

**AGRICULTURAL PRACTICE AND THE STATE OF ENVIRONMENT  
ACASE STUDY OF KERIO DIVISION RIFT VALLEY  
PROVINCE IN KENYA**

**BY**

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## APPROVAL

The study entitled the agricultural practices and the state of environment a case study of kerio division Rift Valley Province in Kenya, was done under my supervision and its now ready for examination.

Signed  .....

date. 29/6/11 .....

Mrs. Debora Talingora

## DECLARATION

The study entitled the agricultural practices and the state of environment a case of study of kerio division Rift Valley Province in Kenya. Is my work and original it has never been submitted to any institution of learning for any award.

Signed MK.....

Date 29/8/11.....

## ABSTRACT

The study investigated the influence of agricultural practice and the state of environment in kerio division Rift Valley-Kenya 2007-2011. The study was guided by specific objectives that included; identifying the different agricultural methods employed in kerio division, to find out the effects of agricultural methods used on the environment and to suggest possible solutions of preserving the environment most through improving the farming methods.

The study a sample survey and cross sectional study designs based on quantitative and qualitative data design. Secondary data were also sought through documentary analysis. Qualitative data were gathered through questionnaires. A sample population of eight (80) represented a target population of 800,000 people in the areas. These respondents were selected from villages that included; Nasokol Ndalul Tartar Kapchonge .the study's demographic nature considered the sex, marital status, levels of education, work experience, and the age groups of the respondents.

The major agricultural practices used are; pastoralism, mixed farming, fallowing and shifting cultivation. The major positive effects include; formation of food, lead to rainfall formation, soil formation, refreshing air, formation of medicine, preservation of soil and conservation of natural resources. The following are the major negative effects; drought and famine, water scarcity, soil erosion and soil exhaustion. The major solutions include; sensitizing the people, use of manure, formation demonstration farms and provision of subsidized farm implements.

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## CHAPTER ONE

### 1.0 Introduction

This chapter bears the background of the study, statement of problem, purpose, objective, research question, significance and scope.

According to Alexandratos (2000), Agricultural production take place in over 800 million hecters with a cropping intensity of 78% implying an annual harvested area of some 680 million hectares. Further expansion depends on the quality or the land reserves available their cost of development and appropriate to utilize them.

In 2000 arable land expansion and cropping intensity increases account for around two fifth of the growth in production this means that if the projected for 2011 is to achieve arable land has to increase by 83 million hectares cropping intensity would rise to 84% and therefore harvest land by 115 million hectares. The magnitudes involved are quite land. Different farmers depending on their different geographical location rise different types of farming these include shift cultivation, mixed farming, inter cropping, strip cropping, ranching, pastoralism and other methods of farming.

### 1.1 Back ground of the study

Agriculture is the growing of crops and rearing of animals, it involves the manipulation and utilization of the environment resources in order to increase food productivity.

Agriculture plays an important role since it's most of the countries in the world especially the 3<sup>rd</sup> world countries depend upon it.

The Kenyan economy is dominated by agriculture which contributes 80% of government income earning and 70% of foreign earning apart from providing food and security and farming incomes.

Agriculture supports the Agro – based industries and employ over 70%b of Kenyan citizens of over 42 million people. Traditionally agricultural practices have been and still being used in Kenya.

Keiro – division is mostly dominated by Kalenjin ethnic group who are largely herdsmen or pastoralists where they keep animals like, cows, sheep, goat and donkeys. They also practice crop growing such as wheat, maize, tea, millet, and coffee. They keep large herds of cattle ranging from 1000 and above and these with small herds range from 10 – 20 animals.

The ethnic found in Kerio division are Kipsigis, Nandi, Pokot Tugen who are normal mixed farming.

The land in Kerio division is generally flat the context of soil is loam in most areas few of the area are sand soil vegetation is bushes with no big tree there are scattered trees especially in the southern part. The land is generally fertile and there is high rainfall where by areas faces long rain season and from November to March it's a dry season, and pastoralists move from one place to another looking for the food and water for their animals.

The pastoralists normal move to northern part of Kipkabus and graze around kapkelio swamp they spend over three month there when its dry season in southern part of kelio and after there you find that they keep moving from one place to another and this led to soil erosion because the stumbling of soil from an area since the pastoralists keep large group of animal and this tend to bring damage on soil.

## **1.2 Statement of problem**

Over 87% of estimated population of 40,000 of people is agriculturalist. According to kerio division documentary 2008 over 30% of these people are pastoralists who have large of animal ranging from 50 to 1000 animals.

These with small herds range from 10-20 animals that theses people have small piece of land they move from one place to another to graze their animals they practice improper farming methods such as overgrazing deforestation among others.

It has been established that this party led to environmental degradation in kerio division where persistent drought mostly result from deforestation have led to unbearable rainfall and the subsequently low produce from agricultural crop grown in the area this prompted the researcher

to investigate the influence of agricultural practice the environment a case study of kerio division of rift valley province in Kenya between 2005 and 2011.

### **1.3 Objective of the study**

The study shall be guided by the following objective

- i. To identify the deferent agricultural method employed in kerio division
- ii. To identify the ways of controlling pastoralist in kenio division
- iii. To come up with solution of how to preserve environment in kenrio division

### **1.4 Purpose of the study**

This study aimed at investigating the effect of agricultural practice on the state of environment in kerio division of rift valley province in Kenya between 2004 and 2009.

