

**IMPACT OF SOIL EROSION ON AGRICULTURAL PRODUCTIVITY IN  
UGANDA: A CASE STUDY OF NYADRI SUB-COUNTY, ARUA DISTRICT**

**BY**

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UNIVERSITY**

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### DECLARATION

I, PITA STELLA hereby declare that this research report is of my own. It has never been submitted else where for any other degree or qualification. I have acknowledged all the secondary sources used in this study.

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Date: 4.8.2010 .....

### **APPROVAL**

This research report has been under my guidance and supervision as University Supervisor therefore, ready submission.

Signature:  .....

Supervisor: DR. TWAHA ATEENYI

Date: 4.8.2010 .....

## **DEDICATION**

I dedicate this work to my guardian, Mr. Malis who not only helped me financially but also imparted in me the moral consciousness and interpersonal competence.

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I am highly grateful to the Almighty God, for he has been so gracious and so good to me since my childhood up to now.

I am cordially thankful to my parents and relatives. It is through their directives, support and advice that I have managed to reach to the extent of producing such a wonderful work.

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I cordially appreciate the commitment, direction and supervision of DR. TWAHA and all other sacrifices he has made for the success of this work. May God reward him for his generosity.

Accordingly, I am indebted to all the respondents who helped me to gather the necessary information for the success of this study. It is through the questionnaires they filled in and the interviews I had with them that I managed to compile this work. May God reward all of you for your contributions.



## **LIST OF ACRONYMS**

FAO	Food and Agricultural Organization
NGOS	Non-Governmental Organizations
MDGS	Millennium Development Goals

## **ABSTRACT**

This study establishes the effect of soil erosion on agricultural activities in Nyadri Sub-County, Arua District, North Western Uganda. The research objectives included establishing the evident forms of soil erosion in the sub-county, main causes of soil erosion in the sub-county and ways in which soil erosion affects agricultural production in the area. The Research was conducted in the four parishes of Nyadri Sub-county and it was carried out in a period of three months.

The literature review in this study formed basis from different theories and concepts hence making the whole work easily understood. In the research methodology, the study employed descriptive design where both qualitative and quantitative approaches were employed and the study population consisted of the local councilors, students, sub-count administrators, NGO workers, farmers and 80 respondents were sampled through random sampling and purposive sampling. Both questionnaire and interview methods were used to collect data and the researcher followed all the research procedures on ground besides respecting all the ethical and logistical considerations of research. Both qualitative and quantitative approaches were also used to analyze data.

The findings reveal that the incidence of soil erosion at the Sub-county is rampant and both human induced and natural factors are responsible for soil erosion in the sub-county. There was also an indication that soil erosion is disastrous to both crop farming and animal farming in the area.

The researcher therefore recommends that inter-sectoral approaches involving all stakeholders be taken to prevent further damages of environment and help to restore the land that already been degraded.

## **CHAPTER ONE**

### **1.0 INTRODUCTION**

#### **1.1 Background of the Study**

Soil erosion has been seen as one of the forms of soil degradation along with soil compaction, low organic matter, loss of soil structure, poor internal drainage, salinisation, and soil acidity problems (Chichilnisky, 1994). However, López (1995) in his study indicated that these other forms of soil degradation are serious in themselves since they usually contribute to accelerated soil erosion.

Barbier (1994) defined the term soil erosion as the removal of the surface soil through the combined action of man's activities and the natural processes, at a rate greater than would occur because of the natural process alone. In this case, it can therefore be said that any natural process or human activity by which the surface of the soil is worn away can be said to be an agent of soil erosion.

Deacon (1995) articulated in his research that soil erosion may be a slow process that continues relatively unnoticed, or it may occur at an alarming rate causing serious loss of topsoil. The loss of soil from farmland may be reflected in reduced crop production potential, lower surface water quality and damaged drainage networks. It is therefore because of the alarming rate where fertile top soil is lost that agricultural production is affected.

As soil erosion has detrimental effects on agricultural production, the alarming concern to find solutions or to reduce aspects of soil erosion rapidly spread throughout the Africa continent and as such, many African countries took up the challenges seriously and started looking for ways to combat the phenomenon (Deacon, 1995). Currently, many bodies

coordinate and have initiated the development of a database of research activities on soil erosion, and developed a set of guidelines for survey, assessment and monitoring of soil erosion, including early warning indicators (F.A.O 2001).

In Nyadri Sub-county, Arua district, the phenomenon of soil erosion is at its peak. This has led to poor agricultural output with its associated problems. It is therefore within this framework that this research intends to articulate the effects of soil erosion on agricultural activities.

