

**THE IMPACT OF DEFORESTATION ON THE ENVIRONMENT:  
A CASE STUDY OF BUGA VILLAGE,  
KAMDINI SUB-COUNTY  
OYAM DISTRICT**

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A Thesis  
Submitted to the college of  
Higher Degrees and Research  
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Kampala-Uganda

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In Partial Fulfillment of the Requirements for Award of  
The Degree of Master of Science in  
Environmental Management

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SEPTEMBER, 2012



## **DECLARATION A**

I, Oryema James, hereby declare that this is my original work and has not been presented for a Degree or any other academic award in any university or institution of higher learning.

Signature.....

Date.....

**ORYEMA JAMES**

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## **DECLARATION B**

"I confirm that the work reported in this thesis was carried out by the candidate under my supervision."

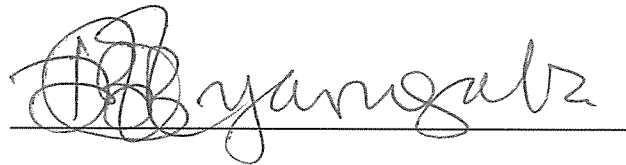
Signature.....

Date.....

**DR. TWAHA ALI BASAMBA ATEENYI**

## APPROVAL

This thesis entitled "The impact of Deforestation on the Environment in Kamdini Sub-County, Oyam District, Northern Uganda" has been submitted in partial fulfillment of the requirements for the Degree of Master of Science in Environmental Management of Kampala International University has been approved by the panel on oral examination with a grade of PASSED.



Name and Sig. of Chairman

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Name and Sig. of Supervisor

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Name and Sig. of Director, HDR

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Name and Sig. of Principal, CHDR



## **DEDICATION**

I dedicate this thesis to my beloved grandma Esther Akite, mum Alice Akullo, Brother and sisters.

## **ACKNOWLEDGEMENT**

I thank the almighty God for his love throughout this work. I extend my sincere gratitude to Dr. Twaha whose guidance, criticism and instruction contributed significantly to the completion of this research. May the almighty God bless you abundantly? I acknowledge with deep appreciation, the support from my uncle Mr. Ayo William. Ms Alanyo Margaret for her financial support throughout the production of this work I am greatly indebted, the same extended to Ms Margaret Ayella. Pastor Edward Otim, Rev Polycarp, Ebong Tonny and his group their prayer helped me a lot during the course of the work. Opio Okori Jurubabel for his elderly advice. I placed on record the entire staffs of college of higher degree and research that have shaped the carrier of my study at Kampala international university. I am also very grateful to all my classmates throughout the most stressful moment. May God bless you all? To all those who in one way or another contributed towards the successful completion of this research, I appreciate your support. Despite the assistance I received, I accept full responsibilities for any imperfection which may be found in the body of the research are entirely mine.

## **ABSTRACT**

Deforestation has become an issue of Global Environmental concern because of the value of forest in biodiversity conservation and in limiting the green house effect. The major objective of the study is to investigate the impact of deforestation on the Environment in Uganda. Specifically, the study aimed at finding out the values of forests to the Environment, investigating the factors responsible for the persistent deforestation, determining the impact of deforestation on the Environment and formulating measures for solving the problem of deforestation.

The study was carried out in Kamdini Sub-County, Oyam District. A sample of 120 respondents was selected. This was a small sample compared to the total population of people of Uganda but given that this was an academic study coupled with limited financial resources, this sample was commensurately appropriate. A variety of data collection methods were used. These include interviews, observations and photography. These participatory research methods provided an opportunity for respondent to take for themselves without attribution and highlight their resources.

Study findings highlighted a general lack of sustainable development. They indeed revealed that a few people practice sustainable use of the Environment. The study recommended that further research on this be made in future.

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## **LIST OF ACRONYMS**

FAO	-	Food Agricultural Organization of the United Nations
IUCN	-	International Union for the Conservation of Nature
MFPEd	-	Ministry of Finance, Planning and Economic Development
NEA	-	National Environment Act
NEAP	-	National Environment Action Plan
NEMA	-	National Environment Management Authority
NGO	-	Non Governmental Organization
NRM	-	National Resistance Movement
PPAP	-	Participatory Poverty Assessment Programme
UNEP	-	United Nations Environment Programme
WWF	-	World Wide Fund for nature

## **CHAPTER ONE: INTRODUCTION**

### **1.1 Background**

The forest is one of the most complex and least understood ecosystems on our planet. The forests of the world are the greatest storehouse of biological diversity. They also regulate climate, protect the soil, act as water sheds for some of the world's major aquatic systems, and promote inhabitant for an incredible variety of organisms ranging from fish to human beings (Domroes, 1991). Several million acres of tropical forests are destroyed each year with great repercussions for all organisms within the complex forests Web of Life (IUOCC, 1991).

Forest of Buga, despite their important role in the Environment and the rich catchment areas they provide the forests have been felled for firewood and development activities to mention but a few. These are numerous challenges which this research methods highlight. Because the removal of trees means that the soil is eroded by the heavy rainfall, and loss of soil means that they are unable to cultivate their traditional way of life based on cultivation of crops (Oyam District Local Government, 2004; 2005).

Today, deforestation is often viewed as one of the most environmental problems (Salati, 1991, Shukla, 1990, Edward, 1989). The underlying causes of deforestation are complex and often poorly understood (Cynthia 1991), and while others are held responsible many times large scale Governmental and private land developers involved in logging, plantations

or industrial development, frequently small – holder shifting cultivators and migrants farmers are cited to be the main culprits (Domroes, 1991).

Deforestation is the loss or continual degradation of forest habitat due to either natural or human related causes. Agriculture, urban sprawl, unsuitable forestry practices mining and petroleum exploration all contributes to deforestation (National Environmental Management Authority, 2002). Downing (1992) reckoned that natural deforestation can be linked to forest fires, volcanic eruption, glaciations and desertification. The effect of human related deforestation generally can be mitigated through environmentally sustainable practices that reduce permanent destruction of forest. Accordingly, Environmental change and climatic change in particular are likely to impact significantly upon resources such as water and soils, transforming present day landscapes and their ecological characteristics (Shumatoff,1990). Deforestation alters the hydrological cycle, potentially increasing or decreasing the amount of water in the soil and ground water and the moisture (Myers, 1991). Against this background, there is now a call for wise use of forests because of the important biodiversity they harbor, and the crucial rôle they play in function of life support systems.

The actual extent of the role that forests and their subsequent deforestation play in Global climate and its change is difficult to gauge. This is one reason why this research was done. Further loss of any of the remaining forests could threaten the services and factors that they provide. The way forward might be to undertake restoration of the

already deforested forests and promote wise use and sustainable management of forest resources (NEMA, unpublished).

It was with this reason in mind that gaps were identified which had been left out by academic researchers because Environmental issues affect every life on this planet from the smallest parasite to human race. There is therefore urgent need to conserve forest because single disruption in the earth's delicate balance can mean certain destruction of the very place that cradle the life of many Species (NEMA, 2001). What is not so simple is findings alternatives to the now dangerous and confronting acts of planet degradation that have been afflicted on the planet over recent years. One such issue that requires consideration is deforestation. Trees have been or have been cut down at increasing high rates. There is also need to provide practical guides with clear statement on best practices on how to minimize alternation of hydrology and soil erosion because if this is not stopped many unfavorable side effects could result (Myers, 1991).

To understand why deforestation is such a pressing urgent issue, forest must be given credit for what they bring to Global Ecosystems and the quality of life that all Species maintain. Trees improve the quality of air that Species breathe by trapping carbon and other particles produced by pollution. Trees determine rainfall and refresh the atmosphere. As more water gets back in to the atmosphere, (clouds form and provide another way block out the sun heat. Trees are what cools and regulates the earth's climate in conjunction with other such valuable services as

preventing erosion, landslides and making the most infertile soil rich with life (Hersilia, 2003).

The recent calls for sustainable use of natural ecosystems in such documents as the world conservation strategy, produced by three of world's leading conservation organization, the world's conservation union (IUCN), The United Nations Environment Programme (UNEP) and the World Wide Fund for Nature (WWF), and the conservation on Biological Diversity drafted at the 1992 Earth summit in Rio de Janerio highlight one of the future solutions. The forests must be managed and not plundered if they are to survive and perform their vital functions. Therefore, to destroy forests is to eradicate species, to alter world climatic patterns, and perhaps eventually to condemn the human Species to extinction (Whitney, 1996).

The National Environmental Management Authority (NEMA) through research and action programmes has come to realize that ensuring sustainable development is the only way Uganda can acquire good relationship in the environment. This is why every year Uganda celebrates World Environmental Day on 3<sup>rd</sup> June. Millions of Ugandans and others now depend on the Country's forestry for firewood, cooking and warming, timber for constructions, paper for printing and almost other essential products for numerous uses (forest department of Uganda. 1997).

Villages in poor Countries such as those from Sub-Sahara Africa where firewood is used for cooking are depleting local forests despite different

authors contribution on various function and values of forests at populations, ecosystems and Global values (Donavan, 2001). The average villages require 1.1 and two tons of firewood each year. (Hersilia, 2003). In developing countries, wood is a primary building materials everywhere. Because of this situation, cutting down trees has been successive. Forest has shrunk and their capacities to satisfy human needs and Environment are consequently diminished (Ministry of Water, Land and Environment, 1998, Brown, 1998).

Lester (1994) asserts that, most of the Middle East, North Africa much of the continental Asia, and Central America is now virtually forestless. Forests in all regions of the world are shrinking. Almost every country undergoing rapid population growth is being rapidly deforested. Forest that once covered a third of the total land area of Morocco, Tunisia and Algeria for example has been reduced to scarcely a tenth of their original area by the mid century (Kuechli, 1997). In each Country, different Government departments have been assigned the responsibility for implementing sustainable use and managing the forest resources.

Timber supply in United States once seemed limit less. Settlers cut and burned forests to clear the land for farming. Loggers cut and moved on, giving no thought of maintaining these forests. Excessive deforestation occurred in the East such as Israel in the early 1800's. By 1890, most big trees were gone (Diwan and Parag, 1998). World over, deforestation has reached its highest tall. This prompted a call for Environmental Management (Cunningham 2000).

The consequences of deforestation are quite alarming. The assault on tropical forests is the latest episode in mankind continuing war on the world's natural vegetation cover. There is consequently a much higher probability of Species extinction on forest shrinks and become fragmented (Oyam District Local Government 1997).

The danger of all these necessitated the development of this research aimed to add on what other researchers have done and to investigate the continuing causes of deforestation, its effects on the Environment and measures that should be taken to solve these problems (Ministry of Natural Resources 1995, Oyam District Local Government 2002).

### **1.2 Statement of the problem**

The consequences of over taxing the earth's natural resources are variably negative, destructive and costly. They range from loss of biodiversity and soil fertility to the inadvertent modification of climate. Virtually, all such ecological stress is likely to intensify as human numbers and demands increase further. Deforestation is generally deteriorating the environment. It is increasing at an alarming rate as population grows and peoples demands rise. A review of the state of the world's forest provides no ground for optimism (NEMA, 2001).

IN Kamdini, Oyam District, deforestation is not different from that of the rest of the world. Some NGO's and Uganda Government have tried to stop



deforestation. Despite their efforts, deforestation is going on at an alarming rate in Kamdini (NEMA, 2002).

Although deforestation jeopardizes future supplies of firewood, promotes silting and contributes to soil erosion and flooding, little is being done to reverse the trend.

### **1.3 Objectives**

The general objectives of the study were to assess the impact of deforestation on the environment. Specifically the research aimed at;

1. To find out the value of forests to the environment.
2. To investigate the factors responsible for persistent deforestation in Kamdini.
3. To determine the impact of deforestation in the environment.
4. To formulate measures for solving the problem of deforestation.

