ASSESSING THE EFFECTS OF LAND USE PRACTICES AND ENVIRONMENTAL CONSERVATION IN RUBANDA DISTRICT, A CASE STUDY OF HAMURWA SUB-COUNTY.

BY

MUTESIGENSI SAMUEL

17/A/BENV/0042/F

A RESEARCH REPORT SUBMITTED TO THE NATURAL SCIENCES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELORS DEGREE IN ENVIRONMENTAL SCIENCE OF KABALE UNIVERSITY

DECEMBER, 2020

DECLARATION

I **MUTESIGENSI SAMUEL**, solemnly declare that this research report is my work and has never been submitted to any university or institution for academic award.

Signature…….

Name: MUTESIGENSI SAMUEL

Date……

APPROVAL

I hereby certify that this research report by **MUTESIGENSI SAMUEL** entitled **"Assessing the Effects of Land use practices and Environmental conservation in Rubanda district, A case study of Hamurwa sub-county"** has been done under my supervision and is now ready for submission

Signature…….

Name: Mr. BYAMUKAMA WILBROAD

(Supervisor)

Date……

LIST OF ABBREVAITIONS

FAO	Food Agricultural Organization
NEMA	National Environmental Management Authority
NARO	National Agricultural Research Organization
ICAN	International Community Agricultural Network
BMCT	Bwindi Mgahinga Conservation Trust
IUCN	International Union for the Conservation of Nature
UNDP	United Nations Development Program
GEF	Global Environment Facility

Table of Contents

DECLARATION ii
APPROVAL iii
LIST OF ABBREVAITIONS iv
LIST OF TABLES vii
LIST OF FIGURES viii
ABSTRACT ix
CHAPTER ONE: GENERAL INTRODUCTION 1
1.1 Background to the study 1
1.2 Statement of the problem 2
1.3 Purpose of the study 3
1.4 Objectives of the study 3
1.5 Research questions 3
1.6 Scope of the study 3
1.6.1 Geographical scope 3
1.6.2 Content scope 4
1.7 Significance of the study 4
1.8 Operational definition of terms 4
CHAPTER TWO: LITERATURE REVIEW 6
1.0 Introduction 6
2.1. Effect of land use practices on environmental conservation. 6
2.2 Policies/laws that governs land and environment 9
2.3 Activities that degrades the environment 12
CHAPTER THREE: METHODOLOGY 14
3.1 Introduction 14
3.3 Area of study 14
3.4 Study Population 14
3.5 Sample size and sampling technique 15
3. 6 Research instruments 16
3.7 Data collection method 17
3.10 Data analysis and management 19
3.11 Expected limitations of the study 19
CHAPTER FOUR: PRESNTATION OF FINDINGS 21

4.0 Introduction 21
4.1 Bio-Data of respondents. 21
4.2 Effects of land use practices on environmental conservation 24
4.3 policies/laws that governs land and environment 26
4.4 Activities that degrades the environment 28
CHAPTER FIVE 31
DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS 31
5.1. Introduction 31
5.2. Summary of findings 31
5.3 Conclusion 33
5.4 Recommendations 33
REFERENCES 34
APPENDICES 36
APPENDIX I: Questionnaires for respondents 36
APPENDIX II: Interview guide 39

LIST OF TABLES

Table 1 Age of respondents 21
Table 2: Sex of respondents 22
Table 3: Educational level of respondents 23
Table 4: Effects of land use practices on environmental conservation 24
Table 5: policies/laws that governs land and environment 26
Table 6: Activities that degrades the environment 28

LIST OF FIGURES

Figure 1: Sex of respondents 22
Figure 2: Education level of respondents 23
Figure 3: Effects of land use practices on environmental conservation 26
Figure 4: A pie chart showing policies/laws that govern land and environment 28
Figure 5: Activities that degrades the environment 30
Figure 6: Activities that degrades the environment ..... **Error! Bookmark not defined.**

ABSTRACT

This study was focused on assessing the effects of land use practices and environmental conservation in Rubanda district**.** The study was guided by three objectives; to identify effects of land use practices on environmental conservation in Hamurwa sub-county Rubanda district, to establish policies/laws that govern land and environment in Hamurwa sub-county Rubanda district and to identify the activities that degrade the environment in Hamurwa sub-county Rubanda district. Data collection tools included questionnaires and interview guide which were used to collect data from 100 respondents mainly staff of Hamurwa sub-county, leaders and community members. Data analysis was done using Microsoft excel and the findings were presented in tables, charts and graphs.

The study findings indicates that there were policies/laws that govern land and environment as they include; national land use policy with 14%, national environment Act with 20%, the land Act of 1998 with 10%, the Uganda national land policy 2013 with 16% and local policies or rules that govern land and environment with 40%. Majority of the respondents with 40% agreed that local policies or rules that govern land and environment were the major policy used by respondents from Hamurwa Sub-county Rubanda district. Findings of the study indicates that there were effects of land use practices on environment as they include; Good quality yields indicated by 18%, Increased Quantity yield or yield per acre presented by 20%, improved soil fertility presented by 36% and other factors with 26%. However majority of the respondents revealed that improved soil fertility with 36% was the most common effect affecting land use practices in Hamurwa sub-county Rubanda district. The study findings indicates that there were activities that degrades the environment which include; overpopulation with 16%, housing/settlement with 8%, land tenure with 4%, overgrazing with 12%, bush burning with 10%, over cultivation with 22%, mono cropping with 20% and other factors with 8%. However majority of the respondents revealed that over cultivation with 22% was the major activity that degrade the environment.

The study concludes that there were activities that degrades the environment which include; Over population, Housing/settlement, Land tenure, Over grazing and Deforestation. The study recommends that; there is need for farmers to apply manures and fertilizers in order to get high quality and quantity yields. The use of farmyard manure should be encouraged to restore soil fertility. This should be done along with good husbandry practices such as crop rotation, and rotational grazing to avoid exhausting a particular plot of land in a short period, which in most cases forces people to encroach lands. There is need for policy making concerning environmental conservation measures through a forestation thus discouraging or reducing deforestation and education of masses should be encouraged relating to the efficient use of land use practices on environment through sensitizing people on dangers of mining and mining related effects.

.

CHAPTER ONE: GENERAL INTRODUCTION

1.1 Background to the study

According to a report by the United Nations' Food and Agriculture Organization (2010), environmental management has been exacerbated where there has been an absence of any land use planning, or of its orderly execution, or the existence of financial or legal incentives that have led to the wrong agricultural decisions, or one-sided central planning leading to over-utilization of the land resources. Environmental degradation can lead to declining potential yields on the farm. But, fertilizer use or changing the agricultural use can hide the effects of this degradation for long periods.

Land use practices vary considerably across different countries. In Uganda, the Food and Agriculture Organization explains that "Land use practice concerns the products and/or benefits obtained from use of the land as well as the land management actions (activities) carried out by humans to produce those products and benefits." FAO (2010) reveals that about 13% of the Land was considered arable land, with 26% in pasture, 32% agricultural, and 1.5% urban areas.

Environmental conservation on the other hand is the practice of protecting the natural environment by indivuals, organizations and government with the objectives of conserving natural resources and existing natural environment and, where possible to repair the environment.

Environmental degradation is the decline in environment management caused by its improper use, usually for agricultural, pastural, industrial or urban purposes. Environment degradation is a serious global environmental problem and may be exacerbated by climate change. It encompasses physical, chemical and biological deterioration. Blanco et al., (2010). In attempt to address these threats, Rubanda district Local government and conservation partners such as the International Union for the Conservation of Nature (IUCN), United Nations Development Program (UNDP) and Global Environment Facility (GEF) have supported the implementation of conservation interventions like digging of trenches on steep slopes of surrounding hills, planting trees along the shoreline of Lake Bunyonyi, monitoring and regulating harvesting of fisheries resources in order to help in conserving the environment.

Land-use change reflected in land-cover change and land-cover change is a main component of global environmental change (NEMA, 2010) affecting climate, biodiversity, and ecosystem services, which in turn affect land-use decision. Land-use change is always caused by multiple interacting factors. The mix of driving forces of land-use change varies in time and space. Highly variable ecosystem conditions driven by climatic variations amplify the pressure arising from high demands on land resources. Economic factors define a range of variables that have a direct impact on the decision making by land managers. Technology can affect labor market and operational processes on land. Demographic factors, such as increase and decrease of population, and migration patterns have a large impact on land use. Life-cycle features arise and affect rural as well as urban environments.