### **1.5 Research questions**

The study was guided by the following question

- i. What is different agricultural practice used by farmers in kerio division of rift valley province?
- ii. Examine the influence of the different agricultural methods on the environment in kerio division.
- iii. Examine the different modalities that can employ in preserving the environment a case study of kerio division rift valley province in Kenya.

## **1.6 Scope of the study**

This study took place in kerio division among five villages these include chepkabus, Moiben, Bendaras, Tartar and Nasokol. These were chosen because it's in this village that the effect of environment degradation is mostly face due to poor agricultural method used.

## **1.7 Significance of the study**

The researcher hopes the finding if this research study would be of the following importance.

This study will provide vital information on the danger of the different farming methods employed in kerio expose to the environment. The environmentalist and other policy makers will use this information to solve the problem of environmental degradation. Through this study the government of Kenya will identify kenrio as one of area being degraded environmentally.

This would help them device policies regarding the else different natural resources that are being misused by the people this would be so since the magnitude and the causes of the problem would

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.0 Introduction

This study aimed at investigating the influence of agricultural practice on the environment a case study of kerio division rift valley province literature was reviewed according to the objective of the study that included examining the different agricultural practices in kerio division the effect of agricultural practices in kerio division and the solution in order to preserve the environment.

#### 2.1 The various agricultural practice used in kerio division

Division is largely dominated by pastoralist they move from one place to another looking for good pasture and water for their animal. They practice crop growing whereby shifting cultivation and bush fallowing are commonly used method of crop growing they grow crops mainly for subsistence survival.

Kenrio being a dry area they mainly practice pastoralist Kagoba (2006) notes that 20-25 million pastoralist who are mainly located in the northern and southern fringed of the Sahara the horn of Africa occupied by nandi people the Turkana in the north western part of Kenya the Karamojong and the Balima in Uganda and Masai Taturu and small number of Sukuma are all pastoralist who keep large herd of animals.

Luisigi 1980 further notes that in many part of sub-Sahara Africa pastoralist exploit the low opportunity cost of natural resource on land which are not suited for sustainable agriculture production.

The Nandi people practice pastoralist in various forms the practice are characterized by communal grazing, overgrazing and bush burning. Among other practices they have large herd of animals ranging in thousand. They hardly have padlocking no good fence and land is mismanaged through overgrazing. There is no limitation on the number of animal that may be grazed on the piece of land through communal grazing land is owned as common property people graze with respect to the health and conservation of natural resources base.

Just like Uganda where pastoralists move to wet areas during dry season the Kipsigis also move to the south where there is Kipsugut swamp for water during dry season national environmental management authority (NEMA) 1998 of Uganda noted that most of the range lands all over the country are communally grazed. The pastoralist raise animals on cultivation hillside fallow on previously harvested fields the stocking rates have in some areas exceeded the optimum. The Nandi overstock animals where an individuals posses over one hundred animals.

Mbuza etal 1996 notes that many community overstock because they are convinced that large herd area source of prestige sign of wealth and insurance in adverse circumstance such as when disease attack their livestock a number of authorities have acknowledged and changes in composition of livestock to suite the vegetation and conserve it sand ford (1983) the nandi and pokot keep large herd because they fear to loose certain breed since they believe they have been with them for so long.

Shifting cultivation is practice due to need of fertile soil for growing of seasonal crops such as maize sweet potatoes millet and rice for substance purpose. Katende etal (1995) noted that since pastoralist are always in hurry and in need of healthy grass they cut down the tree bum the leaves to generate soil nutrient which systems bears obsessive effect to the environment as soil erosion has resulted to reduction of nutrient in the soil.

The nandi also practice multiple cropping this is where different types of crops are grown on the some piece of land many people are poor and posses little piece of land for crop growing though its communally owned cruz (1992) noted that different types of crops especially cereals are grown by pastorals these may include millet, Sorghum, and Maize since they can be turned into flour that can be kept for long period of time these crop are grown on the some pieces of land which is usually small especially an acre.

## **2.2 Effects of the Agricultural Practice on the Environment in Kerio Division**

Ecosystem inhabited and utilized by pastoralist is characterized by low erotic and unreliable rainfall with high seasonal variability frequently experiencing long period of draught. Although such change are continuous and unpredictable there are general pattern of circle that can be

discerned albeit with low degree of predictability Nema (1996). Pastoralism has both positive and negative effect on environment.

### **2.3 Agricultural practice and state of environment a case study of kerio division Rift valley province**

#### **2.3.1 Positive effect**

Under the right condition or proper management of the environment livestock is very important avenue through which the environment may be preserved for along period of time with high proceeds.

Kisamba (1995) livestock can play an instrumental role in supporting range land by biodiversity enhancing soil fertility and nutrient recycling and directly promoting the amenity value of particular landscape for other uses.

In kerio divisions few wild animals managed to survive because people get meat from the animal they rear in case they need it.

Downen (1972) noted that cattle keepers make the most use of environment where non attractive productive activity is visible in the short run mobility has been shown to be an appropriate mechanism for adaptive management for such ecosystem.

Where mobility continues unhampered it has resulted in increased biodiversity conservation and sustainable land management some areas such as southern Kerio are good for crop growing due to high level of nutrient added to the soils from the cattle dung.