### **1.4 Research questions**

This study was guided by the following questions;

For objective 1

What values do forests contribute to the environment?

For objective 2

What factors are responsible for the persistent of deforestation in Kamdini?

For objective 3

What are the impacts of deforestation on soils, water bodies and atmosphere?

For objective 4

What measures can be put in place to control and ultimately halt deforestation?

For objective 5

This study was basically concerned with the implication of deforestation on the environment and was conducted between January and September 2012 by using sample cross section survey design of a constructed cohort of Buga village.

### **1.5 Significance/Justification/Rationale**

In Uganda, the Ministry of Water and Environment is unable to continuously and consistently follow the rate at which the environment is being degraded. The Ministry of Water and Environment does not have up-to date information on the state of environment in the Country. Given the importance of forests to the environment in Uganda, there was need to aggressively address the issue of a wider perspective. It is hoped that this study will yield data and information that will be useful for proper planning and decision making at the Ministries.

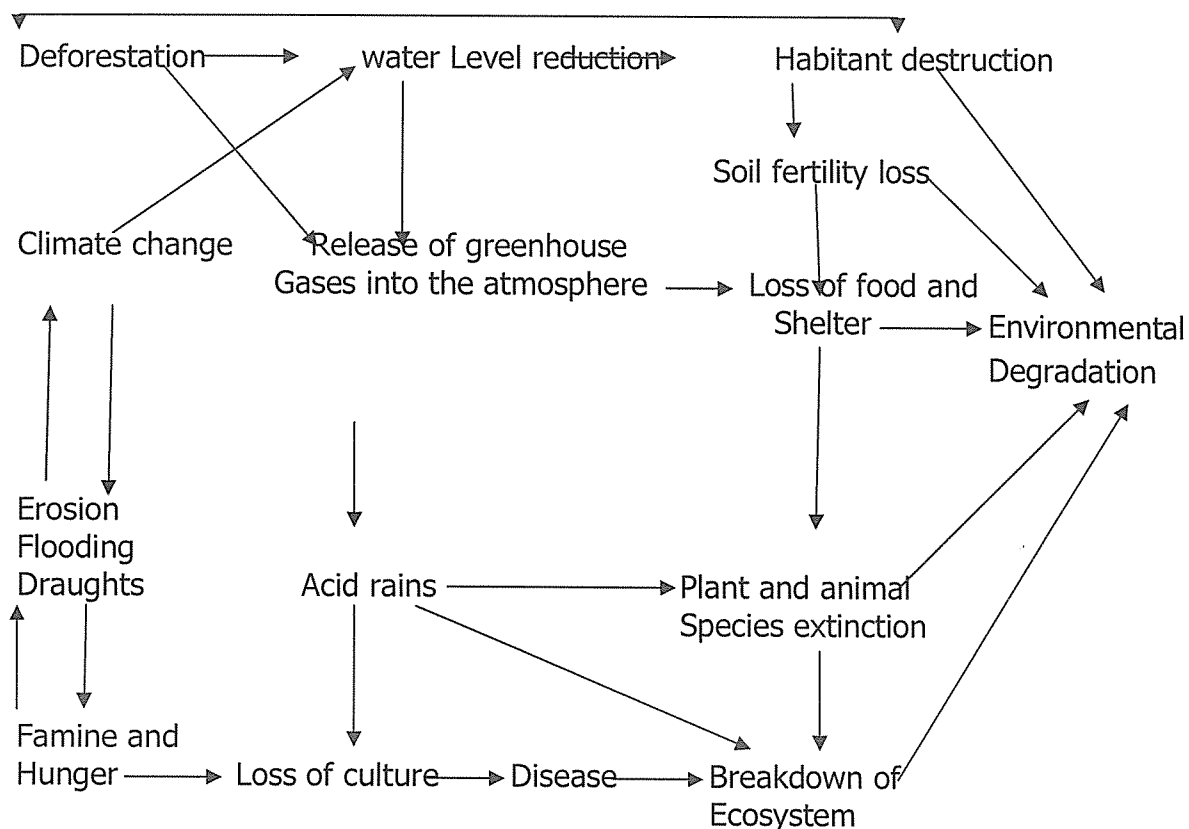
The findings and recommendations of the study should also be useful to the community and Government to understand the causes of deforestation and its consequences, and help to formulate remedial restoration of the forest state. Hence forth, they will not rely on haphazard personal experience, subjective expert judgments, but base their methods, decisions and actions on concrete knowledge of issues of

the environment supported by research findings. This will lead to sustainable development as well as academic excellence.

The study forms a basis for further research on the management of natural resources in general. This should lead to generation of new ideas and confidence for better and more efficient management of natural resources in Uganda and the rest of the world.

### 1.6 Conceptual Frame Work

The Conceptual Frame Work was developed and presented in Fig.1.



**Figure 1 conceptual framework**

In this context, the Conceptual Frame Work was based on Diwan and Parag (1998). Deforestation leads to climatic change which influences soil erosion, flooding and draughts. When these are excessive, they encourage famine and hunger which eventually lead to environmental degradation through over cultivation, overgrazing and wetland reclamation, ultimately causing loss of soil fertility.

The release of carbon dioxide in to the atmosphere can further cause green house effect that result into acid rain formation when it rains which make life hard by inducing disease that may result due to loss of culture and Species extinction, hence leading to the whole break down of ecosystem. For example the acid rains in London in the year 1926 gave a shock to man to be awakened to the danger of excessive indiscriminate environmental abuse (Diwan and Parag, 1996). Through habitat destruction, deforestation leads to loss of food and shelter for animals that may result in to Species extinction.

Reduction of water level through deforestation can cause lack of food and shelter for some organism leading to their extinction.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 General Over View**

Weber (2001) defines deforestation as the long term permanent loss of forest cover and implies transformation in to another land use. Different authors (Example FAO 2002, Shioban, 2004 and Hedger, 1997) defines a forest as a minimum area of land of 0.05 – 1.0 hectares with free crown cover of more than 10-30% with trees, with potential to reach a minimum height of 2-5 meters at maturity in situ (FAO, 2002, Shioban and Catherine, 2004).

According to FAO (1991), forests have been classified in to two type's natured forests and planted forest. Natural forests are said to be forests composed of indigenous trees plus other components such as human beings, animals, plants and a variety of non living components. Whereas planted forests are those established by planting and seeding in the process of a forestation or reforestation. It consists of introduced or indigenous Species. A plantation forest may be forest land or secondary forest established by planting or direct seedling. Tree plantations cannot be called forests but mere tree crops intended for a single or specific purpose. A real forest consists of numerous species of trees and bushes of all ages, even larger number of other plant Species growing both on the forest floor and on the trees and bushes themselves, and along variety of Species of fauna (Shioban and Catherine, 2004).

According to Rebledo (2001) and Scrase (2001), human communities are also part of the forest since many human beings live in them, interacting with forests and obtaining a number of goods and services from them, which ensures their survival. A large scale commercial plantation is composed of one or a few Species of trees planted in homogeneous blocks of the same age (Rebledo, 2001, Scrase, 2001).

## **2.2 Theories of Deforestation**

If this research is to be of any use, it must be tested against theory. The facts never speak for themselves; they must be interpreted through the cloned lenses of ideas. The theories of deforestation adopted for the study are delivered from Whitney (1996) who advances three schools of thought to explain the causes of deforestation as follows:

- a) The impoverishment school, which believes that the major cause of deforestation is “the growing number of poor”. This school sees small holders as the Principal agents of deforestation. Many peasants cut down forest in order to meet the day today livelihood. Man’s participation in poor farming methods like shifting cultivation, increase in population puts pressure on forests because of man’s increase demand for land for settlement and cultivation. This impacts directly on the environment since the cutting down of forest reserve leads change in general climate.
- b) Neoclassical schools believe that deforestation is caused by “open – access property rights”. That school explains that forests have been encroached on because of unclear legislation and public ownership of forest reserves since the population has open access to most

reserve, loss of trees due to increased demand for logs, charcoal and timber goes to its peak hence deforestation.

- c) The third school of thought is the political ecology. This school believes that the major cause of deforestation is that of the “capitalistic investors” crowd out peasants. Due to urbanization, industrialization and mineral demand for energy, the capitalists cut down trees in order to expand on land for their operations or get cheaper and alternative source of fuel.

### **2.3 Trend of Deforestation in the World**

Deforestation has recently become a major concern for many Countries in the world. It is one of the most pressing land use problems. Deforestation is occurring around the world on a scale never known before. More than 30% percent of the world’s forest is believed to have been deforested (World Resources Institute, 1985).

About a half of the forest that was present under modern (that is post Pleistocene) climatic conditions, and before the spread of human influence has disappeared, largely, through the impact of man’s activities. The spread of Agriculture and animal husbandry, the harvesting of forests for timber and fuel, and the expansion of populated areas have all taken their toll on forests. The cause and timing of forest loss differ between regions and forest types, as do the current trends in change in forest cover. Satellite photographs of the Philippines show that deforestation is far more advanced than official statistics reveal with the forest cover probably less than a fifth to the Country’s land area (Lester, 1994). The rapid

depletion of Filipino forests by logging, mining and settlers encroachment was officially acknowledged as requiring a policy response in the late 1980s ( Adeleke, 1998). The need to limit and regulate logging and promote community forestry alternatives was accepted by the end of the decade. In 1990 the Government adopted a master plan for forestry development, which entail, an attempt to scale up previous community level initiatives in forest management (Crutzen, 1990).

## **2.4 Deforestation in Africa**

There has been much concern about the pressure that population exerts on world resources and the environment. Many people blame the serious problems of deforestation in the developing countries on the growth of population (Anderson, 1993, and Adeleke 1998, Cleaver, 1993, Diwan, 1998, Kichodo, 2003). The fact that population growth increases pressure on forests resources cannot be ignored. Population pressure particularly in the densely areas, has forced the extension of Agriculture into forests and even fragile and marginal lands and increased the demand for firewood, setting in motion a down ward spiral of forest destruction. However, deforestation is a complex problem, and rapid population growth alone may not explain the rapid rate of deforestation experienced in Africa and in many other developing countries.

Myers (1991) identified poverty, unequal land distribution, low Agricultural productivity, rapid population growth and various in appropriate and counter – productive growth Public Policies / as underlying causes of deforestation. This view is also supported by Perlez (1991), Nicolson and



yin (2001), WRI, (1985), Sukla, 1990. They argue that the rural poor, being themselves victims of development process are often caught in a vicious cycle of poverty that force, them in to destructive patterns of land use to meet the basic needs for food and fuel. Other factors such as a breakdown of traditional common property management and commercialization of the forest resources have also led to increasingly severe pressure on forests in most developing countries (Salati, 1991). Therefore, to regard the problems of deforestation as a consequence of population growth for food, fuel and other forest products is over simplify the problems, creating a danger of mistakenly formulating and appropriate policies and strategies to solve it.

The problem of deforestation in Africa needs to be looked in a broader perspective. While single causes of deforestation may be identified and analyzed, local interactions are inevitably far more complex than a simplistic overview suggest.

According to Matloff (1995), the process of deforestation is derived from the entire pattern of world development since the colonial era, and the economies of most developing countries demonstrate a number of parallels that contribute to a greater or less extent to the deforestation process.

As argued by Myers (1991), deforestation may be seen to reflect a specific type of development model which began in the late 1800s and early 1900s when national economies were drawn in to the world market for

primary goods such as cotton, coffee and tobacco. Many countries had to rely on these primary goods to generate the foreign exchange needed to bring about economic growth and development. This situation prevails until today and is verified by Government policies. A crop like tobacco is a stable and profitable crop in the short-term; however, its environmental costs are high because of the large scale deforestation associated with it.