The common land use practices identified in the Rubanda district include agriculture, settlement, forest for water catchment and biodiversity conservation. However, most of agricultural practices are unsustainable because they degrade the environment. There was thus a tremendous need to obtain a further assessment on the effects of land use practices and environmental conservation in Rubanda Hamurwa Sub-county Rubanda District.

1.2 Statement of the problem

Many agricultural activities can have environmental impacts on land, water, and air. These environmental impacts differs based on the farm location, farm type, and the specific farming and land management practices used as well as the timing of these practices (i.e., season of fertilizer application). For instance, nutrients and pesticides can run off agricultural fields into surface water bodies or leach into groundwater. Increased phosphorus loading from agriculture is one of several factors that have resulted in land use practices degrade the biodiversity. The major causes of land degradation include over population, declining use of fallow and increased commercialization of agriculture, without recycling and continuous addition of fertilizer that lead to loss of natural soil nutrients there are other causes may degrade the environment such as pollution, limited farmer awareness to use appropriate technologies, land defragmentation and tenure insecurity system.

Despite the efforts rendered by government on control of land use practices, environmental conservation has remained low in Hamurwa sub-county. Yield from use of land remains uncertain, perhaps due to inappropriate environmental conservation measures. Most farmers carry out their agricultural activities on unprotected soils. The government and other

organizations such as National Environment Management Authority, National Agricuture Research Organization, International Community Agricultural Network and Bwindi Mgahinga Conservation Trust have tried to sensitize communities in Hamurwa sub-county on recommended land use practices although very few farmers adhere to the recommendations by these bodies. Therefore there is need to assess the effects of land use practices and environmental conservation in Rubanda district Hamurwa sub-county.

1.3 Purpose of the study

The purpose of the study was to assess the effects of land use practices and environmental conservation in Rubanda district Hamurwa Sub-county.

1.4 Objectives of the study

i. To identify effects of land use practices on environmental conservation in Hamurwa sub-county Rubanda district
ii. To establish policies/laws that governs land and environment in Hamurwa sub-county Rubanda district.

iii To identify the activities that degrades the environment in Hamurwa sub-county Rubanda district.

1.5 Research questions

i. What are the effects of land use practices on environmental conservation in Hamurwa sub-county Rubanda district?
ii. What are the policies/laws that governs land and environment in Hamurwa sub-county Rubanda district?
iii. What are the activities that degrade the environment in Hamurwa sub-county Rubanda district?

1.6 Scope of the study

1.6.1 Geographical scope

The study was carried out in Hamurwa sub-county Rubanda district. Rubanda is boarded by Kabale district to East and North, Kanungu district to the North West, Kisoro district to the West and Rwanda to the south. The town of Rubanda is approximately 35Kms (22mi) by road, west of Kabale, the largest city in Kigezi sub-region.

1.6.2 Content scope

The study was limited on the assess of land use practices and environmental conservation in Rubanda district in Hamurwa sub-county and it was guided by three objectives; to identify the effects of land use practices on environmental conservation in Hamurwa sub-county Rubanda district, to establish policies/laws that governs land and environment in Hamurwa sub-county Rubanda district and to identify the activities that degrade the environment in Hamurwa sub-county Rubanda district

1.6.3 Time scope

The study covered a period of five month that is from January 2020 December 2020. This was because the researcher believed that the information gathered in this period was sufficient to establish the relationship between the study variables. During the period of January to December, most of the agricultural practices were done during that period.

1.7 Significance of the study

The study hopes that the outcome would inspire other researchers to take an interest in the topic, especially where such studies have not been carried out.

The study would help to acquire knowledge and skills which would help the researcher to do other related issues.

The study would go a long way in providing information that would guide decision makers in policy decision making on land use practices in light of the current population growth rates and increasing catchment of environmental management.

1.8 Operational definition of terms

Land use Practices: This means basically a collection of principles to apply for farm production processes in order to get better agricultural products.

Environment: This is the complex of physical, chemical, and biotic factors (such as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival.

Environmental conservation. This is the umbrella term that defines anything we do to protect our planet and conserve its natural resources so that every living thing can have an improved quality of life.

Conservation: This is carefully preservation and protection of something especially planned management of natural resource, prevent exploitation, destruction or neglect water conservation and wildlife conservation.

CHAPTER TWO: LITERATURE REVIEW

1.0 Introduction

This chapter reviewed the related literature on effects of land use practices and environmental conservation in Rubanda district Hamurwa sub-county and it was guided by the following objectives; to identify the effects of land use practices on environmental conservation in Hamurwa sub-county Rubanda district, to establish policies/laws that governs land and environment in Hamurwa sub-county Rubanda district and to identify activities that degrade the environment in Hamurwa sub-county Rubanda district.

2.1. Effect of land use practices on environmental conservation.

Rapid population growth and long history of sedentary agriculture has changed the land use/land cover system and has been a major cause of environmental conservation on most parts of the world including Ethiopia (Chen et al, 2001). Agricultural activities change the soil chemical, physical, and biological properties, and play the major role for soil degradation mainly due to soil fertility decline as a result of lack of nutrient inputs (Lal, 1986 cited in Alfred et al., 2008). In Ethiopian, where agriculture is the back bone of the economy (approximately 50% of GDP, 90% of foreign exchange earnings (Ethiopian Economic Association, 2002), It was estimated that half of the Ethiopian highlands' arable lands are moderately to severely degraded and nutritionally depleted due to over cultivation, over grazing, primitive production techniques, and over dependent on rainfall (Hugo et al, 2002).

The extraction of minerals, stones, gravel, laterite and clay provides raw materials for development and earns the country foreign exchange. However, although these activities are important for the country, they are associated with land degradation and physical and health risks to those involved in this sector. It is important that the conflicts between mining, quarrying, excavation and the need to maintain the integrity of the environment be addressed through appropriate land use planning NEMA. (2010).

"Human settlement" is a phrase used to designate any place on earth where humans live. This does not only refer to houses and associated infrastructure, but an integrated combination of human activities, artifacts and a set of facilities intended to support the living environment. Human settlements have also been described as a material structure system established artificially by human beings, and whose basic need is to meet social needs indispensable for

everyday life. Human settlements in general are complex because they involve not only basic population distribution characteristics, but also the tremendous variety of physical facilities developed to sustain a population and a country's economy. They range from the smallest hamlet (village) to the largest urban area (city); reflect the culture, values and technology of a society, but also the natural resource endowment as cited by Mulugeta et al (2010).

Hence, soil fertility depletion is considered as the fundamental biophysical causes for declining per capita food production in sub –Saharan African countries in general (Sanchehez et al., 1997) and in particular Ethiopia. The problems of land degradation and low agricultural productivity in the country, resulting in food insecurity and poverty, are particularly severe in the rural highlands (Hagos, 2003; Nedessa et al., 2005). Soil losses from crop and grazing lands have been reported as 42 and 5 tons/ha/year respectively (Kassa, 2002; Bojo and Casells, 1995). The severity of land degradation in some parts of highlands is estimated to reach as high as to offset the gains from technical change (WDR, 2008, pp 180). Finding solutions to these problems require identifying the farming system, the environment, and understanding the society.

Many approaches can be justified to mitigate soil degradation problems. These include private incentives, integrated watershed management approach, and focus on farming systems approach in research and development (Kassan 2008). Private incentive is provided for individuals in order to manage resources efficiently from the society point of view (WDR, 2008, pp 181). On the other hand, focusing on farming systems approach as well as watershed development approach to research and development are also a vital element to understand and implement environmentally friendly, economically feasible, and socially acceptable options. However, to implement suitable management options the fundamental element to start with is to identifying different land use patterns as well as current management trends and effects on soil physical and chemical property.

Environmental degradation caused by inappropriate land use is a worldwide problem that has attracted attention in sustainable agricultural production systems. Ethiopia is considered to be one of the least developed countries where agriculture had always played a central role in the country's economy. Although agriculture has always been the mainstay of the economy, it is

characterized by very low growth rate. The rapidly increasing population has led to a declining availability of cultivable land and a very high rate of soil erosion (Abera 2003). It is apparent that soil is one of the most important and determinant factors that strongly affects crop production. Soil is the foundation resource for nearly all land uses, and the most important component of sustainable agriculture (Mulugeta & Karl 2010). It is apparent that the destruction of vegetative cover can promote soil erosion, which eventually increases the magnitude of soil related constraints to crop production. Generally, a sound understanding of land use and management effects on soil properties provides an opportunity to evaluate sustainability of land use systems (Woldeamlak 2003).