### **1.2 Statement of the Problem**

Although the issue of soil erosion in relation to agricultural activities has several times been under investigation, an inquiry from some residents of Nyadri Sub-County, Arua district reveals that the findings on soil erosion regarding the causes, effects and possible solutions have not been well promulgated at grass root level. Many people in the area have little knowledge about the phenomenon. Furthermore, many residents of the district continue practicing activities that lead to soil erosion. It is because of this background that this research attempted to unearth the aspects of soil erosion in the area, especially in relation to agricultural activities in the area.

### **1.3 Purpose of the Study**

The purpose of this research will be to unearth the impacts of soil erosion on agricultural activities.

### **1.4 Research Objectives**

The objectives of this study will be:

- (i) To find out the forms of soil erosion in Nyadri Sub-County, Arua District
- (ii) To find out the main causes of soil erosion in the Sub-County

- (iii) To establish the detriments of soil erosion on agricultural activities

### **1.5 Research Questions**

This study will be guided by the following questions:

- (i) What forms of soil erosion are evident in Nyadri Sub-County?
- (ii) What are the causes of soil erosion in the sub-county?
- (iii) What are the detriments of soil erosion on agricultural activities?

### **1.6 Scope of the Study**

This research was carried out in Nyadri Sub-County Arua district, North Western Part of Uganda. This suggests that all the information needed were got from the people in the sub-county. The study addressed the impact of soil erosion on agricultural activities in the sub-county. In so doing, the study unearthed the various forms of soil erosion together with the main causes of the phenomenon in the area. This research was carried out in a period of three months. This time frame was sufficient enough to carry out the study.

### **1.7 Significance of the Study**

The study will help policy makers to fully incorporate environmental perspectives in the development process as one of the significant strategies for achieving Millennium Development Goals (MDGs).

The study will give the government system the opportunity to review most of its development programs and ensure that issues of environmental conservation and preservation are fully addressed and implemented up to the grass root level for proper development.

Additionally, this research will help to provide adequate intervention programs to the development agencies and NGOs that operate in the area of study.

Furthermore, this research will also act as a reference to other people or researchers who in future want to do investigations on the same topic.

## **CHAPTER TWO**

### **2.0 LITERATURE REVIEW**

#### **2.1 Forms of Soil Erosion**

One of the noticeable forms of soil erosion that has been mentioned by López (1995) is sheet erosion. It involves movement of soil particles due to raindrop splash resulting in the breakdown of soil surface structure and surface runoff. López (1995) indicated that sheet erosion occurs rather uniformly over the slope and may go unnoticed until most of the productive topsoil has been lost.

Besides sheet erosion, one of the common forms of soil erosion indicated in the works of Barbier (1994), has been rill erosion. This type of soil erosion results when surface runoff concentrates, forming small, yet well-defined channels. It is because of the creation of channels that this type of soil erosion is called rills. However, Barbier (1994) noted that the channels may be small enough not to interfere with field machinery operations.

Additional type of soil erosion according to López and Niklitschek (1991) is gully erosion. Illustrating the formation of gully erosion, the two scholars indicated that it results from continuous erosion of channels in rill erosion, hence creating gullies which become a nuisance factor in normal tillage. In mentioning some of the common examples in the world, Deacon (1995) suggested that some of the common example of gully erosion can be traced from the farms in Ontario where large quantities of topsoil and subsoil are lost each year due to gully erosion. Surface runoff, causing gull formation or the enlarging of existing gullies, is usually the result of improper outlet design for local surface and subsurface drainage systems.

Riparian erosion is one of the rare causes of soil erosion mentioned in the works of Deacon (1995). This type of soil erosion is commonly observed in riverbanks. As such, it occurs when the banks of rivers lose top soil due to the action of the fast moving rivers waters. These waters remove the underlying soil and this results in the loss of topsoil.

## **2.2 Causes of Soil Erosion**

Glowka et al. (1994) in his study elaborated that soil erosion in some of the tropical area are commonly caused by rainfall intensity and runoff. According to Glowka et al. (1994), both rainfall and runoff factors must be considered in assessing a water erosion problem. The impact of raindrops on the soil surface can break down soil aggregates and disperse the aggregate material. This view was supported by Chichilnisky (1994) when he demonstrated that lighter aggregate materials such as very fine sand, silt, clay and organic matter can be easily removed by the raindrop splash and runoff water; greater raindrop energy or runoff amounts might be required to move the larger sand and gravel particles hence causing rill erosion and later gully erosion.