As national economies were drawn in to the world market, peasant's producers were increasingly drawn in to national markets (Mac Gaffey, 1991). This meant intensifying agricultural production to produce the food required and a marketable surplus in order to obtain the income necessary to purchase products in puts and consumer goods. The intensification of agriculture led to accelerated conversion of forest areas to crop and pasture land. Coupled with the above, modernization process that was initiated introduced cultural attitudes which saw other forest as resources to be cut down and used (Jarosz, 1993). Lumber industries were stunted with the introduction of new technologies in order to meet foreign demands for tropical timber. This led to the opening up of the forest areas for commercial logging, which played a key role in the conversion of forest in most developing countries. Deforestation caused by commercial logging is thus believed to be, by large as a result of economic expansion that fails to take account of value of the environment (Information Unit on Climate Change, 1993).

In the process of integrating the peasant producers and national economies in to the world market, highly skewed patterns of resources

distribution emerged which left many people living in extreme poverty with limited access to land, credit and other essential goods and services. Their desperate need for survival forces them to over tax their land and extend cultivation in to forest and even fragile and marginal lands, causing a lot of destruction of forests and severe land degradation. To date, the situation in Africa has not changed much. Many people are still poor, and being themselves victims of forest destruction, they have often been caught in a chain of events that has forced them to over tax their land and natural resources, especially forest. Their efforts to escape from poverty by cutting fuel wood and producing charcoal for sale in towns and cities, and growing cash crops like tobacco have damaged the forests even further (FAO, 1998, Domroes, 1991).

From the preceding discussion, Jarosz (1993) also asserts that growth of herding on marginal land has also had a significant impact on the regions forest. As increasing marginal land has come under cultivation, particularly within semi arid countries, pastoral agriculture has been pushed out further to the fringes (Jarosz, 1993, Matloff, 1995). In many instances farmers are forced to harvest forest products to feed their herds (Perlez, 1991). Not only do these practices reduce Africa's forest resources, they also accelerate the process of desertification. A review by Anderson (1993) emphasizes that while overgrazing kill the grasses that are necessary to combat the effects of soil erosion, grazing within forested areas dangers foliage and root systems of the plants and trees which not only maintain the health of the soil but provide bulwark against erosion and desertification.

According to the republic of Uganda (1997) another contribution to the problem of deforestation in Africa is that many Africans depend on the use of forest products principally wood and charcoal to meet their cooking and heating needs. Because of the demands of an ever-increasing population and the effects of externally driven economic reforms, alternate sources of energy have become very expensive and difficult to obtain. Currently, almost ninety percent of Africans depends on firewood, charcoal and other biomass fuel to meet their basic energy needs. As African's population continues to grow and get poorer, forest resources will represent ever more important fuel resources, reducing the livelihood of the implementation of sustainable forestry practices (United Nations Environmental Programme, 1987; World Resources Institute, 1985).

In addition to its environmental consequences, continued unsustainable forestry practices will have a negative long-term effect on the region's economy. Forestry plays a more important role in the African Economy than in other regions (Porter 1991).

Recent studies by Whitney (1996) have revealed that Africa has been devastated by deforestation. They thought that Africa is mostly jungle and wide opens Savanna with all sorts of wild animals roaming around is more myth than fact (Anderson, 1993). Africa's open plains have been reduced mostly to grazing land and its rain forests are becoming less and less a prominent feature throughout the continent (Cleaver and Schreiber, 1993).

Increasing concern about the rapid rate of deforestation and forest degradation in developing countries caused by the rapid rate of loss of about 17 – 20 million hectares of forest annually should be done (Chazen, 1998). Forest serves as habitat for heterogeneous animal Species. It controls the climate and provides hydrological services such as regulation of stream flow and maintaining of rainfall of the area. Forest control erosion in the areas where it is located and provides many timbers and non timber products, these are indispensable to man's livelihood (Mac Gaffey, 1991).

According to Western and Wright (1994), war is a curse for the environment. On one hand it can force people to concentrate on other things and not on deforestation. But on the other hand, it can force resource flow, countries chop down even more trees and cause even more harm to the environment (Berry, 1993). For example in 1990, the former African State of Zaire, experienced a major decrease in forest areas, most of its natural forest reserves were completely deforested. The cause of all these was rebels escaping from a country in Chaos, and setting up refugee camps in the woods. They had to survive and heat their food, so they used just about every resource they could take from the forest. The refugees killed many animals for food and chopped down millions of acres of forests for personal and commercial purpose (Bassett, 1993).

A critical study by Hamilton (1982) revealed that economic exploitation of poorer countries by the world's industrialized nations underlines much of

the over-exploitation of tropical ecosystems by populations without land or employment. This insight must become the foundation for the reform of bilateral and multilateral aid policies and relevant world trade practices if the tropical rain forests are to be saved. This will mean among other things, dealing with the problem of third world debt (Hamilton, 1982, Burgess, 1993).

According to Park (1992), the third world is being impoverished to make the wealth richer. In many countries, a vicious circle has raised loans used to finance environmentally destructive projects can only be repaid through further destructive resources exploitation. Thus, the debt crisis has exacerbated environmental destruction in the third world (Park, 1992, Republic of Uganda, 1997).

Variations in the rate of deforestation, however, exist from one country to another. In Ivory Coast and Nigeria for example, the rate has been as high as 5-6% a year (Jarosz, 1993), and information unit on climate change, 1993, Ivory Coast alone is believed to have lost over 56% of its forest cover since 1965 (WRI, 1985). Burkina Faso loses about 85,000 ha a year to make way for cash crops.

The result by Houghton (1991) revealed that five countries with the largest rain forest areas are also among the world's most heavily indebted countries. Hence they are now under tremendous pressure to cut and clear rain forests to finance debt repayments (Houghton, 1991, Hecht, 1985).

In Madagascar, the problem of deforestation began when it was annexed as a French colony in 1896 (Burgess 1993, and Basset, 1993). Other researchers (WWF for nature 2000, Chazen, 1998, and Hamilton, 1982) reported that if the forests continue to be rapidly destroyed without taking this biodiversity measure into account, it could have serious ramifications on Madagascar, Uganda and the world.

A study by Wass (1995) and Hart (1982) indicates that Kenya's forests are rapidly declining due to pressure from increased population and other land uses. With most of the country being arid and semi- arid, there is a lot of strain on the rest of the land since the economy is natural resources based. The productive area which forms about 20% of the country's are falls in the medium and high potential agro-ecological zones and is under Agriculture, forests and natural reserves.

According to Wass (1995), Kenya is classified among the countries with low forest cover of less than 2% of the total land area. The dwindling forest covers has a severe effect on the climate, wild life, streams and human population (Ministry of Environment and Natural Resources, 1995).

In Burundi, rates of forests clearing have risen by almost 48% since the close of the 1990s in total. Burundi lost 137,000 hectares or 47% of their forests cover between 1990 and 2005. Today only some 152,000 hectares remain in the country none of which is considered intact forest. As a result

of this forest loss, gorillas and elephants are extinct in Burundi. (WOODEC, 1987, FAO, 1988).

Tanzania like many African countries has been experiencing rapid rate of deforestation. However, estimates of the magnitude and rate have varied widely. Antoshhek (1998) estimated that Tanzania has been losing between 300,000 and 400,000 hectares of forest per annum. The FAO and World Bank estimates give an average annual rate of 130,000 hectares or 0.3% (WRI 1985) on World Wide Fund for Nature, 2000). FAO (2002), on the other hand, believes that annual rate of deforestation has already exceeded 700,000 hectares. Such disparities of data have made it difficult to assess the magnitude of the problem and to come up with strategies aimed at minimizing it and dealing with its impacts.

## **2.5 Deforestation in Uganda**

In Uganda, deforestation started with the eve of foreign influx to the country. The foreign forces including missionaries, explorers and later fortune seekers and business interests culminated in the colonial exploitation of forests. In the mid 1970s, a period of Agric encroachment began, and over a period of ten years up o 1980, 20900 hectares of fromontane forests and rain forests were almost completely destroyed on Mount Elgon (Hoefsloot, 1997). Military war fare in Uganda has contributed much to deforestation. Uganda has had a turbulent history and sometimes guerrilla groups launch their attacks from forests and wood land (Uganda Government, 1995, Uganda Bureau of Statistics, 2000, 2004, 2009).



The introduction of cash crops and tax later aggravated forest destruction through clearance for cultivation and other cash generating activities. Protected forests were invariably created through eviction of some peasant communities from their ancestral homeland, but this was reversed in the Museveni Government and deforestation went on till now (Hoefsloot, 1997, Tread way, 1974, Shiobha, 2004).

A long Lake Victoria, deforestation has intensified in the recent years and presently it has taken its greater toll in the region. Many NGOs and some Government bodies such as NEMA and UWA have tried to halt deforestation but the majority of stakeholders do not take up their message (NEMA, 2002).

Tread way (1974) shows that in 1990s, the area covered by forests in Uganda was estimated at 30.901 Kilometers representing about 12.7% of the total land area. In 1952, forests had been denuded to an area of 11.76 Kilometers representing only 4.6% of the total land area. Today it's estimated that only 30% of the total areas is covered by the forests. Forest reserve land is about 6 percent of the total area of Uganda (Forest Department of Uganda, 1997).

Kichodo (2003) and World Bank (1995) outlines the reasons for the disappearance of forests in Uganda as, among others population pressure on Land, increased demand for food, increased energy requirement, forest

fires, unfavorable political climate, poor harvesting methods for forests, and for Agricultural techniques.

Kichodo (2003) also outlines the effect of forest destruction as follows:-

Reduced amount of rainfall, the green house effect, serious soil erosion on steep slopes, destruction of Wild game habitat which lead to extinction of some animals Species for example White Rhino which is now extinct, dwindling levels of lakes and rivers, and the destruction of bio-diversity.

## **2.6 Importance of Forests on the Environment**

Water recycling: Water is an important forest product. Forest soils are giant sponges they soak up rain (water) during wet season so that the water seeps slowly in to the ground during dry seasons. This helps to regulates floods during raining seasons and allows streams to flow steadily in dry seasons (Kuechli, 1997).

In high Mt forests, winter snow is shaded from the sun and sheltered from drying winds and often lasts well in to summer. Most towns and cities depend on forest reserves (Weber, 2001). But when the forest is cut, the soil is exploited and washes away or blows away. The rain runs off quickly causing erosion and flood. Little water penetrates in the soil and this explains why areas where forests have been cut dry faster and have little water available all year round (Vanmele; Poschen, 2000).

Source of wildlife: Forests are not only vital to the survival of wild life, but it is also the starting point for many major rivers. These rivers provide water. These bodies of water act as filters and sponges for toxins that would otherwise pollute valuable drinking water. This water source must be preserved and restored where possible in order to maintain critical habitat for wildlife and abundant source of water for everyone (Pedroni, 2001, Perry, 1999, Poffenberger, 2000).

Control of floods and erosion: Forests do great in control of floods and soil erosion. Forests on hill sides especially control running water that would face away soil in large volumes. Where forests are established, floods are always regulated (Richard, 2001). While the forest is there the roots keeps the soil porous so it can absorb larger amount of water (Cavelie et al, 1997, water shed, 1998, UNEP, 2002).

Nutrients to the soil: The decayed leaves and other decomposition plant materials add great amount of humus to the soil making it spongy. This enriches the soil hence supporting plant growth (Lester, 1984).

Social environment: People looked at forest as places for recreation, hiking, pick-nick; sightseeing, fishing, hunting, swimming and other outdoor activities become more popular every year (Sigurdson, 2000).