There is increasing awareness that soil nutrient depletion from the agro ecosystem is a very widespread problem and an immediate soil production constraint in Ethiopia (Felix,2012) A change in land use, poor soil management, topography of the area and socioeconomic activities can negatively affect the potential use of an area and may ultimately lead to land degradation and loss of productivity. Loss of arable land due to soil degradation is a wide spread phenomenon in the highlands of Ethiopia, which accounts for 45% of Ethiopian total land area and 66% of the total land area of Amhara Region (Lakew et al. 2006). Low soil fertility was reported as one of the major factors affecting soil production in west part of Amhara region (Yihenew, 2007).

Human activities in southwestern Uganda have profoundly changed land cover in southwestern Uganda over the course of the last one century, and even earlier than that. Remotely sensed land use cover data from the early 1990s, acquired and analyzed by the National Biomass Study (1996), shows that (mainly small scale) farmland covers 57% and 68% of the land area (i.e., excluding lakes) in Kabale and Kisoro Districts respectively, while natural forests (excluding woodlots and plantations) cover only 2.0% of land in Kabale District and 16.3% of Kisoro District (Raussen et al, 2002). It is also beyond doubt that people in the region have expanded and intensified their agricultural and pastoral land use systems as a response to increasing population densities and market opportunities (Carswell, 2002b).

Mass soil movements, whether or not caused by human activity, is a potentially important but little researched form of soil erosion in the Kigezi highlands. The same characteristics (highly permeable clay loams) that make soils in Kigezi resistant to rill and interrill erosion,

unfortunately also appear to make the hillsides prone to landslides and mud flows during the rare intensive rainstorms in the area Boardman (2006). measured the incidence of landslides in four areas in one sub-county in Kabale District and concluded that erosion was a serious problem in the area. This study, however, has been criticized for over-generalizing its results based on a small and purposively selected sample (Carswell, 2002). The area is also prone to localized source-point erosion such as road cuttings, incised gullies and other exposed areas on the hillsides (Tukahirwa, 1995).

The land tenure of most of the rangelands is communal, with communal grazing on natural pasture. Major socioeconomic changes are occurring in the dry lands to affect this system, however, including increasing human population density and in-migration by agricultural settlers. While the human population has been increasing at a rapid rate, doubling from the 1930's to 1960's, the cattle population has increased at a slower rate. The increase in both populations is placing pressure on the land with intensive degradation occurring especially at watering points, along livestock paths and on hilltops. Areas particularly affected by over utilization include counties in Mbarara and Rakai districts (NEMA 2001).

Agricultural intensification without soil conservation practices can have significant detrimental effects on soil, such as increased erosion and lower fertility, further leading to ground water pollution and eutrophication of rivers and lakes (Mupenzi, et al 2016 and Matson, 1997). For instance, Mediterranean lands have suffered changes from land uses that resulted in organic matter exhaustion, erosion, soil degradation, salinization, and crusting due to both traditional land uses and human activities.

2.2 Policies/laws that governs land and environment

A Land Policy is a systematic framework for addressing the role of land in national development, land ownership, distribution, utilization, alienability, management and control. A National Land Use Policy, on the other hand, is an integral element of the National Land Policy. The aim of a National Land Use Policy is to provide general guidance on optimal and sustainable utilization of land, and is based on the analysis of soil types, topographic features, and agro-ecological considerations, as well as social and demographic factors. Importantly, the Land Use Policy must address the various use categories and the conflicts that arise from competing demands.

2.1.1 National Environment Act 1995 on the Principles of environment management;

The authority shall ensure that the principles of environment management set out in subsection (2) are observed.

The principles of environment management referred to in subsection (1) are:

(a) to assure all people living in the country the fundamental right to an environment adequate for their health and well-being;

(b) to encourage the maximum participation by the people of Uganda in the development of policies, plans and processes for the management of the environment;

(c) to use and conserve the environment and natural resources of Uganda equitably and for the benefit of both present and future generations, taking into account the rate of population growth and the productivity of the available resources;

(d) to conserve the cultural heritage and use the environment and natural resources of Uganda for the benefit of both present and future generations;

(e) to maintain stable functioning relations between the living and nonliving parts of the environment through preserving biological diversity and respecting the principle of optimum sustainable yield in the use of natural resources;

(f) to reclaim lost ecosystems where possible and reverse the degradation of natural resources;

(g) to establish adequate environmental protection standards and to monitor changes in environmental quality;

(h) to publish relevant data on environmental quality and resource use;

(i) to require prior environmental assessments of proposed projects which may significantly affect the environment or use of natural resources;

(j) to ensure that environmental awareness is treated as an integral part of education at all levels;
(k) to ensure that the true and total costs of environmental pollution are borne by the polluter;

(l) to promote international cooperation between Uganda and others

2.1.2 The land Act of 1998

Section 3 of the Land Act 1998 (The Land Act Chapter227) vests the ownership of all land in Uganda in its citizens, and sets out the tenure system under which the land can be owned. The forms of tenure are customary, freehold, Mailo, and leasehold. The Act further guarantees security of tenure for all Ugandans including tenants on registered land, both lawful and bona fide occupants. It also provides an opportunity for every Ugandan to acquire a registrable interest in land, which can be used to obtain credit. The Act permits the lawful and bona fide occupant to mortgage the certificate of occupancy subject to the consent of the registered owner. Here it makes an assumption that the registered owner will grant permission to the occupant
The Land Act has several provisions that promote judicious land use. In particular, Section 44 requires that a person who owns or occupies any piece of land in Uganda should manage and utilize it in accordance with the National Environment Statute 1995 (The National Environment Act Chapter 153), and other environment related sectoral laws. Section 45, which provides for the control of environmentally sensitive areas, further strengthens this provision. The Act contains provisions for the decentralized management of land through the establishment of District Land Boards. Part of the latter's responsibilities is to hold and allocate land in the District, which land is not owned by any person or authority. These provisions strengthen the control of land use at the local level.

2.1.3 The Uganda national land policy 2013

Land in Uganda is a critical factor of production and an essential pillar of human existence and national development. The policies on land and natural resources address the challenge of land reforms, decree of 1975, the 1995 constitution of republic of Uganda and the land Cap Act 227. The policy therefore consolidates the scattered policies associated with land and natural resources with emphasis on both land ownership and land development

2.3 Activities that degrades the environment

Farming is very important to society because almost all of the world's food is grown on farms. Over the 10,000 years humans have been farming, people have continually improved their farming methods. However, farming has some harmful effects and can lead to soil loss. Farmers often add nutrients to soil in the form of organic or artificial fertilizers to make their crops grow better. However, some fertilizers can make it difficult for microorganisms in the soil to produce nutrients naturally. Fertilizers also add to water pollution when rainwater draining from fields carries the excess nutrients to rivers, lakes, and oceans (Mugisha 2002).

Over time, many farming practices lead to the loss of soil. All over the world, farmers clear trees and other plants and plow up the soil to plant crops. Without its natural plant cover, the soil is more exposed to rain and wind and is therefore more likely to get washed or blown away. American farmers lose about five metric tons of soil for each metric ton of grain they produce. In many other parts of the world, the losses are even higher (McCullough, 2012).

Another problem is overgrazing. Overgrazing occurs when farm animals eat large amounts of the land cover. Overgrazing destroys natural vegetation and causes the soil to wash or blow away more easily. In many dry regions of the world, overgrazing and the clearing of land for farming have led to desertification. Desertification is the expansion of desert conditions in areas where the natural plant cover has been destroyed (NEAP, 1995).

To make roads, houses, shopping malls, and other buildings, people need to dig up the soil. Some of the soil at construction sites washes or blows away because its protective plant cover has been removed. The soil that is washed or blown away ends up in nearby low lying areas, in rivers and streams, or in downstream lakes or reservoirs. This soil can cause problems by making rivers and lakes muddy and harming the organisms that live in them. The buildup of soil on riverbeds raises the level of the rivers and may cause flooding. The soil can also fill up lakes and reservoirs (NEIC. 1994).

Some methods of mining cause soil loss. For example, the digging of strip mines and open-pit mines involves the removal of plants and soil from the surface of the ground. By exposing rocks

and minerals to the air and to rainwater, these forms of mining speed up the rate of chemical weathering (NEMA. 2010).

In mining operations that expose sulfide minerals, the increased chemical weathering causes a type of pollution known as acid drainage. Abandoned mines can fill with rainwater. Sulfide minerals react with the air and the water to produce sulfuric acid. Then the acid water drains from the mines, polluting the soil in surrounding areas (NEMA. 2010).

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter presents the methodology that was used in the study; it gives a description of the study area and the methods that were used to collect data from the field. It gives a summary of the research design, study population and sample size, data collection instruments, data type, data processing and presentation and the problems that were encountered during the process of data collection and analysis.