Daily (1997) mentioned the aspect of soil erodibility as one of the factors responsible for soil erosion. He defined soil erodibility as an estimate of the ability of soils to resist erosion, based on the physical characteristics of each soil. He further suggested that generally, soils with faster infiltration rates, higher levels of organic matter and improved soil structure have a greater resistance to erosion while sandy loam and loam textured soils tend to be less erodible than silt, very fine sand, and certain clay textured soils.

In addition to the aspect of soil erodibility, Allen (1983) states that tillage and cropping practices tend to lower soil organic matter levels and cause poor soil structure. Decreased infiltration and increased runoff can be a



result of compacted subsurface soil layers. A decrease in infiltration can also be caused by a formation of a soil crust, which tends to "seal" the surface. This means that on some sites, a soil crust might decrease the amount of soil loss from sheet or rain splash erosion, however, a corresponding increase in the amount of runoff water can contribute to greater rill erosion problems.

Past erosion has an effect on a soils' erodibility for a number of reasons. Many exposed subsurface soils on eroded sites tend to be more erodible than the original soils were, because of their poorer structure and lower organic matter. Low nutrient levels associated with subsoil contribute to lower crop yields and generally poorer crop cover, which in turn provides less crop protection for the soil.

One of the noticeable factors leading to soil erosion has been the length and steep of slope. According to Allen (1983), it has been observed that the steeper the slope of a field, the greater the amount of soil loss from erosion by water. Soil erosion by water also increases as the slope length increases due to the greater accumulation of runoff. Nepstad et al. (1999) also affirms that consolidation of small fields into larger ones often results in longer slope lengths with increased erosion potential due to increased velocity of water, which permits a greater degree of scouring (carrying capacity for sediment).

Accordingly, the issue of vegetation for example of a place has also been mentioned as one of the factors responsible for causing soil erosion. Chichilnisky (1994) for example illustrated that soil erosion potential is increased if the soil has no or very little vegetative cover of plants or crop residues. Plant and residue cover protects the soil from raindrop impact and splash, tends to slow down the movement of surface runoff and allows excess surface water to infiltrate. In this case, areas that are quite bare allow the agents of soil erosion to penetrate easily.

López and Niklitschek (1991) have indicated that poor construction, or inadequate maintenance of surface drainage systems, uncontrolled livestock access and cropping too close to both stream banks has led to bank erosion problems. This therefore suggests that appropriate measures should be taken while constructing dams and drainage systems and their maintenance should also be looked into.

### **2.3 Effects of Soil Erosion on Agricultural Productivity**

In elaborating the effects of soil erosion on agricultural activities Ruthenberg (1980), outlined and explained that wind erosion, for example, creates adverse operating conditions in the field. This therefore suggests that crops can be totally ruined. This condition caused by soil erosion by wind therefore makes plants to be sandblasted and set back with a resulting decrease in yield, loss of quality and market value.

Ruthenberg's (1980) research report on the effects of soil erosion was similar to that of Ehui (1990) as it noted that soil drifting is a fertility-depleting process that can lead to poor crop growth and yield reductions in areas of fields where wind erosion is a recurring. Ehui (1990) believes that continual drifting of an area gradually causes a textural change in the soil. Loss of fine sand, silt, clay and organic particles from sandy soils serves to lower the moisture holding capacity of the soil, hence low agricultural productivity.

Additional effect of soil erosion on agriculture has been observed by López and Niklitschek (1991) as they showed that water erosion's main off-site effect is the movement of sediment and agricultural pollutants, hence affecting the productivity of agricultural activities. Additionally, flooding through the process of water erosion also leads to damage of crops planted, hence affecting agricultural production since it removes plants and crops.

Nepstad, et al. (1999) illustrated that areas with higher levels of soil erosion tend to have high levels of crop and animal diseases hence affecting both crop production and meat and milk production in such areas. This therefore puts soil erosion affected areas at a disadvantageous position as far as agricultural production is concerned especially in terms of pests and diseases affecting both crops and animals.

Chichilnisky (1994) illustrated that soil erosion affects fish farming through the process of flooding and sedimentation. This means that through leaving huge amounts of soil in ponds, fish hide in the soil hence reducing fishing in such ponds. Additionally, Chichilnisky (1994) further illustrated that soil erosion leads to removal of agricultural chemicals that often move with eroded sediment. These chemicals move into, and pollute downstream watercourses and water bodies and sometimes fish ponds, hence affecting the lives of fish in such ponds.

Soil erosion is also said to not only have effect on agricultural production but also animal production in terms of meat and milk production. According to FAO (2001), areas affected by soil erosion tend to have little vegetation and pasture to feed animals. This means that poor feeding as a result of poor pasture definitely affects the production of meat and milk.