Cultural Environment: Within Huri (forests, of the Congo basin the Mbuti are among African most ancient residents (Hoefsloot, 1997). And they have retained high degree of dependency on the forest resource bases

and skills to exploit it efficiently; they are a population of hunters and gatherers. Related to the Mbuti are a dozen of other ethnic groups such as Efe, Aka and Asua, inhabiting the forest of nine African Countries across Congo basin. Although outsiders commonly refer to these people as Pygmies, its generic term is rejected by the Muti, Efe and other people, and is inadequate to cover the wide diversity found in their languages, cultures and ecological relationship within the forests. Deforestation therefore means displacement and extinction of such cultures (Nicholson and Yin, 2001, Poffenberger, 2000).

Economic Environment: The use of forest products is very numerous. It has been estimated by (Poffenberger, 2001) that tress and tree products are used in about 5,000 different ways. Lumber business is one of the most important branches of Canada's great forestry industry. It supplies man's daily needs. Lumber resources permit larger shipments to other countries thus increasing her international trade (Crutzen, 1990).

## **2.7 Impacts of forests on environmental Quantity of life and economy**

There are no specific studies on the relationship between forests and environment on the other hand and, quality of life and the economy on the other. However, a number of studies tend to link forests with livelihood. Through participatory poverty assessment programme (PPAP) selected districts in Uganda (MFPED, 2003) the following links have been established:-

A healthy environment is important in supporting poor people's livelihoods and reducing their vulnerability to environmental degradation; improving access to, and involvement in decision making over environmental resources, is important to the poor; MFPED (2003) indicated the lives of about 30 million people who occupy Lake Victoria basin are to a large extent, influenced by forest ecosystems.

This large population implies that dependence on forests for food, land and other natural resources will continue to increase. It is therefore important that environmental conditions of forests are maintained to support sustainable utilization. When there is deterioration of environmental quality, majority of the people will be unable to produce enough for subsistence neither will they have surplus for sale. This is bound to affect the quality of their lives.

It is becoming increasingly clear that natural and human environments are threatened by ongoing degradation of forests. There is, therefore, urgent need for detailed knowledge because of the role of forests ecosystems in sustainable economic development and human health.

The immediate effects of deforestation may not yet be felt but if its generation does not feel it the next generation and their children will be the ones to suffer. It is the actions of the human race that can make or break the future of the planet. In the end everyone loses unless a solution can be reached.

## **CHAPTER THREE: METHODOLOGY**

### **3.1 Introduction**

This chapter deals with the methods that were used in obtaining the needed data and the data analysis techniques that were used in order to come up with the findings of the study as shown in chapter four of this research work. Therefore various approaches and techniques were used to conduct this study. It further discusses the area of the study, the targeted population, the sample sizes, the techniques of sampling and the techniques of data collection. The study was conducted in Buga village. The study was specifically to determine the impact of deforestation on the immediate environment of deforested areas.

### **3.2 Study area**

Buga is in Kamdini Parish, Kamdini Sub-County, Oyam County South, and Oyam District. The study area is mainly Agricultural. The economies are based on production of maize, beans, sweet potatoes, cassava, bananas among others both for home consumption and for sale to urban areas like Lira, Gulu and some to Kampala.

#### **Location**

Kamdini Sub County is approximately 17km West of Oyam District Headquarters .It is bordered by: Myene Sub County to the north, Acaba to the East, Aber to the South and Karuma Falls to the West.

## Size

It has a land area of about 124km square, 20% of which is covered by swamps made up of seasonal water mainly and limited permanent swamps with water. The swamps are covered by vegetation such as elephant grass, coconut trees, acacia, shrubs and papyrus to mention but a few.

## Population

The sub county has a population of **40,991** with **19,595** male and **21,396** females as Categorized below: The population is spread over 65 villages in 5 parishes.

**TABLE 1 POPULATION OF KAMDINI SUB-COUNTY**

PARISH	NO. OF VILLAGE	NO. OF HOUSEHOLD	MALE	FEMALE	TOTAL
Kamdini	13	2,813	2,950	3,462	6,412
Ocini	16	2,068	6,064	6,344	12,408
Pukica	12	1,152	2,661	5,291	7,952
Zambia	11	879	4,146	2,074	6,220
Juma	13	1,910	3,774	4,225	7,999
<b>Total</b>	<b>65</b>	<b>8,822</b>	<b>19,595</b>	<b>21,396</b>	<b>40,991</b>

## **Topography**

The sub county is generally flat to the north.

## **Soil**

Generally, much of Kamdini Sub County has sandy, clay and loamy soil which are good for Agriculture.

## **Hydrology**

The rainfall pattern is bimodal and is of convectional type. Generally, the rainfall averages 1200 mm per annum.

## **Vegetation**

Along the swamp is papyrus while much of the land is covered with wooden savannas with continuous grasslands with a few isolated thorny thickest shrubs. Much of the natural vegetation has been cleared due to increase in population that pushed the demand for settlement, farming, timbers, firewood and charcoal.

The impacts of deforestation include destruction of habitats, reduction of catchments potential of some of the forests, soil erosion, siltation of water bodies, reduced agricultural production and loss of environmental functions and government revenue.





## **Climate**

The sub county experiences a bimodal pattern of rainfall with peaks in April/May and August / November. It is generally dry from mid December to mid March, June and July. However this pattern is becoming increasingly ever erratic, partly due to the extensive destruction of the vegetation. The average minimum and maximum temperature are 15-17.5 degree centigrade and 30-32 degree centigrade respectively. The atmospheric pressure is about 20-22 milibers with peaks. The winds are the North-Easterly but the North Westerly occurring during the rainy seasons and can attain speeds of 22km/hour.

## **Land use**

About 20% of the land is covered with swamp where 1% has been reclaimed for farming, the rest being for settlement and arable farming. Other land uses include fishing, brick making, quarrying, lumbering, animal rearing, and agro-processing, amongst others. The land management system is mainly customary.

### **3.3 Research Design**

This study used basically descriptive research design which also used qualitative and quantitative research methods. The qualitative methods were used because they show the real experiences necessary in providing a more profound understanding and analysis of all related aspects. Since

qualitative methods are information driven; they provide a more holistic picture and analysis of implications of deforestation on environment. The quantitative methods are dealing with the tabulation, presentation of data analysis in frequencies and calculation of percentage.

### **3.4 Sample Frame Work.**

This study employed simple random sampling and purposive sampling techniques. Simple random sampling was a method of drawing a portion (or sample) of a population so that each member of the population had an equal chance of being selected. Simple random sampling was used to select a random (representative) sample. Simple random sampling is a technique that selects a sample without bias from the accessible population. It ensures that each member of the target population has an equal and independent chance of being included in the sample. Purposive sampling was used to collect information. According to Stacey (1959), in purposive sampling the researcher uses his/her own judgment about which respondents to choose, and picks those who best meet the purpose of the study.

Reason for the use of purposive sampling: According to Stacey (1959), a major advantage of purposive sampling is that it is a way to ensure that we get at least some information from respondents who are hard to locate and crucial to the study. Stacey (1959) makes purposive sampling more admirable in conducting action research. To him, key selected informants (purposively selected respondents) know a great deal about the subject of

the research. In view of the above, purposive sampling was found suitable in its study for the following reasons:-

The selected respondents are found to be more knowledgeable about the information required due to their direct affiliation or responsibility to the area of concern. More reliable and valid data is likely to be given by the respondents. Respondent may take it as their obligation or duty to answer questions. Thus by the use of purposeful, we selected a total number of 120 respondents from the rest of the population for interview. People of 15 years and above, both men and women as the target population, were considered. This was a small sample compared to the total population of the people in Oyam District but given that this was an educational research, coupled with limited financial resources, this sample was commensurately appropriate.

### **3.5 Data Collection Sources**

The data collection sources according to this study are categorized in to two types. That is primary data and secondary data and below is how they were used.

Primary data: People were asked for their views in relation to the implications of deforestation on environment. The questionnaires and interview guide were used in order to get the primary data. Sense of seeing was used in order to observe what was on the ground in relation to the programmes that are intended to reduce environmental degradation.

Secondary data: In order to get the background of this study and to collect appropriate data, the investigator relied on reading books published and unpublished documents, reports, legislation and policy papers related to the study. Bearing in mind the advantages of documentary analysis, the documents were carefully scrutinized and analyzed. This method helped to get the background to the problem as well as the literature related to the research.

### **3.6 Data Collection Procedures**

Interviews, questionnaires, observations and photography were used as the main tools for collecting data. The selection of these tools was guided by the nature of the data to be collected, the time available as well as the objectives of the study. The overall aim of this study was the implications of deforestation on the environment. Opinion, perceptions, feelings and attitudes were considered. The information was best collected through the use of questionnaires, interviews, observation and photography techniques.

Questionnaires were used because there was information that could not be directly observed or were difficult to put down in writing. The techniques allowed control to be guided over the line of questioning, and historical information.

Observation allows what people actually do rather than what they say they do to be seen without informants.

**Documentary Research:** This is the techniques where Newspapers, Articles, Journals and books published and electronic documents were used. Thus in the present research, review of published documentary, reports, and policy papers relevant to the study were used from both private and public University libraries. This was useful for attaining qualitative information regarding the impact of deforestation on the environment.

### **3.7 Data Analysis**

This depends on the Responses received from the fields. The responses were organized in different measurements, which were the major determinants for analyzing the data.

#### ***Qualitative Data Analysis***

The procedures of analysis were applied, as the researcher classified on the views of respondents on the existing phenomena. The tools applied were; documentation, interview guide methods. The researcher analyzed qualitatively the views of different respondents through dialogue as well as the written documents given to them.

#### ***Quantitative Data Analysis***

For purpose of quantitative data analysis, the collected data was expressed in three different tables. The data collected was analyzed basing on the number of respondents. The data was calculated in percentages and it was on this basis that conclusion was drawn.

### **3.8 Limitations of the study**

Without over emphasizing the magnitude of the short comings encountered during the data collection process, the study was successfully accomplished, although the beginning was made difficult due to suspicion by the respondents. Majority were suspicious about the goal of the research project. For instance, in Buga, Kamdini parish, Oyam District, Some respondents had it rumored that research was instituted by government to assess the rate at which the environment is being degraded. Others thought that the research was part of the government programme aimed at evicting respondents from their land. This partly culminated from the fact that the research almost coincided with President Yoweri Kaguta Museveni's donation of the land to the investors. However, it was explained and such areas of fears and the majority of the selected respondent accepted to be interviewed. The task was to ensure respondents very strict confidentiality and that their names would not be recorded if they preferred not to have them recorded.

Majority of the respondent had too much expectation from the investigator. Some of the respondents who were interviewed expected the investigator to assist them in some way, not just to collect information and go. This problem is increasingly becoming a serious problem in Uganda. Part of the problem was that some respondents were used to projects that often hand-out some items to the respondents. Such respondents hardly distinguished investigators from such organizations.

Transport was a big problem for the researcher. The road to the study area, were very poor and there were no taxis leading to the place. The researcher was forced to foot and hire a motor cycle commonly known as Boda- boda which was so costly.

Weather conditions were not favorable being the rainy season; the research was interrupted on many occasions since meeting could first go to a standstill as respondents took shelter.

## CHAPTER FOUR: RESULTS AND DISCUSSION

### 4.1 Introduction

The study investigated the role of deforestation on the environment. This was in light that Uganda is losing its forests all over, and many people are suffering from destructive process that deprives them of their natural resources on which they have sustained their livelihood for a long time. The data were analyzed using descriptive methods, and they are discussed under the following sections.