3.2 Research design

The study employed descriptive research design using both qualitative and quantitative tools. The qualitative tool were used to give insight vividly on institutional characteristics, opinions, beliefs, feelings and perceptions of respondents on the topic of interest. The quantitative research technique was basically used because of the desire to solicit and present data numerically. It was also applied in this study to deal with quantifiable measurements which were counted for example the number of farmers and leaders.

3.3 Area of study

The study was carried out in Hamurwa sub-county Rubanda district. Rubanda is boarded by Kabale district to East and North, Kanungu district to the North West, Kisoro district to the West and Rwanda to the south. The town of Rubanda is approximately 35Kms (22mi) by road, west of Kabale, the largest city in Kigezi sub-region

3.4 Study Population

Target population is defined as a complete set of individuals, cases/objects with some common observable characteristics of a particular nature distinct from other population. According to Ngechu (2004), a population is a well defined or set of people, services, elements, events, group of things or households that are being investigated. Hamurwa sub-county had a total population of 28,600 people (UBOS, 2017). However the researcher used Krejcie & Morgan, 1970 table to select a study sample. The population proportion comprised of 130 respondents who included Chairman LCII, political leaders, agricultural officer, environmental officer and community members.

Table showing study population and sample

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

3.5 Sample size and sampling technique

A sample is a finite part of a statistical population whose properties are studied to gain information about the matter (Webster, 1985). Simple random sampling design was adopted and this provided equal chance to all respondents. A total of 100 respondents were selected randomly from Hamurwa sub-county Rubanda district and they included; 01 Chairman LCII, 20 political leaders, 01 agricultural officer, 01 environmental officer and 77 community members. However purposive sampling was used to select chairman lcii, agricultural officer and community

development officer because the researcher was interested in their classified data records and simple random sampling was used to select community members and political leaders as they were given equal chances to be included in the sample and this helped to avoid bias during selection process.

Table showing sample size and sampling procedure

Category	**Sample size**	**Sampling technique**
Chairman LCII	01	Purposive sampling
Community members	77	Simple random sampling
Environmental officer	01	Purposive sampling
Agricultural officer	01	Purposive sampling
Political leaders	20	Simple random sampling
Total	**100**	

Primary data, 2020

3. 6 Research instruments

According to Kombo and Tromp (2006), data collection refers to gathering specific information aimed at proving or refuting some facts. The sources of data that were adopted in this study were primary and secondary data. Primary data was the information gathered directly from respondents by use of questionnaires.

3.6.1 Questionnaires

A questionnaire is a special document that allows the researcher to ask a number of standard questions to a large number of people in order to gather information from them. According to White, (2000), a questionnaire is an instrument with open ended or closed ended questions or statement to which respondents must respond. The study involved collection of data through the use of questionnaires on the assessment of the effects of land use practices and environmental conservation in Rubanda district Hamurwa Sub-county. Questionnaires were preferred for this category (Chairman LCII, political leaders, agricultural officer and environment officer) of respondents as it limited the amount of information and gives only the relevant information that the study required.

3.6.2 Interview guide

An unstructured interview schedule which contains open-ended questions was used as a guide to obtain qualitative data from community members. The interview schedule was used because they had a high completion rate compared to other methods. Interviews also guaranteed an immediate feedback.

3.7 Data collection method

The study involved the collection of data through the use of questionnaires on the land use practices in Hamurwa sub-county Rubanda district. Questionnaires was preferred for this category (Chairman LCII, political leaders, agricultural officer, environmental officer and community members) of respondents as it limited the amount of information and gives only the relevant information that the study required

3.7.1. Questionnaire

According to Gillham, B. (2008) questionnaires are set of questions for obtaining statistically useful or personal information from individuals. Self administered a questionnaire were used for data collection from respondents in Hamurwa sub-county Rubanda District. Closed and open ended questions were included in the questionnaires to enable respondents give their views. This method was preferred to be used to these respondents because the researcher believed that they knew how to read and write and were able to interpret the questions. Questionnaires were expected to enable the researcher obtain results within a considerably short time. Amin (2005) confirmed the usefulness of questionnaires in terms of their simplicity, time used and easiness for a researcher to administer.

3.7.2 Key Informant Interviews

Face to face interviews will be carried out with chairman LCIII, agricultural officer and community members to cross check the response from the questionnaire. They were designed in a way that more specific and truthful answers were got. This helped to capture information, not provided by the questionnaires. The researcher used Interview guide to capture the respondents' views. This method was preferred because of its flexibility and ability to provide new ideas on the subject (Kothri, 1990).

3.7.3 Documentary review

The study also used secondary data that included written document such as notice, journals, text books, administrative and public records, magazines and internet. The reason for using secondary information was mainly to help the researcher to place the findings with in a more general context by comparing and integrating the research finding to the existing literature about the study problem. Under this method the researcher used senses of seeing of what will be on ground using a non verbal approach. Under this method the researcher used an observation checklist to assess the effects of land use practices and environmental conservation in Rubanda district Hamurwa sub-county.

3.8 Data Quality Control

Validity: Instruments are supposed to measure accurately what they are supposed to measure. Therefore, before instruments were administered, they were first examined by supervisor taking the same programme as the researcher's. They were examined by the supervisor as these could ensure that the terms to be used in the questionnaire and interview guides were accurately defined and properly assumed.

Reliability: An instrument is reliable if it measures consistently what it is supposed to measure. Even if other researchers administer it, it should produce the same results. In this study, the test re-test methods were used to establish reliability. The tools of data collection were experimented more than once on different instances to the same sample by different data gatherers and they produced the same results if the instrument were reliable.

3.9 Ethical consideration

When human beings are used as study participants in research investigations, care must be exercised in ensuring that the rights of those respondents are protected. The researcher respected human dignity by not revealing the identity of the respondents in the study. To this, a letter of introduction were got from Kabale University seeking permission to conduct the study after being directed by the supervisor to do so. This letter was presented to the respondents in the study area for permission to conduct the study. Once the permission was granted, the researcher distributed questionnaires to the respondents in addition to interviewing them and the next stage after were to analyze the data collected from the study respondents for writing the report.

3.10 Data analysis and management

The reason for carrying out data processing is to prepare raw data for statistical analysis and presentation. This step was essential in scientific and social science research in ensuring that all relevant data are captured for making comparison and analysis. After all data was collected, the researcher conducted data cleaning, which involved identification of incomplete or inaccurate responses which was corrected to improve the quality of response. After data cleaning the data was coded and entered into computer for analysis using spread sheet program (Excel). This research yielded both qualitative and quantitative data. Qualitative data was analyzed qualitatively using data analysis based on analysis of meanings and implications emanating from respondents' information and documented data. As Observed by Gray, (2004) qualitative data provides rich descriptions and explanations that demonstrate chronological flow of events as well as often leading to chance findings

Data analysis was done after collecting the raw data from the field, editing and checking for accuracy of information, consistency and uniformity. The collected data was analyzed both quantitatively and qualitatively. Quantitative data were grouped and statistical description such as tables showing frequencies and percentages and pie- charts were developed for better representation of the study findings. Qualitative data refers to the data collected from respondents that cannot be easily presented in numerical form and the researcher analyzed this type of data by only identifying the responses from respondents that were relevant to the research problem at hand (Stergios1991; Vlahos, 1984). Mainly such data was analyzed in way of explaining the facts collected from the field under which the researcher was in position to use themes developed from the study objectives as the researcher was also in position to quote respondents responses.

3.11 Expected limitations of the study

During the process of data collection, the following limitations were encountered by the researcher.

Being the first research, the researcher was faced with the problem of not having researcher skills during the process of undertaking this study. However, the researcher worked hand in hand with the supervisor to successfully finish his research study in time.

The study was limited with funds in form of transport as distance from the university to the study area was a bit long. However, the researcher solicited funds from his friends and relatives during the process of undertaking his study.

The researcher could sometimes not find all respondents in the study area especially Agricultural officer as at times they could have fixed programs in doing their works. The researcher however arranged with them to fix appropriate time in order to collect reliable and valid information.

CHAPTER FOUR: PRESNTATION OF FINDINGS

4.0 Introduction

This study was aimed at assessing the effects of land use practices and environmental conservation in Rubanda district. The study was guided by three objectives which include; to identify effects of land use practices on environmental conservation in Hamurwa sub-county Rubanda district, to establish policies/laws that governs land and environment in Hamurwa sub-county Rubanda district and to identify the activities that degrades the environment in Hamurwa sub-county Rubanda district. The findings were based on 100 respondents which include; chairman LCii, political leaders, agricultural officer, environmental officer and community members of Hamurwa sub-county Rubanda district.