#### **2.4 Negative effect of pastoralism**

Pastoralism in kerio is accountable for the low rain received in the region. According to Kodjson 1988 range land has limited capabilities in vegetation production formerly due to adverse environmental factors including low and seasonal rainfall, moisture gathering winds varying degree of poor soil, soil erosion and lack of forage and grazing management and overstocking in

terms of what the available vegetation cover can sustain. These are thorny scattered bushes in kerio division due to overgrazing that can allow the growth of vegetation that can add forage to the soil.

There is scarcity of water in kerio division this is because low rainfall is received due to poor vegetation that can not support reasonable rainfall. Formation Luisigi 1980 noted that thicket when cleared leaves large bare patches of ground where there is no vegetation to support rainfall formation. Areas which once covered by savanna species of plant with green vegetation such as swamp are no longer due to pastoralism. Some underable species have mushroomed which are less palatable and nutritious.

The occurrence of drought and famine in kalenjin community has been greatly related to pastoralism in some part the Nandi and Kipsigis depend on land as major production asset they hardly appreciate the value of land by overgrazing.

Angbode (1988) noted that pastoralists suffer from increased pressure on land and environmental degradation due to overcrowding of water sources encroachment by cultivation private investment tourism and mineral exploration with visible alternative offered.

## **2.5 Effect from the other agricultural practice**

Agriculture practice such as shifting cultivation intercropping and multiple cropping, there has been a lot of deforestation in many areas whereby crop growing is practiced Hamilton (1981) noted that activities such as cultivation livestock rearing, mismanagement of forest, population and demand for forest products like firewood, timber and fuelwood lead to environmental degradation. Shifting cultivation practice in kerio has led to adverse effect where soil erosion has resulted. NEMA (1998) consequently noted that intensive cultivation that is often unprotected on slopes is a common practice in pastoral areas in kerio valley which faces soil erosion due to lack of vegetation to control wind and water runoff.

The low rainfall due to long drought have led to encroachment on swamp for arable land Nagut (1992) argued that farmers attribute declining crop yield among other things due to decline in soil fertility the low rainfall due to long drought and lack of enough forage to attribute to soil



fertility account for loss of fertility this bareness of soil has led to poor vegetation where animals die to lack of pasture when draught is worse.

## **2.6 Solution to the effect of agriculture practice on the environment.**

These should be a proper management of land if the environment is to be conserved the agriculture practices used in Kerio division must be largely revised if the areas are to register positive results there should be use of modern farming methods these may include ranching mixed cropping padlocking reducing the number of animals by considering quality rather than quantity, molding use of fertilizer among others.

Kisamba (1992) noted that the communities practicing pastoralism should instead organize themselves into ranch systems here they would keep considerable number of animals look after them well in order to attain high yield from them the government would even be in a position to give assistance through technical skills and provision of equipment.

In Kerio division if farmers organize themselves the government would be in a better position to provide collective needs such as dug enough dams for water supply like that found in Turkwel village of rice. There should be considerable reduction in the number of animals per unit areas and this should be based on the capacity of particular piece of land to provide enough pasture and water for such animals.

Humphrey (1991) states that range scientists frequently advocate reduction in stocking rate in the interest of improving the productivity for vegetation and reducing encroachment and soil erosion move to that need to be addressed.

Standford (1983) noted that there is no evidence that varying stocking method best and national system in attempt to improve the productivity of vegetation has been successful in dry tropical Africa standford rather argues that development of more and better watering facilities extend the access the stock to forage.

Wandera (1993) argued that the pressure on Arabi land has also led to intensive and continuous tilling of the land with no fallowing period in some places and consequently soil fertility land

productivity per unit area has declined .he further commented the soil erosion was noted to be an important factors in environmental degradation and the causes were identified as population pressure on the land for agriculture and poverty this fibrous nor, reforestation cleared areas among other environmental conservation methods.

The international union for conservation of nature and natural resources IUNC 1992 observed that there are several method of agricultural that may be employed to conserve the environment these may include paddocking, for pastoralist use of fertilizers molding and planting of leguminous crops instead of slash and bum forest.

This would keep the soil with moisture and have considerable nutrient kerio division need to take great change in the method of farming the practice such as padlocking and use of mixed cropping for crop growing farmers should be emphasized.

Gale (1998) suggests that farmer's inmost African countries need sensitization about importance of the environment and how they may effectively conserve it. Most farmers degrade the environment because of their ignorance these suing slash and burn agriculture are ignorant of the long term effect of burning on the soil particles in kerio division. Many pastoralist and crop farmers given the low level of education they attained lack basic knowledge of conserving the environment most of the trees have been cut down because of ignorance about the importance having tree in the environment.

## CHAPTER THREE

### RESEARCH METHODOLOGY

#### 3.0 Introduction

This chapter consists of the research design area and population of study sample selection and size, method of data collection procedure of data collection and dissertation writing testing the validity and reliability of research data collection methods and data analysis.

#### 3.1 Research design

Sample survey and cross sectional study design based on quantitative data collection design for primary data were employed. Secondary data were sought through documentary review from literature related to the objective of the study.

Qualitative data were got using interview, observation and group discussion. The questionnaire formed a major basis for qualitative data that were presented in a descriptive form through comparing and contrasting the different respondents from secondary data cited. Both qualitative and quantitative data were analyzed statistically by use of the means percentage, ratio through elaborating the respondents view in comparison with findings from the observation checks list, this information were be integrated into tables chart and graphs.