**TABLE 2: RESPONSE TO VALUE OF FORESTS**

VALUE	RESPONDENTS	PERCENTAGE %
Direct value	34	28
Indirect value	33	27
Existence value	30	25
Option value	23	20
<b>Total</b>	<b>100</b>	<b>100.0</b>

### 4.2 Direct Values

Table 1 indicated that 28.3 percent of the respondents consider forests for direct value to humanity. This is the total value of direct use which was made of the forest resources by various groups of people, and they includes;



Timber and building materials: Timber and other building materials are extracted from forests. This was supported by 41.2% of most of these that considered forests for direct value. Timber values are sometimes high if forests contain a large stock of commercially valuable tree Species. Due to high demand for timbers in Kampala as a result of increased construction of houses coupled with poverty, many people living in these forests areas have resorted to local timber trade so as to earn their livelihoods from the forests resources. Most of the timber is used locally but some timber products are for commercial transaction. This finding coincide with the view of Poffenberger (2001) who asserted that forest resources are used to get lumber business is one of the most important branches of the forestry business and though the sale of timber resources a country raises revenue through taxation. In a similar tone, Shukla et al (1990) also talked about timber business.

**TABLE 3: RESPONSE TO DIRECT VALUE OF FORESTS**

USE	FREQUENCY	PERCENTAGE %
timber for building materials	14	42
Food supply and other raw materials	20	58
<b>Total</b>	<b>34</b>	<b>100.0</b>

Food supply and other raw materials: Not surprisingly, it was found out that forests and forest trees provide many edible and useful products. Although these foods are usually, wild leaves, bush meat, vegetables,

medicines, honey, mushroom, tubers, roots, gum sap are obtained from these forests. This view was supported by 58.8% of the respondents (table 2). Some of these plants are believed by residents to provide vitamins, carbohydrates, fats, protein and minerals. They are also very needful during harsh conditions such as famine or natural disasters like draught.

#### **4.3 Indirect Values**

Some 27.7 % of the response considered the forest rendering indirect value to the people. The indirect values of forests comprise the ecological goods and services they provide. These include regulating micro-climate of the areas adjacent to the forests, recycling nutrients and maintaining soil fertility. These services benefit both local and national population. Forests also provide protection to the water shed catchment for rivers and streams as well as water courses on which thousands of people in the area depend. The indirect values of forest include;

**Soil fertility and stabilization:** The findings of the study indicated that forests are very useful in improving the fertility of the soil on which they stand (Table 3 below). This was supported by 54.5% of those who considered forests for indirect value. The respondents confirmed that decayed leaves and other plant tissues provide organic manure that enrich soils for crop growing. They added that such soils with high levels of organic matter hold water which is used by plants. Areas that were under forests consequently had darker soils compared to areas that were forest free. The respondents further explain that various trees with deep rooting

systems extract nutrients from deep soils and deposit them in the form of leaf litter. This leaf cover enriches the soil and helps the soil to retain moisture. Nitrogen fixing trees also contribute to soil fertility as do the shades which lower surface temperature. Trees and shrubs can manage and control soil erosion thereby stabilizing soil quality and helping agricultural production. This helps to ensure food security and production to communities living around and within those forests.

Similar reasoning was provided by Leister (1998) whose view was that the decayed leaves and other plant materials added a great deal of humus to the soil making it spongy. This enriches the soil hence supporting crop growth.

**TABLE 4 RESPONSES TO INDIRECT VALUES OF FORESTS**

<b>USE</b>	<b>FREQUENCY</b>	<b>PERCENTAGE %</b>
Soil fertility	18	54
Cultural diversity	15	46
<b>Total</b>	<b>33</b>	<b>100.0</b>

Cultural diversity: Some places in the forests are regarded as sacred according to the respondents. This was supported by 45.5% who argued that culture is very important (Table 3). Many people are known to be forest dependant particularly for their food, medicine, worship, cleansing and even good fortunes. Treasures of these forests by those people are so important because, their belief has kept them in harmony with forest for so long. Deforestation and its eventual negative effects have greatly

affected these people in Buga village. Deforestation has deprived these people of their places for worship, their medicinal herbs and their places of gathering in association with their gods. This is greatly affected their culture and contaminated it with the western culture. Culture is very important because it makes these people live in harmony with environmental resources. For instance in Kamdini, some trees are respected as a source of life for some people, and cutting down such trees means depriving people of their livelihoods. Deforestation therefore means displacement and extinction of cultures the view that had been re-echoed by Nicholson (2001) and Poffenberger (2000).

#### **4.4 Option Values**

The option values of forests were supplemented by 19.2% of the respondents and this gave the least percentage of the respondents (Table1). Option values are the premium that people in these areas pump on conservation of a forest for future uses; but they might include providing raw materials for pharmaceuticals, industrial and Agricultural applications which have not yet discovered, for eco-tourism development and for ensuring a permanent range of goods for forest production known and used at commercial and subsistence level.

#### **4.5 Existence Values**

Existence value is the values people derive from simply knowing that forest exists, Even if they never visit it. This includes the cultural and religion significance of particular forests for certain communities, the

aesthetic pressure the people derive from the forest and the heritage and bequest importance of forest as a legacy for future generations. Out of the sample 25.0% of the respondents held the view that forests have existence values.

#### 4.6 Causes of Deforestation in Buga

A number of factors are responsible for deforestation in the study area. These factors ranged from social, economic, religious and political interests.

**TABLE 5 RESPONSES TO CAUSE OF DEFORESTATION**

<b>Causes</b>	<b>Response</b>	<b>Percentage %</b>
Cost of forest	30	33
Increased demand for timber and other materials	34	28
Increased demand for cropping and settlement	20	17
Mushrooming dairy farming	16	13
Increasing demand for fuel wood	10	9
<b>Total</b>	<b>120</b>	<b>100.0</b>

Table 4 indicated that 33.3% of the respondents stated that deforestation is caused by the cost of forests. Forests are believed to incur a number of costs to the local communities. These costs are fundamental cause of deforestation, which includes:-

Opportunity costs: Respondents revealed that keeping land under forest cover produce the possibility of alternate land uses. The range of possible uses of forest land is extensive. However, it is reasonable to assume that the most likely alternate land uses in the area would be small holder's agriculture. Taking variation in agro-ecological zone and different farming system into account, the value of arable production on land currently occupied by indigenous forest is of no use for the community. This was supported by 27.5% of the entire respondent that considered costs as a cause for deforestation in Buga (Table 5).

**TABLE 6 RESPONSES TO THE COST OF FORESTS**

<b>Category</b>	<b>Frequency</b>	<b>Percentage %</b>
Opportunity costs	11	28
Animal costs	8	20
Replacement costs	21	52
<b>Total</b>	<b>40</b>	<b>100.0</b>

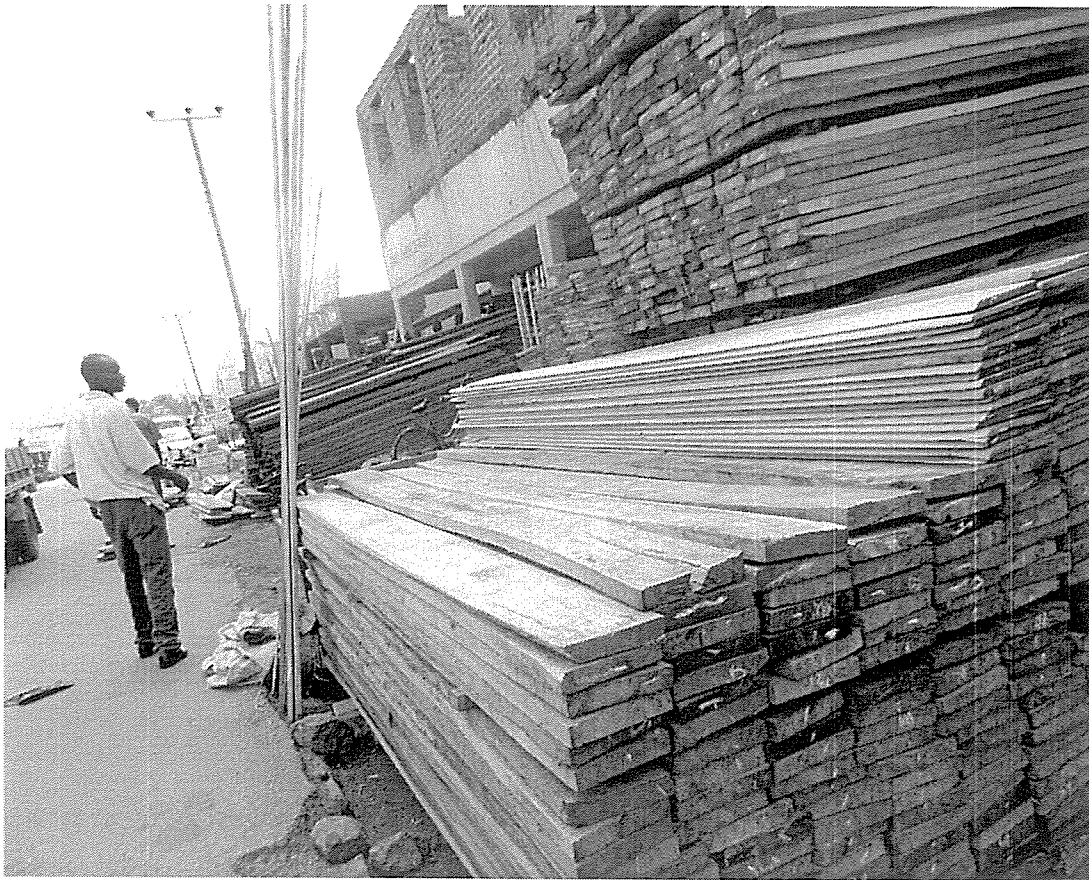
Animal damage: The presence of forests incurs costs on local population through the damage they suffer from vermin and other forest dwelling animals that destroy their crops, buildings and other farm infrastructures. This was confirmed by 20% of the respondents that considered deforestation to be caused by the cost of the forests. Wildlife is said to be destroying crops worth significant amount of money per year. Animals ranging from baboons, monkeys, birds, snakes, cats are said to invade people's farm and eats off their crops and domestic animals. Households

in these areas are estimated to suffer substantial financial losses as a result of wild animal's danger. The communities resort to clearing off the forests in their localities so as to scare away these animals.

**Replacement costs:** Respondents revealed that though forests benefit them, their direct values is less compared to the gain they would get by undertaking market-based activities in the forests. They look at the value of these activities in order to gauge what is better for them, whether they should remain with forests or clear cut the trees to give room for market based activities such as dairy farming and other likes. Looking at replacement costs, 52.5% of the respondents reported that the people prefer clearing the land of its forests cover and replace it later rather than losing the market value.

**Increased demand for timber and other materials:** The study established that the second major cause of deforestation in Kamdini is increased demand for timber. This was supported by 28.7% of the respondents. In Kamdini, timber is used for making furniture, construction of houses. According to the residents, trees that produce high quality timber have been cut down considerably. The cutting of trees to get timber has been increased with use of better tools like saws. The findings also revealed that the major pressure put on forest and eventual deforestation was a rising from increased demand for timber and wood especially in Kampala city and other surrounding towns. Kampala provides amongst 90% of the market for timbers and wood. It's believed that timber serves many purposes in Kampala including house construction, boat making, furniture

making, bridge construction and many more purpose. The pressure on forests is also aggravated by unemployment which has compelled many youths to participate in deforestation so as to make their ends meets. In other words, forest in these areas have proved to be some of the most valuable economic resources to people since majority of the people are poor and less educated to be involved in better income generating activities. This explains why many people are resorting to the forests which are readily available and need no technicalities.