4.1 Bio-Data of respondents.

Personal information of respondents was sought since it does not provide information about the respondents but also determine the responses of respondents. Personal information of respondents includes; Age, sex, educational level and occupation of respondents.

4.1.1 Age of the respondents

Table 1 Age of respondents

Age of respondents	**Frequency**	**Percentage (%)**
18-24	19	19
25-35	25	25
36-45	32	32
46 and above	24	24
Total	**100**	**100**

Source: Researcher, 2020

From Table1, 19% of the respondents from the area of study were in the age bracket of 18-24 years that were obtained from interviews, 25% of the respondents were between 25-35 years who were obtained from questionnaires and 32% of respondents were between 36-45 years and 24% of the respondents were above the of 46years. This indicates that the majorities of the

respondents were between 36 and 45year which means that this age group is more involved in participating and taking their time to understand the effect of land use practices on environmental conservation. Age can affect experience, wealth and decision making which in turn affects how one works and hence can influence individual productivity.

4.1.2 Sex of respondents

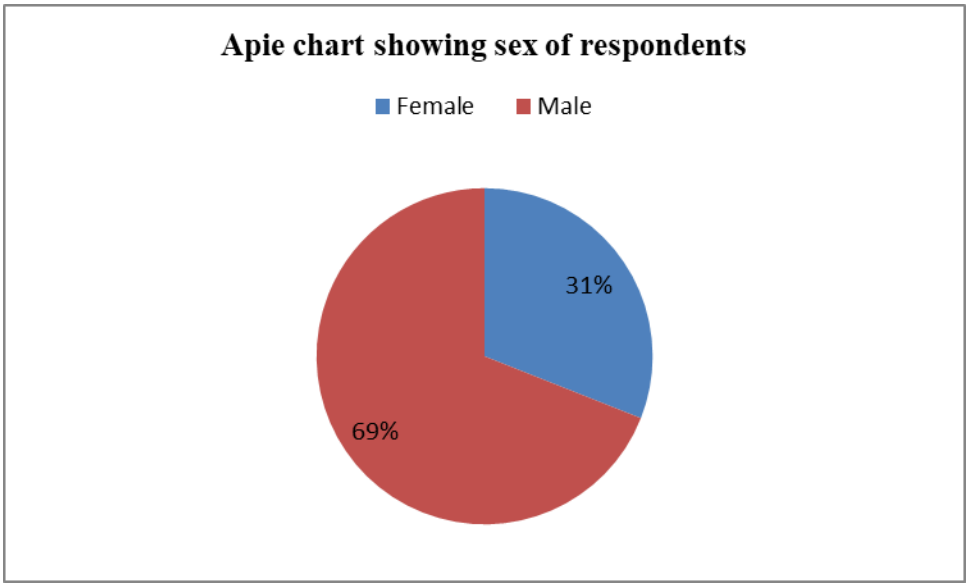
Table 2: Sex of respondents

Sex of respondents	Frequency	Percentage (%)
Female	32	32
Male	68	68
Total	**100**	**100**

Source: Researcher, 2020

From Table 2: above, 68% of the respondents were males and 32% of the respondents were females who were interviewed. This shows that all sexes were represented in the study, however, males dominated the study. The higher population of male respondents shows that they are actively engaged in land use practices than female respondents. In actual fact some women refused to be interviewed on the ground that their husbands were more conversant as they were the ones who did most of the management and supervisory work concerning land use practices.

Figure 1: Sex of respondents



Source: Researcher, 2020

4.1.3 Educational level of respondents

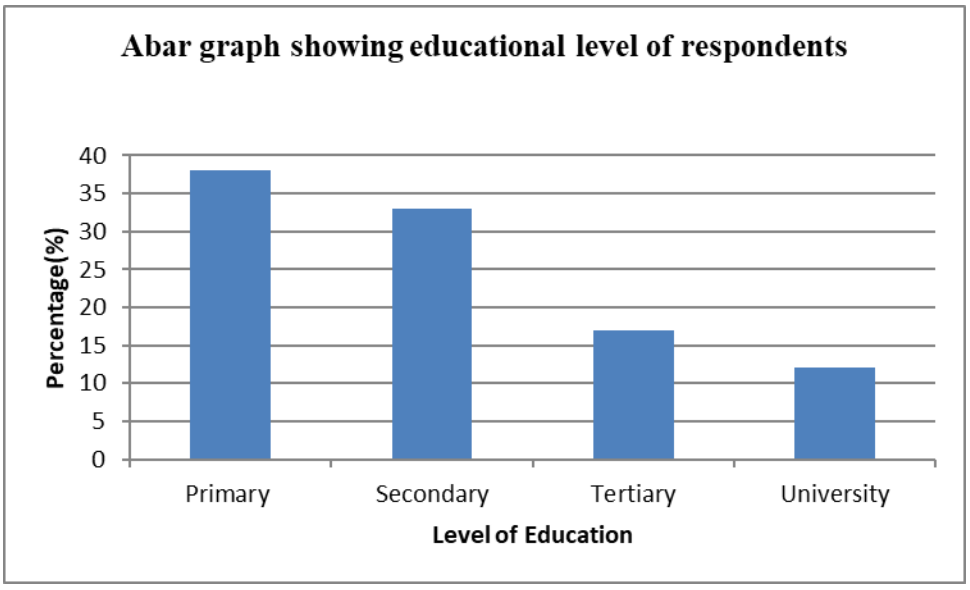
Table 3: Educational level of respondents

Level of education	Frequency	Percentage (%)
Primary	40	40
Secondary	32	32
Tertiary	16	16
University	12	12
Total	**100**	**100**

Source: Researcher, 2020

From Table 3, 40% of the respondents had primary school level of education, 32% of respondents were secondary leavers and 16% of the respondents had tertiary level and 12% were University leavers. This implies that a good number of respondents are well educated and so they understood the study that was carried out and hence gave out informed responses. Level of education of farmers is very important as it influences their ability to utilize efficiently the advice and information offered by the extension services and development agents (Regnar *et al.*, 2002).

Figure 2: Education level of respondents



Source: Researcher, 2020

4.2 Effects of land use practices on environmental conservation

Table 4: Effects of land use practices on environmental conservation

Effects of land use practices	**Frequency**	**Percentage (%)**	**Percentage of yields**
Good quality yields	18	18	15
Increased Quantity yield or yield per acre.	20	20	25
Improved soil fertility.	36	36	47
Other factors	26	26	13
Total	**100**	**100**	**100**

Source: Researcher, 2020

From Table 4, all the respondents interviewed agreed that there were effects of land use practices on environment which include; Good quality yields indicated by 18% of the respondents from manure provided by animals, agro forestry and improved crop growing. Good quality yields was also indicated by 15% of the respondents

Increased Quantity yield or yield per acre presented by 20% of the respondents has resulted from terracing, agro forestry and animal rearing. Increased Quantity yield or yield per acre was also marked by 25% of the yields form the total respondents. This was because of application of organic manure such as cow dung and animals droppings and this was supported by Chen, (2001).

Also agro forestry and terracing improve on soil fertility represented by 36% of the respondents and therefore good quality yields. It was observed that 26% constitute other factors that contribute to soil productivity. Farmers in Hamurwa sub-county who do not use agro forestry properly and don't practice animal rearing for provision of manure, harvest low crop yields and therefore low environmental management. Improved soil fertility also showed 47% of the total yields of the total respondents. The improved soil fertility was due to crop rotation practice by farmers in the area and this is in line with Wang, (2001) who asserted that terracing improves soil fertility due to reduced runoff water.