The population samples were derived using purposive and random sampling given the homogenous nature of the population under study. These represented the estimated population of 25,000 people in the areas. A sample is 15 well selected respondents will be used data will be collected first by seeking a letter form the faculty of education to be presented to the respondent then selection and training of target respondents to who questions will be administered for answering incompetent respondents were replaced by serious to give relevant data to the study.

### **3.2 Area and population of the study**

The study took place in Kerio division among four villages namely Chepkabus, Nasokol, Tartar, and Moiben. These villages are in Soyi ward which is in the northern part of Kerio division. Kerio division is chosen among the seven divisions in Rift Valley province due to its being more affected by environmental degradation, more presumably due to poor agricultural practice.

A total of 15 respondents constituted the sample size and were evenly selected from the aforementioned villages. These included crop farmers, pastoralist, environmental area, administrator, and policy makers at the division. From each village, 5 model crop farmers, 6 pastoralists, 2 village administrators, and 2 environmentalists formed each village to a total of 15 respondents.

### **3.3 Method of data collection**

The study used a range of data collection methods on primary and secondary survey design. Primary data was sought using quantitative and qualitative data survey design. Qualitative data were gathered using interviews, observation, and group discussion. Quantitative data were gathered using questionnaire. Secondary data were collected through documentary review from different literature written relating to the objective of the study, especially from libraries.

#### **3.3.1 Primary data**

##### **Qualitative data design**

##### **Interviews**

Both structured and unstructured interviews were used. Structured interviews involved questions where a list of questions were set and administered to respondents after informing them about the intention of the study. Unstructured interviews were fact-to-face questions and were administered in a conversation form. An interview schedule was used and focused on the method of farming used in Kerio division, effect of agricultural methods on the environment, and the modalities

employed to conserve the environment. Interviews were held with 40 respondents because these were manageable due to limited resources and time.

Interviews were used because they consumed little time where a group of respondent was got at once little financial resources were used since they were administered by researcher.

#### **Observation method**

Here the researcher personally reviews the different cause of environmental degradation in Kerio division as result of poor agriculture practice employed. An observation check list was used. It included the agricultural method used in Kerio division. The effect of agricultural practice on the environment and modalities people are using to conserve the environment.

Observation method was employed because first hand information was got which was used to cross check result from other data collection method and also the researcher knew the reaction the respondent about the problem faced this was vital in analyzing the data derived from all other data collection methods.

#### **Group discussion**

After gathering data through documentary review observation and interviews were asset of five targeted respondents that included a crop farmer, pastoralist, an environmental and a policy maker at the division on environmental issue.

Group discussion performed the following functions devising the appropriate data presentation techniques analyzing the different views given by different respondent that were not understood well and adding more views where they lacked.

### **3.3.2 Qualitative data**

#### **Questionnaire method**

Set of well selected both open and closed ended question were formulated these were distributed to different respondent who answered and returned them within four days they were given 20 respondents because they are manageable due to limited time and resources. Questions were set

depending on the objectives of the study questionnaires were employed because of the following reasons.

The different view held by different respondents were revealed thus fulfilling the purpose of the study

Comparison and constrating of different views by different respondents were possible since answers were written down. This enables easy data presentations and analysis.

### **3.3.3 Secondary data design**

#### **Documentary review**

Different research studies done and other related on agriculture and environment was reviewed in relation with objectives of the study from a different library and other necessary documents. These data were of the following important literature from the documents guided there researcher when designing questionnaires interviews schedules and observation checklist since it was a source of reference.

### **3.4 Procedure of data collection**

The researcher will acquire a letter seeking permission carry out study in kerio division Koinea ward among four mentioned village. The respondents to participate in this study will be chosen according to their knowledge and experience about the area concerning the topic of study. They will be trained on how to answer the different question and then the competent ones will be employed in the study.

The various collection method and techniques will be used as mentioned above and data were analyzed as shown in chapter three sections 3.8 of data analysis below was presented using.

### **3.4.1 Statistical techniques**

The dissertation was written following the Kampala international university research report writing producer as shown in the table of contents.

### **3.5 Testing the validity and reliability of research collections method.**

The researcher reviewed different document to know the different method used in seeking data from respondents. The researcher tested them to discover their reliability. This showed the validity of data collection method.

Reliability of research collection method was done by comparing and constrating the different results from the different research data collection method. Methods that gave consistent results were proven consistent and thus reliable for use in the study.

### **3.6 Data analysis**

The study result both primary and secondary data were treated in related manner to make uniform study report.

The quantitative data generated through the question where analyzed manually to generate mean, ratio and percentage. These helped to establish the magnitude of the problem. Both quantitative and qualitative data were presented in a descriptive form that involved diagrams like graphs and tables.

Data from questionnaires were first be inspected and edited in order to discover items misunderstood, direct, gap, and discarded off any irrelevant data that were generated enough ideas relevant to the study. Responses were compared with literature review from other data sources.

### **3.7 Limitation from the study**

There was challenges faced during this study given that most respondents (crop farmer and pastoralists) attained low level of education or not any at all, it was difficult to attain enough relevant data from them since most of the environmental degradation practices they do are done out of ignorance.

Questionnaires being good sources of data since it is kept for long time in its originals states some of them were poorly answered through they were written in the local languages they speak best and commonly use.