## **CHAPTER THREE**

### **3.0 RESEARCH METHODOLOGY**

#### **3.1 The Area of the Study**

This research was done in Nyadri Sub-county, Arua District. Nyadri Sub-county consists of four parishes namely Pabura, Robu, Baria and Bura. The sub-county is bordering four other sub-counties. In the North, it is bordered by Oleba, in the East by Yivu, in the South by Kijomoro and in the West by Oluvu Sub-county.

According to the household and population Census of 2002, the population of the sub-county was 21997, of which 10249 were males while 11520 females.

Concerning the economic activities in the sub-county, most people in this place are agriculturalists. They mostly grow crops and rear animals, while few of them are involved in hawking. Tobacco is the major cash crop grown in this Sub-county and there are three tobacco buying companies dealing with farmers in the area. These include: the British American Tobacco (BAT), Master Mind (MM), and Leaf Tobacco and Commodity (LTC).

Since curing tobacco demands a lot of firewood, most of the trees in the sub-county are cut down. This means that the area has been terribly affected by soil erosion since deforestation in the area has left the area quite naked.

#### **3.2 Research design**

The research employed a descriptive design involving both qualitative and quantitative methods. Through these research designs both the

detailed and specific information obtained from key respondents were presented and analyzed.

### **3.3.0 Sample Framework**

#### **3.3.1 Sampling Size**

The researcher selected a total of 80 respondents in the sub-county. This sampled respondents composed of both men and women of different positions, age and education background. The target groups in this included the local councils, sub-county administrators, NGO staff, students and farmers in the sub-county.

#### **3.3.2 Sampling Technique**

In this research, the researcher employed both simple random sampling and purposive sampling methods. The category of respondents to be sampled by random sampling included the local councilors, students and farmers while those sampled by purposively included the sub-county administration and NGO staff.

#### **3.3.3 Sampling Procedure**

Using simple random sampling, the researcher first gathered the names of intended subjects from the responsible personnel in the sub-county. The selection of the respondents was done from the surnames that start with the letters A, G, O, D and S. Since the people with their surnames started with letters A, G, O, D and S were many, the researcher then employed purposive sampling method to select the number that fits the sample size. In using purposive sampling, the researcher employed the cases of some age range and educational level. This is because the researcher believes that some age range and education level were incapable of revealing the required information for the study.

### **3.4 Methods for data Collection**

#### ***(i ) Questionnaires***

Different sets of questions were set and given to respondents. Both open ended and closed ended questionnaires were formulated to provide adequate information on the study. In this, issues of age, sex and education background were all considered for realistic information about the topic for the study.

#### ***(ii ) Interviews***

Interviews were carried out in the Sub-county. Both formal and informal interviews were performed. In formal interviews, guides were used with the target groups while informal interviews were through day-to-day conversation with different people such as farmers and students.

#### ***(iii ) Focus Group Discussions***

Discussions were organized with target group members and in the discussions, different issues related to the topic of the study were discussed.

#### ***(iv ) Observation***

Personal observation on the forms of the study, causes and the effects of soil erosion in the area of the study was also helpful to the researcher to come up with realistic information since this was a first hand information.

### **3.5 Sources of Data**

Both primary and secondary sources of data were employed in this research.

### ***(i ) Primary sources***

These were based on the information from the field that is, from the respondents using the different methods such as questionnaire, interview among other and personal observation

### ***(ii ) Secondary sources***

This involved information from the library, journals and Internet. Basically, it helped in the review of the related literature and comparing the information of different authors or researcher.

## **3.6 Data Processing**

Data processing in this research involved three activities and these include coding the information from the field, editing the coded work and tabulating the different frequencies from the findings. This suggests that responses from the questionnaires and the interview guides were all paid attention to in this process.

## **3.7 Data Analysis**

The researcher used both quantitative and qualitative approaches of data analysis. After coding the necessary information, the researcher was then established how many times each alternative response category was given as answer, using tally, marks were then added up. Later on, the findings were presented in frequency tabulations hence rendering it ready for interpretation. Microsoft word and Excel were used to run all data in the study.

## **3. 8 Limitations and Delimitations of the Study**

Some informants demanded money for what they were asked to do, that is, filling in the questionnaire. They claimed that filling in the questionnaire does entail the use of brain power and personal time which could be used to make money somewhere else. Although this was

somehow challenging to the researcher, he struggled and managed to convince many of such informants to fill in the questionnaires freely without any pay.

Some people in high posts or positions from whom the researcher thought he would get enough information about the topic under study claimed they had no time to fill in the questionnaires or to be interviewed. However, some of them indeed responded to my appeal and gave detailed information for the study.