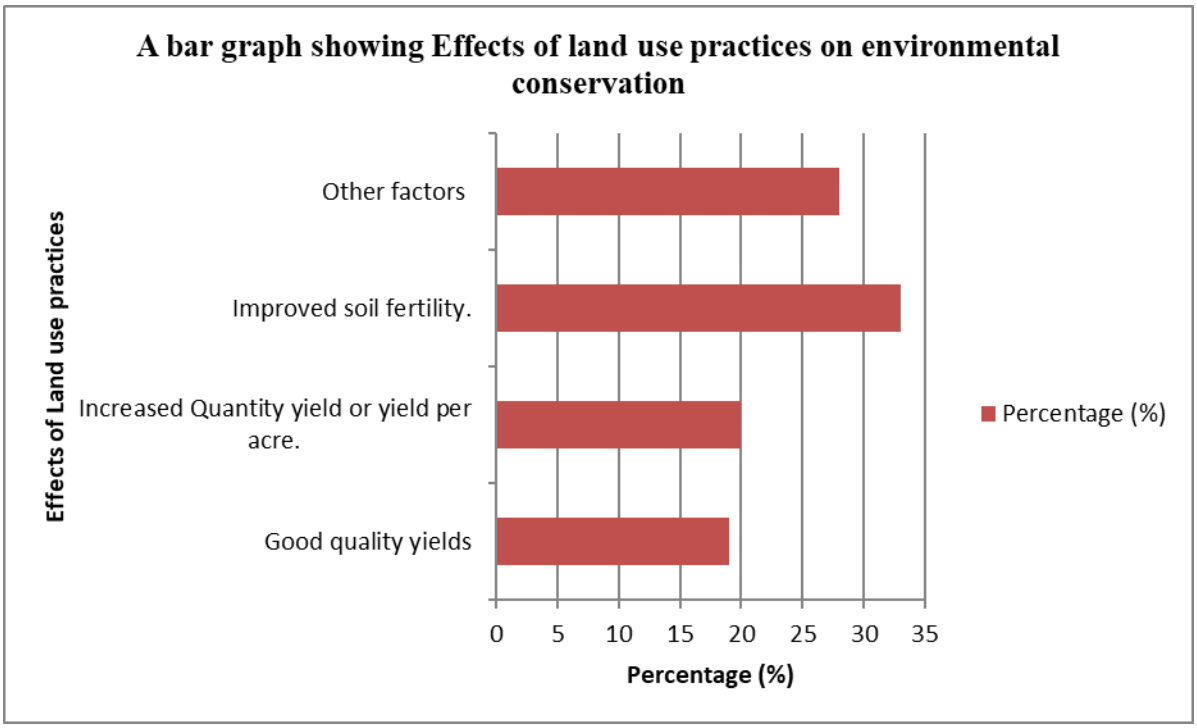
In some places in Hamurwa sub county it was discovered that terracing in steep slopes was not put into practice and the land being so hilly and steeply there were a lot of erosion and floods which destroyed peoples' property and crops inclusive. This has lead to soil exhaustion hence loss of soil nutrients as it was in line with Imbernon, (1999).

Mining leads to destruction of soil structure vegetation and organic matter leading to poor crop yields in the area. The area being so over populated, it has resulted into land defragmentation where different pieces of land are scattered in different places and have not been properly managed, mono cropping and continuous cultivation are the common practices hence poor environmental management. Mono cropping has resulted into loss of soil fertility and this has reduced on the crop yields Jackson, (2004).

The system of land tenure where some farmers do not own land permanently led to negative influence on soil productivity due to low environmental conservation management practices. Majority of the farmers fear to use their land effectively due to lack of permanent ownership and this has resulted into loss of soil and water management plans Mathen, (2004).

The use of unimproved seeds in crop growing like barley, beans, Irish potatoes, sorghum and maize has resulted into low crop yields and thus low environmental management. Unimproved seeds lead to loss of soil nutrients and this definitely accelerate to loss crop harvest Johnson, (1999). He pointed out that unimproved seeds normally bring uncontrolled weeds which usually reduce on crop yields.

Figure 3: Effects of land use practices on environmental conservation



Source: Researcher, 2020

4.3 Policies/laws that governs land and environment

Table 5: Policies/laws that governs land and environment

Policies/laws that governs land and environment	**Frequency**	**Percentage**
National land use policy	14	14
National environmental Act of 1998	20	20
The land Act of 1998	10	10
The Uganda National Land policy 2013	16	16
Local policies/rules that govern land	40	40
Total	**100**	**100**

Source: Researcher, 2020

From the table5 above, all the respondents interviewed agreed that there were policies/laws that govern land and environment as they include;

The study findings indicate that national land use policy as indicated by 14% of the respondents was one of the Policies/laws that govern land and environment. In Hamurwa Sub County, few plots of farm land were found fully registered with land registration board and working fully with the National land use policy programmes in the sub county and this is in line with Uganda land board, (1999).

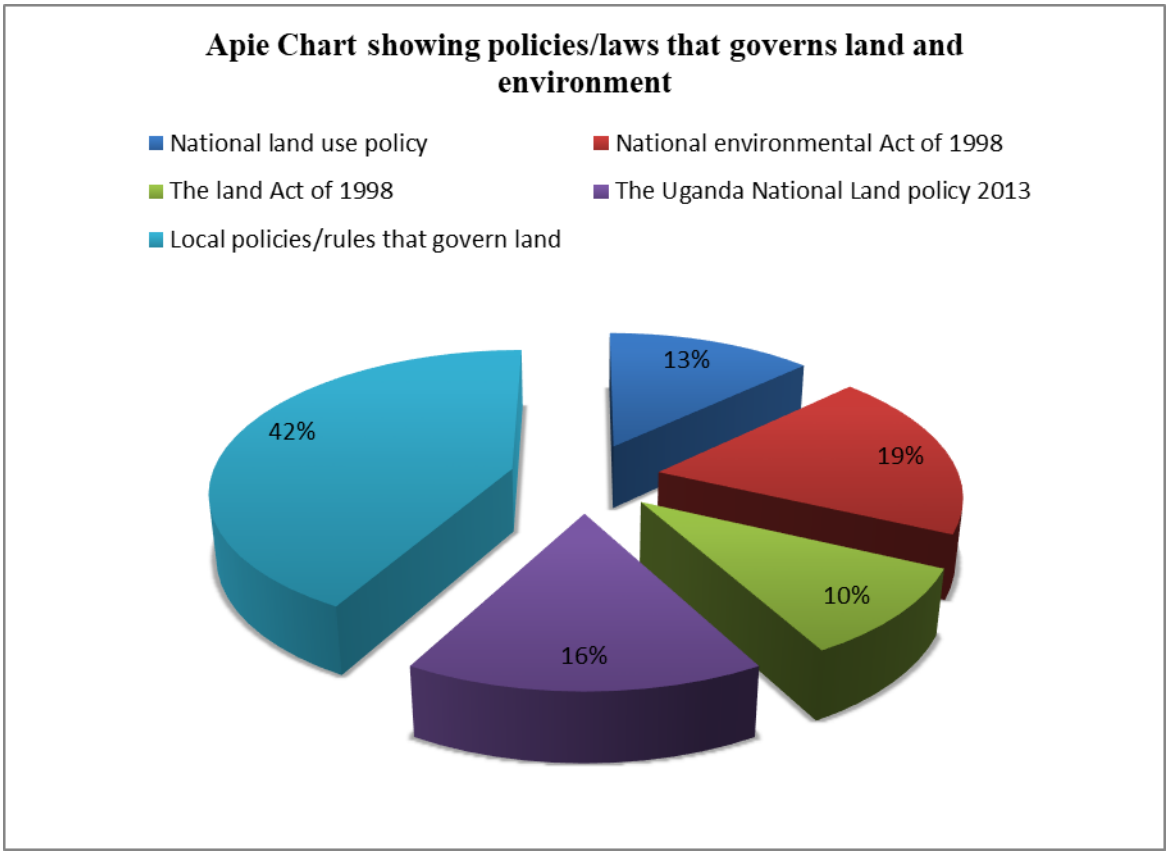
The study findings also indicate that 20% of the respondents showed that national environmental Act of 1998. Majority of the respondents revealed that few famers were having their land fully registered following the environmental Act of 1988.

The study findings also indicated that the land Act of 1998 was presented by 10% of the respondents and this was because most of the respondents from Hamurwa Sub County had the least registered land with the land Act of 1998 which was marked by 10% and this is in agreement with The Land Act Chapter227

The Uganda National Land policy 2013 was Policies/laws that govern land and environment. The Uganda National Land policy 2013 was presented by 16%. This indicates that majority of the respondents from Hamurwa Sub County showed that some plots of land were fully registered with Uganda National Land policy 2013

The findings of the study also revealed that Local policies/rules that govern land were presented by 40% of the respondents. Majority of the respondents showed that the local policies were fully used as policies to that govern land and environment and this is supported by the Constitution of republic of Uganda 1995.

Figure 4: A pie chart showing policies/laws that govern land and environment



Source: Researcher, 2020

4.4 Activities that degrades the environment

Table 6: Activities that degrades the environment

Activities	Frequency	Percentage
Over population	16	16
Housing/settlement	08	08
Land tenure	04	04
Overgrazing	12	12
Bush burning	10	10
Over cultivation	22	22
Mono cropping	20	20

Any other	08	08
Total	**100**	**100**

Source: Researcher, 2020

From Table 6, all the respondents interviewed suggested activities that degrades the environment which includes; Over population presented by 16% of the respondents, Housing/settlement revealed by 08% of the respondents, Land tenure indicated by 04% of the respondents, Over grazing presented by 12% of the respondents, Bush burning represented by 10%, Over cultivation presented by 22%, Mono cropping presented by 20% and other factors revealed by 08% of the respondents.