The interview was oral which necessitated moving from one village to another hence becoming expensive and tired.

The Kerio division being a remote area many people does not have telephones for easy communication wasted of time trying to coordinate with different respondents for interviews leading to delay of information.



## CHAPTER FOUR

### DATA PRESENTATION, ANALYSIS AND INTERPRETATION OF THE STUDY FINDINGS

#### 4.0 Introduction

The study investigated the agricultural practices and the state of environment case study of Kerio division Rift Valley province of Kenya. The following objectives guided to identify the different agricultural methods employed in Kerio Division. To identify the ways of controlling pastoralist in Kerio division to come up with solution of how to preserve the environment in Kerio division.

#### 4.1 The study employed both male and female respondents

The study employed both male and female because both engage in filed preparation while the women do weeding and harvesting pastoralism where done by men and even number of respondents where used so that affair analysis could be taken.

##### 4.1.1 Background characteristic of respondents

##### Gender of respondents

Table 1: Shows the gender of the respondents

Gender of respondents	Frequency	Ration	Mean	Percentage
Male	50	5:8	1.6	62.5%
Female	30	3:8	2.7	37.5%
<b>Total</b>	<b>80</b>	<b>1:1</b>	<b>1</b>	<b>100%</b>

Source: Field Data 2011

Basing on the above table out of 80 respondents used in the study 50 of them were men and the remaining 30 were women.

#### 4.1.2 Marital status of the respondents

The study considered being married, divorce, single, and widow/widower.

The study considered the marital status of the respondents because its effect land use in the area most of respondents were married because many people highly believed that children are good source of labour. Also many people have large families with many children.

**Table 2: Shows the marital status of the respondents**

Marital status of the respondents	Frequency	Ratio	Mean	Percentage
Married	48	3:8	1.7	60%
Divorced	08	1:10	10	10%
Single	10	1:8	8	12.5%
Widow/ widower	14	7:40	5.7	17.5%
<b>Total</b>	<b>80</b>	<b>1:1</b>	<b>1</b>	<b>100%</b>

Source: Field data 2011

Out of 80 respondents basic on the above table used in the study 48 of them were married, 08 Divorced, 10 single, 14 widow/ widowers, this information were presented in table 2 above.

#### 4.1.3 Level of Education of the respondents

The study considered these respondents who never step at school at primary education ordinary level education and these with degree education level.

The study considered various level of education because in kerio division there are people that never attended any school. These that dropped put and ones that completed their studies in various institutions such as college and universities it was established that many people in the area ever studied beyond primary education.

This mainly resulted from low income and people negative attitude to education

Table 3 shows level of education of the respondents

Education level of the respondent	Frequency	Ratio	Mean	percentage
Never studied all	15	3:16	5.3	18.75
Primary education	40	1:2	2	50
Ordinary level	12	3:20	6.7	15
Degree	5	1:16	16	6.25
<b>Total</b>	<b>80</b>	<b>1.1</b>	<b>1</b>	<b>100</b>

Source: Field Data 2011

Basing on the above table out of 80 respondent used in the study 15 never studied at all 40 had primary education 12 had ordinary level 5 had degree education as shown on the table 3 above.

#### 4.1.4 Age of respondents

The study considered the age of respondent of both young and old people that engage in Agriculture in the area age between 10-20 years 21-30 years 31-40 year 41-50yaer. It was established that the most active age because they are the most energetic that can work for hours as most of input is unskilled labour

Table 4 shows the age of respondent

Age	Frequency	Ratio	Mean	Percentage
10-20year	05	1:16	16	6.25
21-30year	20	1:4	4	25
31-40year	26	13:40	3.1	32.5
41-50year	15	3:16	5.3	18.75

Source: field Data 20

Basing on the above table out of 80 respondent used in the study 05 were between age 10-20 year 20 between age 21-30 year 26 between 31-40 year 15 between 41-50 years.

#### 4.2 Agricultural activities practiced in Kerio division Rift province Kenya.

Agricultural practice	Frequency	Ratio	Mean	Percentage
pastoralism	16	1:5	5	20
Mixed farming	14	7:40	5.7	17
Shifting cultivation	13	13:80	6.2	16.25
Fallowing	11	11:80	7.3	13.75
Intercropping	10	1:8	8	12.5
Strip cropping	6	3:40	13.3	7.5
Intercropping	10	1:8	8	12.5
<b>Total</b>	<b>80</b>	<b>1.1</b>	<b>1</b>	<b>100</b>

Source: Field Data 2011

Out of 80 respondent 16 reported pastoralism 14 reported mixed farming 13 reported shift cultivation 11 reported fallowing 10 reported crop rotation and 10 reported intercropping this information is presented in the table above.

##### 4.2.1 Common Agricultural Practices in Kerio division.

The study found out that the common used agricultural practices in the area is mixed farming, shifting cultivation crop rotation and strip cropping.

Pastoralism was noted as the most common used agricultural practices in the area farmer move from place to place with their animals looking for water and pasture kerio division has one dry season and one wet season. Dry season starts from May to November and wet season start from December to April during dry season pastoralist move to the South East kipkelion areas with a lot dams where animals get water and pasture in the village of Nasokol and tartar during the wet season they move to the Northern part to the village of Mitindei and Chepkabus these area are commonly known as Kimwetei. These is characterized by temporary settlement were farmers construct grass thatched houses in the area.