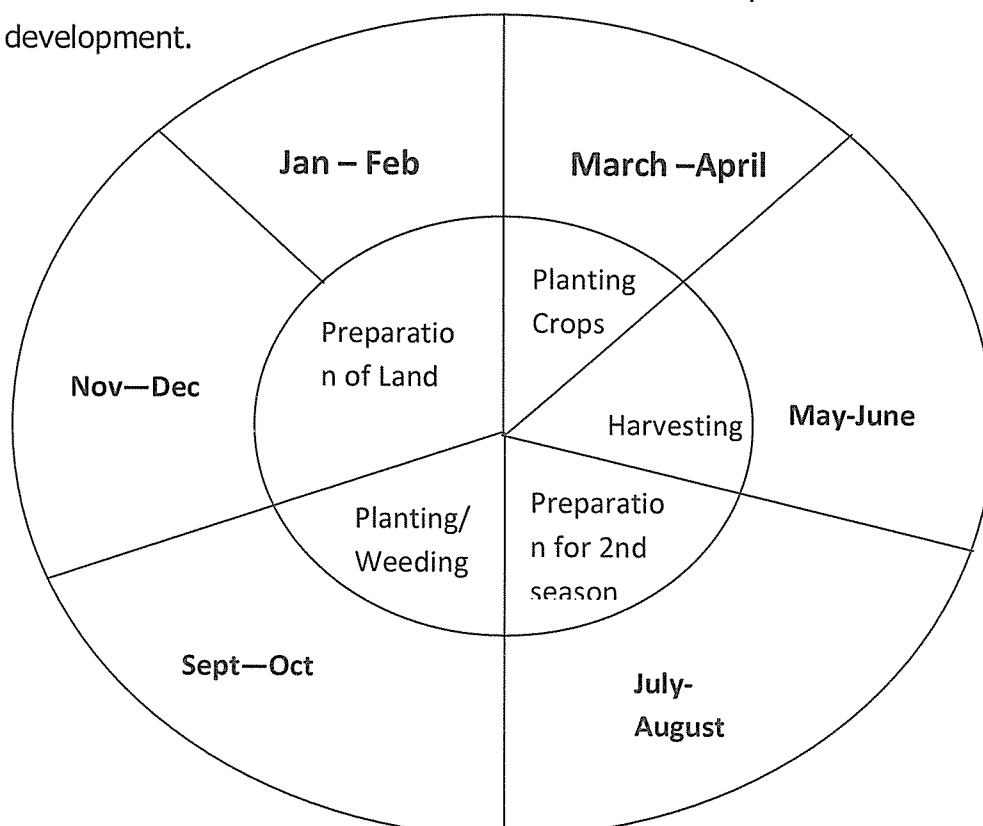
**Plate 1 Timber for making furniture and construction work**



Increased demand for crop land and settlement: A 16.7% of the respondent attributed deforestation to increasing demand for crop growing that forests are being cleared in the area. Farming is spreading from forests to forests, wet land to wetland, valley to valley due to increasing population of humans. While the significant amount of forests is cleared daily, the growth in demand from food is increasing following the amount of forest cleared. The demand for food is not only aggravated by local residents but also by the town dwellers whose population has greatly increased. Much of the food produced in the study area is sold to the town dwellers in big amounts leaving local communities with no food. Being a major source of income to all locals, these local communities can not abandoned crop growing in favors of forests, but rather to clear more chunks of land in order to grow more food which will generate in more income to educate their children and meet other necessities. Most people in the study area are all cultivators a part from a few immigrants who cultivate a long side keeping cattle. The crop grown in Kamdini includes maize, beans, cassava, millet, vegetables, and sunflowers. Vegetables like cabbages, Egg plant are grown in newly cultivated deforested areas because they thrive well in such areas where humus content is high. The land is prepared for cultivation during dry season (December to February). Preparation process involves cutting down trees to create space for crop cultivation. Tools used to cut down trees include pangas and axes. Planting of most crops starts in March with the start of the heavy rains. After germination of seeds, weeding follows. It's done several times depending on the intensity of rain. The labor force is mainly family labor in the areas of Kamdini. Immigrant's labor is employed by some farmers

who have big gardens. Harvesting is done by family labor and migrant labor depending on the income levels of the farmer and the garden. The harvested crops are stored in locally made granaries. According to one resident farmer pests like maize weevils and bean aphids are rare and as such loss of crops during storage is not great. Agricultural events that take place during the year in Buga are shown in fig 2.

The increase in the demand for land to be used in Agriculture is resulting from the increase in the population of an area. Essentially then, Cleaver (1993), Diwan (1998) and Kichodo (2003) emphatically argued that population growth increase pressure on forest resources particularly in the areas close to the forests. Increasing population that does not match with economic development is bound to experience serious challenges to developing countries such as Uganda. The solution to such dilemma is for the government to educate the masses to practice sustainable development.



**Figure 2 Farmers calendar in the study**

Farmers in the study area revealed that the areas presently covered by their gardens were occupied by trees when they had just settled in the area in the early 1980's. Trees were cut down to create land for the growing of crops to support the settled population in the area. Trees were few or absent in areas that are under cultivation as farmers argue that trees obscure crops from receiving light. It was also observed that more land under forest is being put to cultivation.



**Plate 2 A new areas cleared for maize growing in buga**

Other than the mentioned crops, simsim and sunflower has put a lot of threat to the forest. Many local people have put much effort in simsim and sunflower growing which forces them to clear the land for these crops. Simsim for example is nicknamed white Gold because it fetches high price compared to all other crops and also with the introduction of Mukwano industries, there is high demand for sunflower for Mukwano industries So people embarked much on sun flower as raw materials for Mukwano oil industry. Thousands of acres of land were cleared to pave way for growing of these crops. Unfortunately, the cleared lands out of forest were not allowed to regenerate.



**Plate 3 Banana plant planted on former forest land in Kamdini**

Settlement: Table 4 shows 16.7% of the respondents stated that deforestation is caused by increased demand for land for settlement. The type of settlement patterns observed in the study area can be classified as linear, sparse and nucleated.

Nucleated and linear types of settlement were found to be more in the area of Kamdini. Linear settlement patterns occur along the feeder roads such as Kamdini Town Board. Nucleated types occur in trading centers such as Nora trading centers. Sparse settlement patterns were noted to be prevalent in the areas near forest reserve and areas with gentle rolling hills such as Juma hills towards Karuma.

The variation in settlement patterns is attributed to the fact that deforestation and hence settlement took place at different times. Oyam District Forest department used to issue people with permits which allowed them to carry out temporary settlement within the area close to Kamdini before the forest was degazetted. In this area (close to Kamdini) human activities including settlements have therefore occurred more than in any parts of the sub county. It was however noted that even within the area close to Kamdini, sparse settlement patterns do occur on the side of the hills where soil erosion is severe.

Vegetation is said to be dense in the areas occupied by the linear, sparse and nucleated settlements. Trees near homes have been cut down to create space for the construction of more houses. These houses are built out of materials obtained from the forest. Example of such materials includes poles and rafters. With increased construction of houses

especially in nucleated settlements areas, more and more of trees have been cut down to obtain building materials.

Mushrooming dairy farming: Table 4 also indicates that 13.3% of the respondents pointed at mushrooming dairy farming as the cause of deforestation in Kamdini. Forest land is prone to be a source of grazing grounds in Kamdini. Respondents revealed that people in the area have greatly changed their status from crop farming to cattle rearing. This situation has been worsened by emigrants from Acholi region and Karamoja due to instability in the North.

Dairy farming is also responsible for the disappearance of many forests in Kamdini. Adoption of exotic cattle and the characteristics of cattle grazing have changed indigenous cattle can wonder anywhere in the bush searching for grass, but exotic breed need total hygiene free of pest. This forces people to clear the entire bush and the farm to create better conditions for these exotic breeds. In so doing plants are cleared in favor of good pastures for cattle. This explains why many trees have been cut. This is precisely the situation which Adeleke(1998) talked about when he said the rapid depletion of Filipino forests by logging, mining and settlement encroachment was requiring a policy response. Farmers stated that they were engaged in cattle rearing because it was bringing in quick returns compared to other activities. In this rein an attempt was made by Jarosz (1993) to analyze the impact of Harding on marginal lands and he established that a growth in Herding on marginal land and he established that a growth in herding had a significant impact on regions of forests.

The idea persist that there must be a way of reconciling Herding and environmental conservation.



**Plate 4 An exotic cow in one of the farm cleared from the forest in Obari**

Marketing livestock products. Kampala's large population offers a very ready market for livestock products. In fact what is produced in Oyam District is just a small fraction of what is needed in the market of Kampala. As a result, farmers within these areas get good prices for their



products compared to their counter parts in other rural parts of Uganda. For instance a dairy farmers in Kamdini is able to sell their milk at 1000/= per liter to a trader in Kampala compared to his counterpart in Corner Atapara who may be but lucky to shell his milk at 600/= per liter to a buyer in the village.

Besides, farmers in Kamdini do not incur heavy expenses on transport which would reduce the profit. Such lucrative market provides an incentive for heavy investments in the activity. Much as the people of Kamdini want to take the opportunity of the Kampala market, they should be environmentally friendly; because forests are necessary resources which play a vital role both in social and economic development and their proper management of improves quality of life.

Increased demand for fuel wood: it was established that 8.4% of the respondents stated that deforestation is caused by increased demand for wood fuel (Table 4) this was least percentage on all options given. It was noted that wood fuel is the main source of energy in Kamdini. The study established that 98% of the population uses firewood while 2% comprising of trading centers dwellers use charcoal for cooking. Through interviews each household was found to use firewood that is equal to one kilogram per day with increasing demand and diminishing firewood supply, some residents in the study area have turned to the forest reserves as the main source of firewood. Others cut down trees and leave them to dry for future. This is precisely a situation which Salati (1991) talked about that many Africans depends on the use of forests products principally wood and charcoal to meets their cooking and heating needs.



Respondents revealed that there is always ready market of whatever charcoal that is produced. While charcoal burning creates employment and provide fuel especially to low income groups, traditional methods of manufacturing charcoal are very inefficient and the environmental costs involved due to deforestation, are not reflected in the price of the product.



**Plate 5 Charcoal stocked in bags ready for sale to Kampala**

Additionally, due to constant load shedding, in major towns and the whole country, demand for firewood has increased. Firewood is used in small

scale industries as a source of energy and heat. The situation has been worsening by the increase in the prices of insufficient hydro electricity power. This has led to many urban dwellers including those in Kampala city to resort to extensively firewood. Many small scale industries especially those that depend on heat for production are currently using firewood. Among those include bread making bakeries. Bread in Kampala and other peri-urban areas is now firewood dependant, business has found it easy and cheap to produced bread by use of firewood rather than depending on ever costly load shaded electricity. This has not only resulted in to deforestation but also clearance of woody bushes and other vegetation in the area.



**Plate 6 Firewood in Buga for transportation to bakery in oyam town**

Additionally, the brick industry has created some employment to the people but as the study has been at pains to point out the implication of deforestation on environment in Kamdini, brick industry has negatively impacted on the environment through deforestation and creation of water pools, which is breeding areas for disease Vectors mostly mosquitoes, which carry malaria parasites.



**Plate 7 Trees cut for brick burning and general kiln work firing**

#### **4.7 Extent of deforestation in Buga**

Most trees in the village have been cut down to create land for Agriculture, settlement and grazing. People have cut down trees to obtain timber and wood fuel as noted in section 4.1 cultivation intensified within these areas in the 1990's due to increase demand for agriculture and settlement.

**According to DFO (NFA) Oyam, deforestation occurred in two phases;**

The first phase took place in areas close to Kamdini village in 1998 when this part of forests was still gazette. The second phase took place after 1998 in Southern part of the village in areas close to forest reserve. This is so because the district forest department used to issue people with lincas that allow them to carry out temporary cultivation. Despite claims by forest officers that deforestation no longer takes place, grazing domestic animals and people carrying firewood, timber, bamboo and green vegetables were observed in the forest reserve.

Residents involved in such practices when interviewed said that they do not have any other alternative source of materials it was also noted that some residents exchange the materials (honey, bamboo and vegetables) they obtained from forest reserved for food items within and outside the country. Therefore the situation of this kind, where the forest reserves were being used as a source of food and building materials, the possibility for further cutting down of trees are high.