The study findings revealed that over population with 16% in the area was as a result of poor use of family planning methods and this result in many people which compete for natural resources in the area and results in environmental degradation and this is in agreement with White, (2004) who asserted that over population increases pressure on land and this results in increased agricultural practices which accelerate environmental degradation.

Housing/settlement with 8% was seen as an activity that degrades the environment. This was because of overpopulation with nuclearated type of settlement and this result in environmental degradation due to over cultivation on the soils and this is in line with Wang, (2006) who stated that over cultivation results into environmental degradation.

Majority of the respondents revealed that mono cropping which was presented by 20% was one of the activities that degrade the environment in Hamurwa sub county and this was because of the over population in the area on small plots of land Neill, (2004). He further asserted that as a result of over population, mono cropping is the major practice in the area due to high pressure exerted on land.

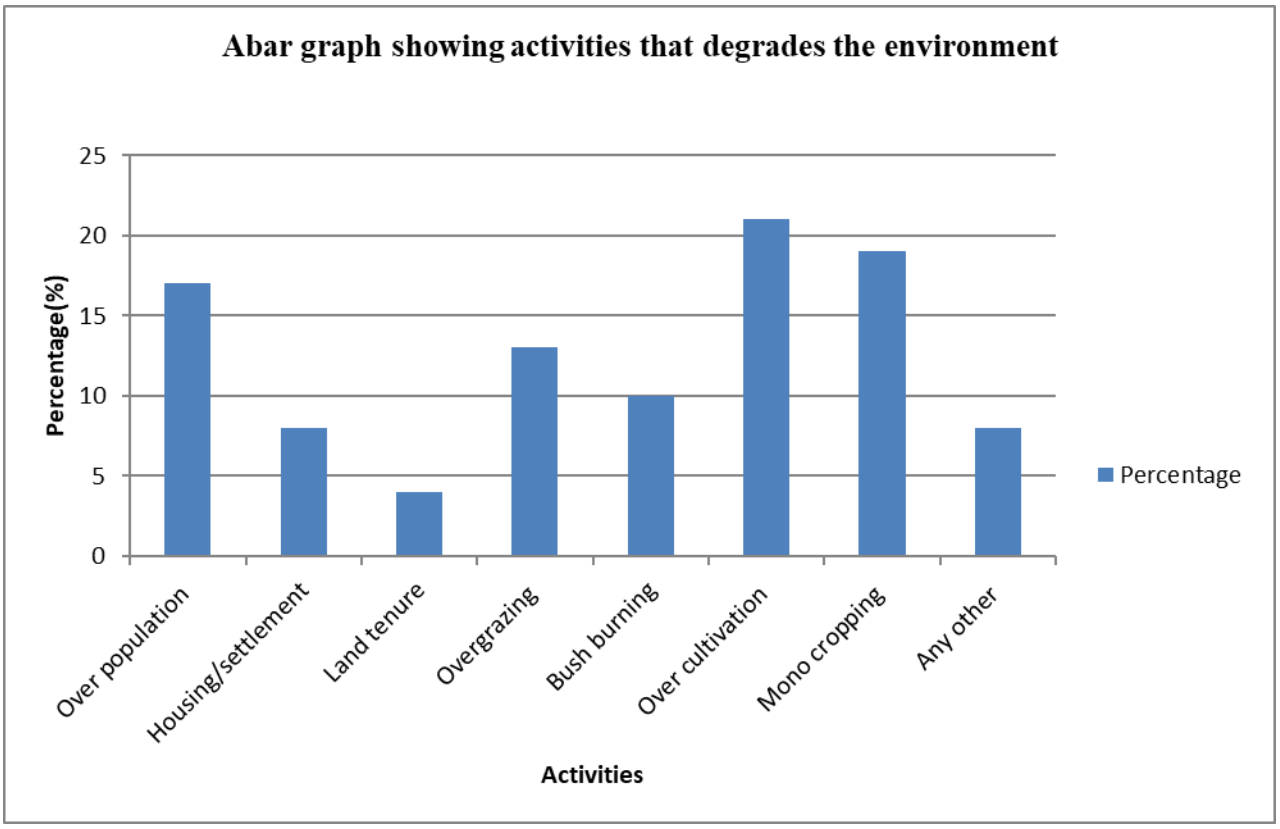
Over cultivation with 22% was also seen as one of the activities that degrade the environment in Hamurwa Sub County and this was attributed to limited land and the population is too high. Bush burning with 10%was also seen as an activity that degrades the environment. Most of the respondents revealed that when they practice bush burning it eases on cultivation rate and the soils in the area are compacted and respondents propounded that when they practice bush burning soils tend to be easier to cultivate and this was supported by (NEMA. 2010). The environmental report 2010 revealed that over cultivation degrade the environment.

Majority of the famers practice overgrazing with 13% due to limited land and they keep their animals rotating in one area which in turn lead to soil exhaustion as a result of over feeding on green pastures and normally leave the soils bare and barren and this is supported by Qi, (2001) who pointed out that overgrazing cause soil exhaustion in different parts of the world like in Denmark.

There were also other factors that lead to environmental degradation like use of fertilizer. The use of fertilizers destroy micro organisms which help the soil to form humus and this results in loss of soil nutrients which support the growth of flora and fauna and therefore the use of inorganic fertilizer application results in environmental degradation and this is supported by Vitousek, (1997).

The respondents however suggested the possible solutions to the activities that degraded environment such as crop rotation, conservation tillage, terracing, contour ploughing, wind breaks, adopt family planning methods, land registration, a forestation and zero grazing and this is in line with Liang, (2006) who stated that with existence of crop rotation, conservation tillage, terracing, contour ploughing, wind breaks, adopt family planning methods, land registration, a forestation and zero grazing environment can be restored.

Figure 5: Activities that degrades the environment



Source: Researcher, 2020

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This chapter includes summary, conclusions and recommendations. The findings were discussed basing on the study objectives.

5.2. Summary of findings

This chapter summarizes the findings of the study following the objectives.

5.2.1 Effects of land use practices on environmental conservation

The study findings show that, all the respondents interviewed agreed that there were effects of land use practices on environment include; Good quality yields indicated by 19%, Increased

Quantity yield or yield per acre presented by 20%, improved soil fertility as indicated by 33% and other factors indicated by 28%.

The study findings also indicates that agricultural intensification without environmental conservation practices can have significant detrimental effects on soil, such as increased erosion and lower fertility, further leading to ground water pollution and eutrophication of rivers and lakes (Mupenzi, et al 2016 and Matson, 1997). For instance, Mediterranean lands have suffered changes from land uses that resulted in organic matter exhaustion, erosion, soil degradation, salinization, and crusting due to both traditional land uses and human activities.

5.2.2 Policies/laws that governs land and environment

The study finding show that, all respondents interviewed agreed that there were policies/laws that governs land and environment and they include; National land use policy indicated by 13%, national environmental Act of 1998 indicated by 19%, the land act of 1998 presented by 10%, the Uganda National land policy 2013 indicated by 16% and local policies/rules that govern land which was presented by 42% of the respondents. Majority of the respondents revealed that local policies/rules that govern land had the greatest number of respondents as they were presented by 42% and this was supported by Land in Uganda is a critical factor of production and an essential pillar of human existence and national development. The policies on land and natural resources address the challenge of land reforms, decree of 1975, the 1995 constitution of republic of Uganda and the land Cap Act 227. The policy therefore consolidates the scattered policies associated with land and natural resources with emphasis on both land ownership and land development

5.2.3 Activities that degrades the environment

From the findings of the study, all the respondents interviewed suggested the activities that degrades the environment include; Over population, Housing/settlement, Land tenure, Over grazing and Deforestation.

The study findings also show that construction of roads, houses, and other buildings, people need to dig up the soil. Some of the soil at construction sites are washed or blown away because its protective plant cover has been removed. The soil that is washed or blown away ends up in nearby low lying areas, in rivers and streams, or in downstream lakes or reservoirs. This soil can cause problems by making rivers and lakes muddy and harming the organisms that live in them.

The buildup of soil on riverbeds raises the level of the rivers and may cause flooding. The soil can also fill up lakes and reservoirs (NEIC. 1994).