In Chepkabus the areas they normally build with unburn bricks and make roof with clay soil so that they don't leak water during rain season farmers' keep large cattle from 10-30 80-200-500-1500 animals that include cattle donkey sheep goat and camels.

They also practice mixed farming where they keep animals at the same time grow crops many farmers carry out subsistence agriculture where seasonal crop that mainly grow their include maize rice, beans ground nut, millet, cotton, sweet potatoes are grown for food the little surplus and sold to supplement the family income simultaneously keep animals domestically consumed and to S. farmers use shifting cultivation this is where they slash the vegetation and burn it in order to create soil nutrients most farmers noted that this is practiced mainly in areas that have low population these areas include Misanga Kapnchonge and Ndaluu. seasonal crops especially maize beans sweet potatoes millet among others are the most common only grown under this practice. Fumbuka noted that these crops help to provide food in the short time to meet the ever growing demands for food in the areas. Similarly Kisamba (1992) noted that through shifting cultivation provides high yields of seasonal crops to cater for the ever growing population in many areas of intercastine region it is fatal to the soil as the nutrients like bacteria are killed by fire.

Fallowing is another agricultural practice that is used in Kerio division this is where farmers after harvesting crops from the field they leave them to rest for sometime to regain fertility fields are left for up to six months where various vegetation that include Nitrogen fixing ones are left to grow to allow fixing of soil nutrients it was noted that most farmers that grow cereal crops practice these farmers that grow cereal crops practice this form of agriculture. Relatedly Naguti (1992) note that bush fallowing is very common among subsistence farmers as it allows the field to regain their fertility underling the fallowing period when rain comes farmers till the land and grow crops in the rested fields.

Intercropping helps farmers to yield more than one type of food at the same time helps to fix nitrogen and other soil nutrients and provide constant supply of food as noted by many respondents this is where farmers plant more than one type of crop in the same field. Farmers mainly plant maize and beans, maize with sweet potatoes at the end of the wet season they plant chick pea which they harvest in dry season in consonance Luisigi (1980) note that many farmers in the intercastine region practice intercropping where seasonal crops are planted with perennial crops such as coffee and bananas these help to provide food to the people.

Also they practice crop rotation this is where farmers plant crops by rotating into the field in which they plant them. This is because different crops have different nutrient requirements and at the same time preserve the soils from exhaustion and soil nutrients are kept within the soils after being fixed by some plants similarly Kagoba (2006) notes that crop rotation is very common agricultural practice in the areas where seasonal crops such as maize, sweet and Irish potatoes soya beans are grown in a rotation system to enable soil regain their nutrients.

Lastly the study reported farmers practice strip cropping where farmers plant crops in long lines after another type of crop. Farmers mainly plant strip of with cassava, maize beans among other crops these prevent water runoff and proper harvesting of crops and provision of enough space for plants to grow.

### **4.3 Effect of agricultural practices to the environment**

The study investigated both negative and positive effects of agricultural practices on the environment.

#### **4.3.1 Positive effects of agricultural practices on the environment**

The study employed various agricultural practices have the following positive effects they include the formation of food lead to formation rainfall formation of soil formation refreshing air formation of median formation of soil and conservation of natural resources.

**Table 6 shows the positive effects of agricultural practices used in Kerio division.**

<b>Positive effect of agricultural practices</b>	<b>Frequency</b>	<b>Ratio</b>	<b>Mean</b>	<b>Percentage</b>
Formation of food	14	7:40		17.5
Rainfall formation	13	13:80		16.25
Soil formation	7	7:80		8.75
Refreshing air	12	3:20		15
Formation of medicine	09	9:80		1.25
Conservation of natural resources	10	1.8		12.5
<b>Total</b>	<b>80</b>	<b>1.1</b>	<b>1</b>	<b>100</b>

**Source: field data 2011**

Basing on the table above out of 80 respondent 14 reported food formation 13 reported rainfall formation 7 reported soil formation 12 reported refreshing air o9 reported formation of medicine 15 reported preservation of soil and 10 reported conservation of natural resources.

Soil conservation was noted as the most paramount positive effect of agricultural practices used practices such as intercropping strip cropping help to control the rate of soil erosion as wind and water are controlled crop rotation and fallowing help to maintain soil nutrients through nitrogen fixation. Mixed farming helps to provide composite and animal manure that are used to increase soil fertility. These practices help to reduce environmental degradation. Similarly frank etal (2002) noted that various forms of agriculture such as mixed farming crop rotation, intercropping and shifting cultivation lead to high yields and at the sometime maintain soil fertility and water this preserve the environments.

Also various agricultural practices lead to provision of food to both human being and animals which saves, the depletion of flora and fauna in the environment. It was highly noted that practice such as mixed farming helped to provide food to the animals through plant residues as well as animal provides manure to the plants. Most farmers in many areas of Kerio division practice mixed farming and the environment is more conserved because both human being and animals do not so much encroach on it. These areas include Ndalu similarly Mbuza etal

(1996)note that agricultural method that lead to high productivity in many instance lead to high plant residue that are consumed by the animals. This saves the environment from encroachment equally the farmers may as well plant grass for animals to get food and add to soil nutrient as well.

