forest land conversion affect the quality, availability, accessibility and use of forest products?

What key recommendations would you like to forward in line with the existing situation

Annex 2: Land use cover and changes in the study area between 1990 and 2015

Cover Class	Area (Ha) by Land Cover Type	Land Use Cover and Change for 25 Year									
		1990		2000		2005		2010		2015	
		Over all	*CFR*	*Over all*	*CFR*	*Over all*	*CFR*	*Over all*	*CFR*	*Over all*	*CFR*
1	Deciduous Plantation	71.10	71.10	-		17.30	17.30	-	-	-	-
2	Coniferous Plantation	111.21	111.21	-		72.60	72.60	-	-	-	-
3	Stocked Tropical High Forest	6,657.83	6,628.77	6,556.35		5,439.89	5,439.89	5,666.31	5,630.24	5,619.92	5,529.38
4	Degraded Tropical High Forest	183.53	115.86	62.95		760.72	760.72	111.96	71.85	95.01	65.70
5	Woodland	704.33	704.27	836.07		681.19	681.19	147.42	115.27	179.64	129.60
6	Bushland	-	-	-		749.27	749.27	436.09	215.06	382.26	276.49
7	Grassland	1,180.91	928.39	16.92		40.89	40.89	308.29	253.08	97.59	97.59
8	Wetland	-	-	-	-	-	-	-	-	-	-
9	Subsistence farming	5,596.48	2,056.16	6,654.94	6,654.39	6,347.35	6,347.35	5,950.70	5,819.06	5,983.52	5,932.40
10	Commercial farming	-	-	392.11	331.45	380.16	380.16	1,884.34	1,851.17	2,161.38	2,072.91
11	Built up area	13.94	13.94	-		29.94	30.00	-		-	-
12	Open water	-	-	-		-		-		-	-
13	Impediments	-	-	-		-		14.24	14.24	-	-
Area Totals		**14519.345**		**14519.334**		**14519.332**		**14519.340**		**14519.330**	