5.3 Conclusion

The study concluded that the effects of land use practices on environment include; Good quality yields, Increased Quantity yield or yield per acre, improved soil fertility and other factors that lead to low soil productivity. The study also concludes that there were policies or laws that govern the environment as they include; national land use policy, national environment Act of 1998, the land Act of 1998, the Uganda National land policy 2013 and local policies/rules that govern land. The study concludes that the activities that degrade the environment include; over population, Housing/settlement, Land tenure, over grazing and Deforestation and all these have led to low productivity through fertility depletion. Therefore these activities should be used carefully and sustainably thus leading to maximum quantity and quality of production.

5.4 Recommendations

Basing on the findings and conclusions of the research study, the following recommendations were proposed.

1. There is need for farmers to apply manures and fertilizers in order to get high quality and quantity yields. The use of farmyard manure should be encouraged to restore soil fertility. This should be done along with good husbandry practices such as crop rotation, and rotational grazing to avoid exhausting a particular plot of land in a short period, which in most cases forces people to encroach lands.
2. There is need for policy making concerning environmental conservation measures through a forestation thus discouraging or reducing deforestation.
3. Education of masses should be encouraged relating to the efficient use of land use practices on environment through sensitizing people on dangers of mining and mining related effects.
4. There is need for farmers to carryout land registration, land consolidation to solve the issue of land tenure system thus improving on soil productivity.
5. Farmers should be encouraged to practice zero grazing and rotational grazing through construction of paddocks thus reducing over grazing.

6. Farmers in Hamurwa sub-county should also carry out terracing in steep slopes to reduce the dangers of soil erosion thus improving on soil and water management systems.

REFERENCES

Blanco (2010). *The relationship between land-use change and climate change*. Ecological Application, 7, 753–769.

Carswell, G. 2000. *Soil conservation policies in colonial Kigezi, Uganda*. Successful implementation and an absence of resistance. Manuscript submitted to: Beinart, W. and J. McGregor. In press. Social history and African environment. Heinemann and James Currey.

Carswell, G. 2002 b. *Food crops as cash crops: the case of colonial Kigezi, Uganda.* Unpublished manuscript.

Chen, L. D., Wang, J., Fu, B. J., & Qiu, Y. (2001). *Land use change in a small catchment of northern Loess Plateau China*. Agriculture, Ecosystems & Environment, 86, 163–172.

FAO, (2010) *Land and Water Division*. retrieved 14 September 2010

FAO. (2010). *Soil Compactation*. Conservation of natural resources for sustainable agriculture.

Fu, B. J., Hu, C. X., Chen, L. D., Honnay, O., & Gulinck, H. (2006). *Evaluating change in agricultural landscape pattern between 1980 and 2000 in the Loess hilly region of Ansai County, China*. Agriculture, Ecosystems & Environment, 114, 387–396.

Imbernon, J. (1999). *Pattern and development of land-use changes in the Kenyan highlands since the 1950s.* Agriculture, Ecosystems & Environment, 76, 67–73.

Jackson, L. E., Bird, S. L., Matheny, R. W., O'Neill, R. V., White, D., Boesch, K. C., et al. (2004). *A regional approach to projecting land-use change and resulting ecological vulnerability*. Environmental.

Kassan 2008). *Environmental problems of red soil along the coast of South China*. Soil Use and Management, 18, 39–44.

Mulugeta D, Karl S (2010) *Assessment of integrated soil and water conservation measures on key soil properties in south Gondar, north-western Highlands of Ethiopia.* J Soil Sci Environ Manage 1(7):164–176.

Mugisha, Samuel. 2002. *Root Causes of Land Cover/Use Change in Uganda*: An Account of the Past 100 Years. Kampala, Uganda: LUCID.

Mupenzi, C.; Ndayisaba, F.; Nyesheja, E.M. *Agricultural impact on environment and counter measures in Rwanda*. Afr. J. Agric. Res. 2016, 11, 2205–2212.

NEMA. 2010. *Uganda State of the Environment Report 2000* Version 2. Kampala, Uganda: National Environment Management Authority, Ministry of Natural Resources, Government of Uganda.Kampala, Uganda.

NEIC, (1994) *Convention on Biological Diversity*. United Nations Environment Programme (UNEP), Nairobi, Kenya

The Constitution of republic of Uganda 1995.

Tukahirwa, J.M. 1995. *Measurement, prediction and social ecology of soil erosion in Kabale District, Southwest Uganda*. PhD dissertation, Makerere University

Raussen, T., F. 2002. *Report on a survey to identify sustainable agricultural and natural*

resources-based technologies for intensification in southwestern Uganda. SCRIP phase II report submitted to the USAID Uganda Mission. International Centre for Research in Agro-forestry,

Nairobi, and International Food Policy Research Institute, Washington, D.C.

Sanchehez , (1997) *Household land tenure reform in China*: its impact on farming land use and agro-environment. Land Use Policy, 14, 175–186.

Vitousek, (1997). *Human domination of earth's ecosystems*. Science, 277, 494–500

Wang, A. S., Liang, S. L., & Zhou, W. C. (2006). *Environmental vulnerability evaluation in mountainous region using remote sensing and GIS – A case study in the upper reaches of Minjiang River, China*. Ecological Modelling, 192, 175–187.

Woldeamlak B (2003) *Towards Integrated Watershed Management in Highland Ethiopia:* the Chemoga watershed case study. Tropical Resource Management Papers 44, Wageningen University.

APPENDICES

APPENDIX I: Questionnaires for respondents

Dear respondent,

Iam, **MUTESIGENSI SAMUEL** a student of Kabale University offering a Bachelors Degree in Environmental Science of Kabale University conducting a research study on **"Assessing the Effects of Land Use Practices and Environmental Conservation in Rubanda District, A Case Study of Hamurwa Sub-County"**. I request you to give more information about the study problem and the information given will be confidential and only for academic purposes.

Tick in the boxes and fill in the blank spaces provided

SECTION A: BIO DATA

1. Sex

a) Male ☐

b) Female ☐

2. Age

a) 18 – 24 yrs ☐

b) 25– 35 yrs ☐

c) 35 yrs & above ☐

3. Education level

a) None ☐

b) Primary level ☐

c) Secondary level ☐

d) Tertiary level ☐

4. Marital status

a) Single ☐

b) Married ☐

c) Separated ☐

d) Divorced ☐

SECTION B: EFFECTS OF LAND USE PRACTICES ON ENVIRONMENTAL CONSERVATION IN HAMURWA SUB-COUNTY RUBANDA DISTRICT

5. Have you ever heard about land use practices?

Yes ☐

No ☐

If yes what is it all about?

……
……
……
……

6. What are the common land use practices used on environmental conservation in Hamurwa sub-county Rubanda district?

a) Animal rearing ☐
b) Agro-forestry ☐
c) Crop growing ☐
d) Mulching ☐
e) Terracing ☐
f) Mining ☐
g) Any other……

7. What are the effects of land use practices on environmental conservation in Hamurwa sub-county Rubanda district? ☐

a) Good quality yields ☐
b) Income
c) Improved standard of living ☐
d) Any other……..

SECTION C: POLICIES/LAWS THAT GOVERNS LAND AND ENVIRONMENT IN HAMURWA SUB-COUNTY RUBANDA DISTRICT.

7. What are the policies/laws that govern land and environment in Hamurwa sub-county Rubanda district?

a. National land use policy ☐
b. National environmental Act of 1998 ☐
c. The land Act of 1998 ☐
d. The Uganda National land policy 2013 ☐

☐

e. Local policies/rules that govern land

Any other……..

SECTION D: ACTIVITIES THAT DEGRADES THE ENVIRONMENT IN HAMURWA SUB-COUNTY RUBANDA DISTRICT.

8. What are the activities that degrade the environment in Hamurwa sub-county Rubanda district?

a) Over population ☐
b) Housing/settlement ☐
c) Land tenure ☐
d) Over grazing ☐
e) Bush burning ☐
f) Over cultivation ☐
g) Mono cropping ☐
h) Any other……

9. What are the possible solutions that can be put in place to control activities that degrade environment?

……
……

APPENDIX II: Interview guide

Dear respondent,

Dear respondent,

Iam, **MUTESIGENSI SAMUEL** a student of Kabale University offering a Bachelors Degree in Environmental Science of Kabale University conducting a research study on **"Assessing the Effects of Land Use Practices and Environmental Conservation in Rubanda District, A Case Study of Hamurwa Sub-County"**. I request you to give more information about the study problem and the information given will be confidential and only for academic purposes.

1. Have you ever heard about land use practices?
2. What are the common land use practices used on environmental conservation in your area?
3. What are the effects of land use practices on environmental conservation in your area?
4. What are the policies/laws that govern land and environment in your area?
5. What are the activities that degrade the environment in your area?
6. What are the possible solutions that can be put in place to control activities that degrade environment?