Well practiced agriculture favour rainfall formation some farmers that practice mixed farming agro forestry as well. Many farmers from Ndalung Tongaren and Nasokol practice agro forestry which helps in rainfall formation as the tree favor transpiration they also mulch their gardens with maize sorghum residues which conserve soil moisture thus favour rapid growth of plant that favour transpiration similarly katende et al (1995) observed that agriculture practices such as agro forestry not only favour rainfall formation but add nutrient to the soil provide wood for fire and timber shade among other benefits that save the environment from depletion.

Also the study found out that the various agricultural practices help in refreshing the air in the atmosphere the various types of crops grown consume carbon dioxide in the environment and release oxygen that is vital for human survival according to one environmental health officer (EHO) this reduces the rate occurrence of air borne diseases in the areas when people are healthy the engage other kind of jobs other than encroaching the environment relatedly Nema (1998) put it that when air is refresh it allows proper movement of water that favor growth of various vegetation on the environment.

Further on the various agricultural practice lead to conservation of natural resources in the environments. Resources such as timber wild plant and fish among others have been conserved in the areas. Farmer engage in various agricultural practices that enable them to get enough food there is a lot of forest this is because people hardly encroach on them. Farmers that engage in mixed farming crop rotation pastoralism get yields accordingly.

The various agricultural practices help forming medicine from the various plant grown some agro forestry tree such as fruit tree like mangos guava pawpaw among others apart from providing fruits they are used by local herbalist to treat optimistic infections such as cough influenza among others. Kisamba reported that when farmers use proper agricultural methods encroaching on the environment is lessened and some plant that are grown for food help to provide medicine. The carbohydrates protein and vitamins derived from different crop such as



carrot beans maize peace and sunflowers among others help to prevent the body from various diseases.

More so the various agricultural practices lead to soil formation farmers that practice mixed farming crop rotation strip cropping also use mulches to cover their garden the plant residues that are used as mulches when decay lead to soil formation through humus relatedly craz (1992) observed that improved agricultural practices help to create enough fiana that decay form humus and add to soil and well as main the soils through preventing soil erosion.

#### 4.3.2 Negative effect of agricultural practices on the environment.

Table 7 shows the negative effect of agricultural practices used in kerio division.

Negative effect	Frequency	Ratio	Mean	Percentage
Soil erosion	14	7:40	5.7	17.5
Drought and famine	17	17.80	4.7	21.25
Water scarcity	15	3:16	5.3	18.75
Low yields	11	11:80	7.3	13.75
Soil exhaustion	13	13.80	6.2	16:25
Continues movement	10	1:8	8	12.5
<b>Total</b>	<b>80</b>	<b>1.1</b>	<b>1</b>	<b>100</b>

Source: data field 2011

#### The negative effect of agricultural practices used in Kerio division.

The study reported that the adverse agricultural practice such as pastoralism shifting cultivation highly account for drought and famine. Animal eat most of the vegetation cover in many areas where pastoralist settle. These areas where animals have left bare grounds. These areas include tartar and Nasokol. Animal eats food as well because some pastoralist fails to control them. As a result of semi and condition which are experienced in these areas. They hardly receive rain and face lot of sunshine similarly observe that given that pastoralist more from one place to another

they destroy most of the vegetation cover that would enable rain formation as a result these are face drought due to lack of rain and thus people face famine.

More still many areas of Kerio diverse where farmers practice improper agricultural methods such as shifting cultivation and pastralism are major causes of water scarcity. When pastoralist move their animals every where they consume much of it and contaminate water. This leaves people with little or no fresh water for their domestic use. Areas where shifting cultivation has been practiced lack trees and other vegetation cover thus little rain is received hence lack of water.

Similarly observes that most pastoralist areas are not necessary dry or lack enough water because they are naturally dry but less partly because the evaporation takes place for rainfall formation. This account for low amount of water in such region also many areas face soil erosion because the agricultural practice they carry out favors the problem. In areas where pastoralists are many piece of land are left bare thus water run off and wind erode the soil.

In areas where shifting cultivation has been seriously carried out soil are porous very liable to soil erosion and lack vegetation cover. Related many areas in the Ethiopian highlands face soil erosion due to deforestation under shifting cultivation in search for arable land also Kisamba (1992) observe that karamoja party faces soil erosion due to large number of animals that leaves the; and bare soil erosion is responsible for the removal of top soil which is fertile and better for agricultural crops grown.

#### **4.4 Solution to the effects of agricultural practices on the environment.**

##### **Introduction**

The study suggested that the following should be adapted .this included ranch system, construction of dams reduce the number of animals, paddocking sensitizing the people use of manure formation demonstration firms and provision of subsidized farm implemen

Table 8 shows the solution to the effect of agricultural practices in the environment.

**Solution to the effect frequency ratio means percentage practice on the environment.**

<b>Negative effect</b>	<b>Frequency</b>	<b>Ratio</b>	<b>Mean</b>	<b>Percentage</b>
Ranch system	07	7:80	11.4	8.75
Construction of dam	11	11:80	7.3	13.75
Reducing number of animals	09	9:80	8.3	11.25
A forestation	09	9:80	8.9	11.25
Paddocking	07	7:80	11.4	8.75
Sensitizing the people	11	11:80	7.3	13.75
use of manure	8	1:10	10	10
Providing subsidized farm implements	10	1:80	8	12:5
Demonstration farm	8	1:80	10	10

**Source: Data field 2011**

The solutions to the effects of agricultural practice in Kerio division according to responses have been explained as follows;

A good number of respondents suggested that the people in the areas should be sensitized about the need to preserve the environment. Many people in the areas are ignorant of the danger of encroaching on the environment where they cut the tree irresponsibly through slash and burn agricultural land control soil erosions, when the top soils are washed away thus loss of soil fertility people should be taught about better farming methods that may include agro-forestry mixed farming use of fertilizer and mulches among others.