More so, most residents interviewed were unwilling to leave the area if government tried to resettle them elsewhere. Some said they are used to the climatic condition of the area while others claimed that they lost a lot of properties worth thousands of shillings when they were shifted from their previous areas of occupancy. A number of respondents request government to help to build schools, dispensaries and to construct feeder roads that will be used to transport Agricultural produce to trading centers. This shows the confidence that people have settled in an area that was covered by a forest. This same view is shared by Treadway (1974) who indicated that in 1900, the area covered by forest in Uganda was estimated to be covering 12.7% of the total land area in 1952 it reduced to 4.6% and today it is estimated to be covering only 3%. It appears to be settled that the natural environment of man and his survival is this threatened gravely.

#### **4.8 Effects of deforestation on the environment**

The ecological (environmental) resources that have been affected by deforestation include: micro climate change, loss of bio diversity, decrease water levels, soil erosion and mono culture tree plantations.

**Table 7 IMPACT OF DEFORESTATION ON THE ENVIRONMENT**

<b>NO.</b>	<b>IMPACTS</b>	<b>RESPONSE</b>	<b>PERCENTAGE%</b>
1.	Micro Climate Change	32	27
2.	Loss of biodiversity and culture	30	25
3.	Decreased levels of water bodies	23	19
4.	Soil	20	17
5.	Monoculture tree plantations	15	12
<b>Total</b>		<b>120</b>	<b>100.0</b>

Micro Climate Change: The majority (26.6%) of the respondents referred to micro climate change as the major impact of deforestation on the environment. Since the beginning of deforestation in this area, climate has been changing gradually. While other factors may also be blamed for micro climate change in this area, the natural variations of climate in this area have been the largest than those that existed before extensive deforestation occurred. It is increasing disturbance of natural course of events is a matter of concern as noted by Porter (1991) whose view was that unsustainable practices will have a negative effect on the region's economy.

The other aspect requiring attention is that respondents pointed out that deforestation has altered the earth's heat budget reception and as a result opened land receive more heat than it had in the past, a fact that has changed the micro-climate of the area. Respondents went on to explain

that in the past, Kamdini experience large droughts. Droughts occurred in the month of December to February. These have effects in the past. Recently, heavy droughts have caused famine in the locality are being experienced.

Deforestation is understood to release gases in to the atmosphere which act as green house gases that allow short wave radiations to reach the earth but stops long wave radiations from escaping to the atmosphere making them long wave radiations to be retained by the earth hence increasing its heat.

Land degradation is the biggest problem observed. Land degradation has become one of the most serious environmental problems resulting from micro-climate change. Soil degradation especially in cleared forests is a chronic problem that has undermined food productions. Respondents revealed that in the last decade, drastic food shortage has hit the area as a result of degraded land and extended drought. The reduced capacity of food production has brought a big number of populations in this area to the verge of poverty calamity. Some people have become malnourished while many have suffered impaired health for the rest of their lives. Droughts have become common in the area and are expected to continue, recurring at unpredictable intervals especially due to threats of climate change. Droughts in this area are said to be the end result of deterioration and environmental declines caused largely by mistakes and mismanagement of forest resources has a life supporting system on this earth. The above grounds are not conclusive and other academic researchers have the power to investigate more.

Loss of biodiversity and culture: Loss of biodiversity and was also observed as one of the effects of deforestation and 25.0% of the respondents supported this. They claimed that many forest based plant and animals species are already threaten with extinction. Where as a number of plant species especially trees have been reduced in numbers as a result of deforestation, there has been an increase in the variety of grasses in the deforested area. The grass species observed in the study area i.e. kikuyu grass (*Pennisetum uendestinium*), star grass (*Cynodon doctylon*) and couch grass (*Digitaria abyssinica*). The high number of grass species in the forested area is attributed to factors that includes;

1. Forest vegetation has been cleared in the forested and this has allowed high intensity of high energy from the sun to reach the ground. The high intensity of solar energy received at the ground level has resulted in to photosynthesis by grass species and hence high population of grass species. In the forest reserve, the presence of thick vegetation cover prevents lights energy from reaching the ground and this has prevented the growth of plant species including grass. Chazen (1994) subscribes to this view by saying that forests serve as habitat for heterogeneous animal species while reaching a similar conclusion with MacGaffay (1991).
2. In the deforested area, there are low qualities of litter covering ground. This has created space for the growth of grass. In the forest reserve, the qualities of litter covering the ground are very high. This serves to indicate that the light energy is the most important factor controlling the growth of grass. The historical change is the biodiversity however, have not been adequately



studied. This should be carried out in order to understand the factors that have enabled some of the forest based plants to survive against growing human population pressure.

Additionally, the most common wild animals in Aber are mainly Edible rat, particularly bats and squirrels. According to the resident of the village, other animals species used to exist in the area in the early 1990's and had just settle there were monkeys, Antelopes, Baboons. This is because Kamdini is just about ten kilometer from Murchison falls National Game Park. These animals have moved (migrated) from Murchison falls park into the forest. The types and numbers of animal species are higher in the forest reserve than in the deforested area. This is because of the following reasons:

The clearance of the forest by settlers and growing of crops such as maize resulted into the destruction of the habitat of forest animals;

Animals like monkeys eat and damage crops of residents for example; monkeys eat maize and Irish potatoes. Residents of Kamdini kill such animals deliberately leading to their reduced numbers;

Some residents hunt some animals. This hunting practice has led to the migration of wild animals to areas deep in the forest reserve. On the other hand man's activities here created favorable conditions for some other animals;

The clearance of forest has resulted into expansion of rangeland and availability of more food supply. These conditions has favored animals

such as rodents and long crested eagles. This long crested eagles feed on chicken chicks that are reared by residents and rodents feed on maize grains produced at the clearance of the forests.

Decreased levels of water bodies: The study also found out that deforestation has led to a decrease in the levels of water in Kamdini. This was supported by 19.2% of respondents. Drastic climatic dislocation that took place during the last decade due to deforestation has manifested a decrease of water body levels in Kamdini according to the study. A decrease and changes in the annual precipitation with attendant albedo and changes in cloudiness during the last few years is said to be the cause of threat of decreased water levels in water bodies.

It was found out that the volume of water in stream increase considerably during rainy seasons. This is attributed to the fact that trees have been cut down therefore exposing the soil to the agent of erosion like running water that carry silts in to streams from cultivation areas. According to research finding, the volume of water in some streams increases considerably after rain such that crossing from one side of the streams to the other is impossible and attempt by young children to cross such streams have led to drowning.

The volume of water in stream flowing across the forest reserve was observed to be relatively low. It was further noted that some springs that used to exist in the area in the early 1990's have dried up. This is because hard soils with low porosity have been exposed after the clearance of forest. It was also found out that the residents of the study area fetch drainage water from springs some of which are more than one kilometer

away from household. During dry period, water shortage becomes a problem for communities in deforested areas. Therefore the impact deteriorating water quality should be investigated further.

According to Kichodo (2001) who shares the same view with Kuechilli (1997) having forest cover is the most important way of preventing desert-like conditions.

Soil: Some 16.5% of the respondents also indicated that deforestation has an impact on the soil in Kamdini. The residents of the area reported that soil fertility in the village has declined. Most farmers interviewed said that the qualities of crop yield were greater compare to the past when they first settled than what they produced these days.

Loss of soil fertility is brought about by processes resulting from deforestation. Such processes include; soil erosion, reduction in the quantity of humus and litter in the soil. It was observed that soil erosion is common in most parts of the villages. This is because most trees have been cut down and hence exposing the soil to the agent of erosion such as wind, running water. Vegetation covers of trees reduces the velocity of rain drop so that by the time it reaches the ground, it forces would be greatly reduced and hence reduced soil erosion.

The type of soil erosion observed in the study area is gully, sheet and rill. Gully erosion was observed to be the widest spread form of erosion. It's the form of erosion that carries a lot of water during and after rains. It results from further development of rill erosion. Soil erosion has resulted into removal of large qualities of top fertile soil in the study area exposing these layers of soil that hardly support the growing of crops. In areas

where deforestation took place earlier, reddish/brown soils have been exposed. Black loam soils were rarely observed in this part of the village-Kamdini.

On the other hand, soil erosion was observed to be too minimal in Forest reserves. This observation shows that deforestation is the main cause of soil erosion (a factor that reduces crop yield) in the study area. Humus and litter support plant growth favorably because it's the main source of organic nutrients from the plants in the soil. Humus and litter are formed during remains of micro- organism such as bacteria and fungi. Trees that are main source of humus have been cut down in the village. Fire is observed to prepare land for cultivation during dry season. Trees are burned to create space for cultivation of crops. In the course of burning, soil organism that decomposes plant and animal remains in to humus are also burned and hence reduces qualities of humus and litter. This is in accordance with Kichodo (2003) explanation that clearing and burning of vegetation leads to disruption of closed humus cycling. The low quantities of humus resulting from the cutting down of trees therefore partly explains the decrease in crop yield in Kamdini.

Adoption of monoculture tree Plantation: The study also found that deforestation leads to the adoption of monoculture tree plantation as stated by 12.6% of the respondents (table 6). These respondents affirmed into deforestation are resulted into tree monoculture which threatened their environment. This intended to arrest the impact of deforestation such as lack of firewood, wood for construction, among others and to reverse the situations of harsh weather conditions created by massive clearance of trees. However this has created problems than it has solved.

Tree monoculture especially of alien species of pine and Eucalyptus has not only aggravated the problem but also put more stress on the environment. Monoculture tree plantations especially eucalyptus suck up more water from the soil and underground leaving communities with nowhere to turn to their life supporting resources especially during harsh condition.

Fertility of the soil is also crippled by this practice. Monoculture tree plantations do not allow undergrowth which would otherwise die out, rot and enrich the soil. Their leaves especially pine and eucalyptuses do not rot easily. This leaves soil underneath forest bare which encourage agents of soil erosion (such as running water and wind) to carry away large amount of soil downhill leaving behind the most infertile soils. More so these forests have attendance of even aged trees and especially serving one purpose when cut down these trees lease significant amount of carbon dioxide into the atmosphere that eventually affects the Ozone layer by depleting it as noted by Juttakill (2002).

#### **4.9 Measures to control and ultimately halt deforestation**

The respondents suggested that the government (both local and central) should sensitize the local people on the importance of forests. This is in line with Kichodo (2001) who suggested that the forest department in Uganda should provide education to the farmers surrounding the forests on the need for protecting the forests. The respondents also suggested the adoption of the reforestation policy. They argued that the government should take the initiative to advise the farmers on replacing the cleared land by planting even more than what have been cut. They recommend

that the government should also provide them with seedlings of trees species for planting. Kamdini residents also suggested that they should sensitize on the practice of agro-forestry method of farming which is concerned with both productivity and conservation.

#### **4.10 Analysis of data on implications of deforestation in Uganda**

A careful analysis of the implication of deforestation on the environment in Buga, Kamdini parish Oyam District indicated that there is a much encroachment on the forested area in the region. This has resulted mainly from the values of forests which include direct value which, according to the respondent, takes the highest percentage. Other values include indirect value existence value, and option value supported by 19.2%. These factors show that they are a result of survival strategies by the local people. Poverty is driving the majority of the people into the woodland in attempts to eke out a living. In so doing, they are clear-felling woodland for Agriculture. The people also see a chance to profit by selling wood or charcoal in a commercial market. So they fell live trees, not even sparing the first reserves. The analysis of this study has also shown that deforestation is rampant in the study area. It is mainly caused by the cost of the forest, increased demand for timber and other materials, increased demand for cropping and settlement, Mushrooming dairy farming and increasing demand for fuel wood. The study established that deforestation have impacted negatively on the environment. They range from micro-climate, loss of biodiversity and culture, decreased levels of water bodies, Soil degradation and adoption of monoculture tree plantations.