The study further noted that the government provides farm implements at low costs to farmers in association such as Yagagi cooperative society in Ndula town. Farmers are provided with, seeds especially cotton and pesticides on low interests loan that enable them to get better farm yields and pay after selling the harvesting Ndula town it was reported that farmers carryout pastoralism because they lack modern diary implements to enable them practice ranch systems, build dams or practice irrigation agriculture. So given that many people are poor, the government should play a big role in providing the farmers with the necessary farm implements.

Similarly note that the government through agriculture research development programmes should provide avenues through which farmers may access farm implements such as tractors, refrigeration machines and drugs among others to enable them increase their level of production.

Also farmers insisted that their counterparts should reduce the number of animals in terms of quality than quantity. It was discovered that pastoralism has persisted mainly because farmers have very large herds that they need large pieces of land to maintain them. In areas of Mwambiti farmers have very large numbers of animals that range from 100 to 200 animals.

Similarly Wandera (1993) urged that when farmers keep large numbers of animals, they consume the vegetative cover and leave bare grounds that are exposed to soil erosion. The Sahara desert has expanded because the inhabitants of the region keep very large numbers of animals that consume the vegetation cover.

Soil being a renewable resource in some areas, farmers have started planting trees in areas where they have been cut and where they never existed before. In areas of Nasokol and Tartar more trees have been planted under various governments. Nutrient fixing tree species are planted under various government initiatives. Areas that are adversely deforested should be re-afforested so as to increase the amount of rain formation, reduce soil erosion and increase soil fertility through addition of humus through decayed foliage.

Similarly Kisamba (1992) notes that areas with large numbers of animals face vegetation extinction in most cases due to high demand for green matter. Areas where lumbering is dominant massive deforestation has taken place; there is need for planting more trees to save the environment. Areas of Budongo, Mabira and Bwindi forest reserves need re-forestation because various poor agricultural practices have negatively affected the forest reserves.

More still, the government through its various institutions especially the ministry of agriculture should start demonstration farms where farmers are taught better farming methods and how they can conserve their environment. Demonstration gardens illustrating how various types of crops are grown should be put in place to serve as examples for farmers. Some farmers in Ndalú organized themselves into associations/projects aimed at teaching their fellow farmers that conserve the environment and give high yields at the same time. They practice agro-forestry growth of vegetables and other seasonal plants.

Further on the study suggested the use of ranch systems. Pastoralist should organize themselves into ranch system to enable the government provide them with necessary drugs and implements under this system farmers with very large herds without enough land should seek assistance from the governments to enable them improve their agricultural progress. An environment impact statement should be made to assess the effect of large numbers of animals to the environment.

Lastly the study suggested farmers should practice paddlock system. This would help farmers to have enough pasture for their animals throughout the year control of pest through effective treatment and fencing off paddocks system. This would help farmers to have enough pasture for their animals throughout the year control of pest through affective treatment and fencing off paddocks infested with pest would be easy. The study established that some farmers in areas tongaren are reaping high yield because they environment they practice paddock system .this has saved the environment as they hardly encroach on the environment in search for animals feeds.

In summary most respondents revealed that an environmental protection agency and an environmental response team should be set to help teach the farmers better framing methods .farmers should practice tree planting through agro-forestry system a forestation and re-a forestation sensitizing farmers through demonstration farms education how to use manure reducing number of animals in terms of quality and government subsidization through providing low cost farming implements and drugs.

## REFERENCES

- Alexandrutos N, (1988) World Agriculture toward 20000 New York University Press Washington Dc.
- Angivide (1988), The Nature of Pastoral Development Nigeria case in Prospective Proceedings of National Conference on Pastoralism in Zaire Nigeria.
- Cruz (1992), Impact of Agricultural Traditional Methods in Byaruhanga A (2002) Impact of Traditional Agriculture Practice on Environment of Ruyenzo Bushenyi County Ntungamo District Unpublished Master Dissertation Makerere University.
- Dowel (1992) Hamulton 1981 Naguti (1992) in Kaboga M (2006) Effect of Pastoral Practice in the Biophysical Environments acase study of Rubace sub-county.
- Frank E Muherezal Sarah A Ossya (2002) Pastoralism in Uganda People Environment and Livestock Challenge for People.
- Gale D (1998) Economic and Instruction Print Press Cambridge United Kingdom.
- Humphrey L.R (1991) Tropical Pasture Utilization Cambridge University
- Kagoba S.M (2006) Effect of Pastoral Practices on the Biophysical Environment a case study of Rubale sub county Ntungamo District.
- Katende A.B Binue A.B (1995) Useful Tree and Shrub for Uganda Regional Soil Conservation. A case Study of Rubaale Sub Country, Ntungamo District (Un Published Dissertation) Makerere University.
- Katende, A. B., Birrue, A. B (1995). Useful Trees and Shrubs for Uganda Regional Soil Conservation.