## **CHAPTER FIVE: SUMMARY CONCLUSION AND RECOMMENDATIONS**

### **SUMMARY**

Deforestation is a major challenge facing many countries in Uganda today. Due to severe poverty and lack of other income generating activities many people especially the rural poor find their means of survival from forests. Activities like lumbering, charcoal burning, logging and cultivation of crops are particularly carried out in forests. This has resulted to severe loss of forest cover leading to erosion, change climate and many other related problems. The study aimed to find out the implications of deforestation to the environment. The specific objectives are.

1. To find out the values of forest to the environment
2. To investigate factors responsible for persistent deforestation in Kamdini
3. To find out the impact of deforestation on the environment
4. To find out measure that can be taken to solve the problems of deforestation.

The study was carried out in two of the most deforested area of Buga village. Stratified and random sampling method was used to obtain two mutually agreeable groups of forest users that is those from Kamdini trading centre and those from Buga village. Data collection included name of the respondent, Age, Sex, Marital Status, educational level, family size, users of the forest, benefit of the forest, time of the services of the forest, activities carried out in the forest and causes of deforestation, extent of deforestation, state of the soil in the deforested and forested areas,

presence and absence of animals, the status of Micro-climate and decision that can be taken to control deforestation.

Cross sectional data were collection from 120 forest users that were randomly picked and analyzed. The major findings of the study indicated that direct values, indirect values, option values and existence values were the major benefits of forest. Whereas costs of forests increasing demand for timber and other material, increasing demand for crops and settlement, mushrooming dairy farming increasing demand for fuel wood were the causes of deforestation. Micro-climate change, loss of biodiversity and culture, decreasing water level in water bodies, soil erosion and adoption of monoculture tree plantations were the impacts of deforestation on the environment .Respondents suggested that enforcement of protection laws, public education and participation, political will and motivation of forest officer and setting up of the management body were the measures that could be taken to control deforestation.

## **CONCLUSION**

Deforestation is major environmental problem affecting many part of the Country. Available evidence indicates that it has been accelerating at a very rapid rate. Large tracts of land have been deforested, exposing the land to future environmental damage. The growing demand on forest resources is a threat to the future existence of these forests. The Buga case study as presented in this research is a vivid example of how rapidly the forest is disappearing in Uganda. The situation in Buga shows that



extensive areas of woodland have been completely deforested while in some areas, the woodland has been considerably degraded. Many of the woodland covers have been converted in to cultivated land or grass land interspersed with a few scattered trees. Some new animals and plant species have colonized deforested area. Soil fertility has declined due to deforestation that exposes soil to the agents of soil erosion. The volume of water in stream increases during raining season because of increase in runoff. More data however is required to show the extent of the problem and the rate at which it has been occurring.

The causes of deforestation in Oyam District as elsewhere in Uganda are multiple and complex but all are a result of human development. The more direct causes are settlement and expansion of agriculture, fuel production and dairy farming. Other factors though not very significant are breakdown of traditional management system. These factors interplay in the process of degrading the woodland resources and or converting them into non-forested lands.

The situation has been exacerbated by government policies, which have often encouraged unsustainable resources utilization and management. A good example is the agriculture policy which emphasizes cultivation of export crops, including sunflower in order to generate foreign exchange. The structural adjustment programme has further aggravated the problem of deforestation.

Taking into consideration all the arguments that have been put forward in relation to the causes of deforestation in Kamdini, the following observations were made:

Deforestation has occurred in the entire village. The thick natural forest that covered the study area in the 1990s has been replaced by cultivated field.

- It was noted that encroachment upon the remaining forests is still taking places despite the claiming by the district forest officials that it's has been checked. The residents of the village still cultivate and graze their animals in the first areas.
- The number of tree and varieties has been reduced in degazetted areas. The diversity of grass species was found to have increased greatly in the deforested and settled area of Buga Village. It was further noted that the species for Edible rat has been greatly reached in the deforested area of Buga.
- In the deforested area of Buga Village, it was found out that there is an expansion in the range of habitats and it's has resulted in the expansion or increase in the number of animals and plant which inhabit open ecosystems.
- New animal and plant species have colonized the deforested area. Soil fertility has declined due to result of deforestation that exposes soil to agent of soil erosion. Because of soil erosion, the crop yields have continued to decline, River and stream water has been contaminated by animals and agricultural wastes from the grazing and cultivated areas. The volume of water in stream increases during raining season because of increase in run off.
- Environmental impact Assessment should be conducted to guide any planned development activities in forest.

- Growth caused mainly by immigrants is an important factor in relation to settlements of the immigrant population and the need for agriculture and grazing land.
- Migration has led to the breakdown of agriculture management system of the Buga people.
- Market exploitation of forest particularly for charcoal has been done haphazardly and attempts by the government to regulate its activities through licensing and fees have failed to curb the illegal charcoal business.
- The expert Devine and the need for income have led to the expansion of coffee cultivation causing rapid depletion of woodland.
- At certain occasion the government of Uganda encouraged deforestation by offering forests land to investors.

Basing on the above observation the study concludes that natural event should be considered as a borrowed resource from our grand children or future generation and we have responsibilities to conserve/protect and sustainably utilize those resources without compromising their values to the rightful owners, the future generations. It should be noted that each one of us has a responsibility of recognizing that, through complicity and silence we all contributed to environmental degradation and destroying the environment is compared to signing of death warrant for the entire generation.

## **RECOMMENDATIONS**

Basing on the findings of the study, the following recommendations are made.

1. Awareness campaign on deforestation and environment. Campaign on environmental awareness should be commissioned and the people sensitized aimed to stop the increasing disappearance of the forests not only in Oyam district where the study was conducted but also countrywide.
2. There should be peaceful co-existence with the environment. The resident in the Buga should be taught to adopt sustainable practices when exploiting the environmental natural resources.
3. Reforestation. The government takes the initiative to educate the settlers on the importance of trees and to advice them to plant trees. For this to be achieved the department of forestry and environment in Oyam district should make it a policy that every homestead should apportion part of the land for growing trees.
4. Education. The agricultural official should educate the residents on the different methods of preventing and controlling soil erosion in Buga village. They should be advised to practice terracing, use of bunds, ploughing and planting along contours, planting of cover crops, mulching and other methods of preventing and controlling soil erosions.
5. Agro-forestry. There is need to encourage agro-forestry in the farming system practiced by the residents of Buga village, it involve integration of

tree, crops and animals. Agro-forestry if practiced will play an important role in maintenance of ecosystems and preventions of soil erosion.

6. Policies. The national forest authority and the Uganda wildlife authority should enforce the laws concerning protected areas. People obtaining materials (timber, bamboo) from the forest reserve illegally should be dealt with accordingly.

7. Areas for further research. The study examined the implication of deforestation on the environment in Buga Oyam district. The study revealed that there is relationship between deforestation and environmental degradation. However the study could not make the aspects pertaining environmental degradation partly because it had a limit in its scope and partly because of the limitations experience during the study and because of such, further recommendation that:

- Soil erosion and environmental degradation should be investigated.
- Forest conservations and management bodies are weak, there is need to formulate strategies for effective management of forest ecosystem.
- Research on the impact of economic development on the environment is necessary.

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## APPENDICES

### APPENDIX I

#### INTERVIEW GUIDE FOR KEY INFORMANTS

##### Personal information

Date of interview.....

Respondents.....

Age.....

Sex.....

Marital status.....

Educational level.....

Distance from the forest.....

How do you perceive the term deforestation?

.....

.....

.....

Who are the users of forest?

Children ☐

Youth ☐

Adults ☐

Community ☐

All ☐



What benefits do the residents of Buga obtain from the forest?

.....

.....

.....

.....

What happens when you cut the forests?

.....

.....

.....

.....

How has climate been affected by deforestation in your area?

.....

.....

.....

.....

What do you think are the measures that can be put in place to control deforestation in Buga?

.....

.....

.....

.....

## APPENDIX II: QUESTIONNAIRES

Dear Respondents, you have been randomly selected to participate in an inquiry on the man's activities on the environment in Buga village, Kamdini Parish, Oyam District. Result will not be used for any purpose other than the fulfillment of masters Degree in Environmental Management and Development of Kampala International University.

### Personal Information

Date of interview.....

Respondents.....

Age.....

Sex.....

Marital status.....

Educational level.....

Distance from the forest.....

## Section A.

1. What do you understand by the term deforestation?

.....

.....

.....

2. Who owns forest?

- (a) Neighbor ☐
- (b) Community ☐
- (c) Government ☐

3. Who are users of forests?

- (a) Children ☐
- (b) Youth ☐
- (c) Adults ☐
- (d) Community ☐
- (e) All above ☐

4. What benefits do you obtain from the forest?

.....

.....

5. For how long have you obtained the resources from the forest?

- (a) One year ☐
- (b) Five years ☐
- (c) Ten years ☐
- (d) Several years ☐

6. What activities do you carry out in a forest?

.....

.....

7. Who cut forest in your locality?

.....

.....

.....

8. How often do you cut the forest?

.....

.....

.....

9. What happen when you cut the forest?

.....

.....

10. To what extent is your forest cut?

(a) Big part ☐

(ii) Small part ☐

(iii) All is cut ☐

11. Is your soil the same with the soil where forests have been cut?

Yes ☐

No ☐

If no what is the difference?

.....  
.....

12. Are the animals which used to be in the forests before cutting still there?

Yes ☐

No ☐

If no where have they gone?

.....  
.....

13. How has climate been affected by deforestation in your areas?

.....  
.....

14. Does cutting of trees affect animals in the forest? Explain

.....  
.....

15. Have the quality and quantity of plants where the forest have been cut affected?

Yes

☐

No

☐

16. Have you applied any measures to control deforestation in your area?

Yes

☐

No

☐

If yes how?

.....  
.....

17. What do you recommend on deforestation?

.....  
.....

18. Is cutting of forest dangerous on your Environment?

Yes

☐

No

☐

19. How is environmental deforestation done?

.....

.....

20. What do you think are the measures that can be put in place to control deforestation in Buga?

.....

.....

***THANK YOU VERY MUCH GOD BLESS YOU.***

## WORK PLAN

### THE GHANTT CHART DEPICTING THE ACTIVITIES AND TIME FRAME

No.	Activity	J	F	M	A	M	J	J	A	S	O	N	D
1	Conceptual phase												
2	Thesis proposal writing												
3	Data collection												
4	Data analysis												
5	Viva Voce												
6	Clearance												
7	Graduation												



### PROPOSED BUDGET

S/No.	Item	Quantity	Unit cost (Ugx )	Total cost (Ugx)
1	<b>Stationary</b>			
	• Ruled paper	1 ream	12,000/=	12,000/=
	• Pens	1 dozen	4,500/=	4,500/=
	• Pencil	2	200/=	400/=
	• Note books	4	1,500/=	6,000/=
	• Ruler	2	1,000/=	2,000/=
2	<b>Secretarial services</b>			
	• Typing and printing	500	356	178,000/=
	• Spiral binding	4	2,000/=	8,000/=
	• Data analysis		150,000/=	150,000/=
	• Thesis report (final copy)	120 x 4	500/=	60,000/=
	• Hard cover binding	4	15,000/=	60,000/=
3	<b>Travel cost</b>			
	• To and from Kampala	5 times	50,000/=	250,000/=
			50,000/=	50,000/=
	• Communication (Air time)	7 days	20,000/=	140,000/=
		7 days	8,000/=	56,000/=
	• Hiring motor cycle			
	• Meals			
4	Up-keep	10 days	15,000/=	150,000/=
5	Miscellaneous			100,000/=
	<b>Grand total</b>			<b>1,226,900/=</b>



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