There was also a shortage of money to have access to some of the important materials such as newspapers, internet, journals and other documents for more information, since they were somewhat costly in the area of study. However, the researcher had to borrow some money from his friends and relatives to finish up this work.



## CHAPTER FOUR

### 4.0 RESULTS AND DISCUSSIONS

#### 4.1.0 The Socio-Demographic Information

In the study, 80 respondents were sampled. Out of the 80 respondents, 40 of them were administered through questionnaires, 20 of them by interview and 20 of them by Focus Group Discussion. This suggests that all the proposed instrument were used in data collection.

**Table 4.1: Distribution of Questionnaires**

<b>Respondents administered</b>	<b>Questionnaires given out</b>	<b>Questionnaires returned</b>	<b>% of returned Questionnaires</b>
Students	4	4	11.4 %
Local councilors	10	9	25.7 %
Sub-county staffs	8	7	4.2 %
NGO officials	6	4	11.4 %
Farmers	12	11	31.4 %
<b>Total</b>	<b>40</b>	<b>35</b>	<b>100 %</b>

Source: Primary Data

As clearly demonstrated in Table 4.1, 40 copies of questionnaires were distributed to different respondents. However, 35 copies were returned while 5 copies remained in the field. The five copies were not returned because those who had them were away for their own business engagements and yet the time to collect data in field had elapsed. Although five copies of questionnaires remained in field, the research findings were not affected since most of the copies were returned and other methods such as interview and focus group discussions were fully administered. All in all, 75 respondents were finally administered in this research that is, 35 by questionnaires, 20 by interviews and 20 by focus group discussion.

#### **4.1.1 Gender**

Respondents were asked to tick their appropriate gender during the study. Table 4.2 illustrates the summary on the gender of respondents.

**Table 4.2: Gender-Wise Distribution of Respondents**

Gender of Respondents	Males	Percentage	Females	Percentage
Gender (N=75)	43	57	32	43

Source: Primary Data

As indicated in Table 4.2, both females and males were administered in this research. The percentage composition of males in the field was 57 while that of females was 43 percent. The table also portrays that the gender gap between the two sexes sampled was not big enough to affect research findings. The number of women sampled was relatively low because there were few women in local council, sub-county staff, NGO staff among others.

#### **4.1.2 Marital Status of Respondents**

Besides the gender of respondents, they were also asked to indicate their marital status. The findings on this are illustrated on Table 4.3.

**Table 4.3: Distribution of Respondents by Marital Status**

Marital Status	Male Freq	%	Female Freq	%	Total %
Single	10	13.3	8	10.7	24
Married	25	33.3	21	28	61.3
Divorced	5	6.7	2	2.7	9.4
Widowed	3	4	1	1.3	5.3
Total	43	57.3	32	42.7	100

Source: Primary Data

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Widowed	3	4	1	1.3	5.3
Total	43	57.3	32	42.7	100

Source: Primary Data

As shown in Table 4.3, people with different marital status were sampled. Majority of respondents (61.3 %) were married while the least of them (5.3 %) were widowed. Marital status of respondents was important in this research since people of different marital status sometimes have different perception and attitudes about things around them. This means that different and distinct views about soil erosion were got from people of different marital status hence making the findings enriched and properly analyzed.

#### 4.1.3 Age Group

Respondents were also asked to tick their relevant age interval as indicated in table 4.3.

**Table 4.4: Age Distribution of Respondents**

<b>Age Group (N=75)</b>	<b>Male (Freq)</b>	<b>%</b>	<b>Female (Freq)</b>	<b>%</b>	<b>Total %</b>
20-29	19	25.3	17	22.7	48
30-39	9	12	7	9.3	21.3
40-49	5	6.7	5	6.7	13.4
50-59	6	8	2	2.7	10.7
60-69	4	5.3	1	1.3	6.6
<b>Total</b>	<b>43</b>	<b>57.3</b>	<b>32</b>	<b>42.7</b>	<b>100</b>

Source: Primary Data

As indicated in Table 4.4, respondents from age range of 20-69 were sampled. This age range was preferred because of their ability to internalize and give relevant information regarding soil erosion in the sub-county of study. The largest participants (48 %) in the field study ranged from the 20-29, and this are followed by the 30-39. On the other the least participants (6.6 %) in the field study were those from 60 and

above. The reason for the low participation of the elderly people was that there population (number) in the area was very low. Differences in age among respondents were vital because it enabled the researcher to compare some aspects of soil erosion that happened in different time intervals as revealed by respondents in different age groups.

#### **4.1.4 Education of Respondents**

Education level of respondents was also an important aspect under socio-demographic characteristics. The summary on this is shown below.

**Table 4.5: Education Based Distribution of Respondents**

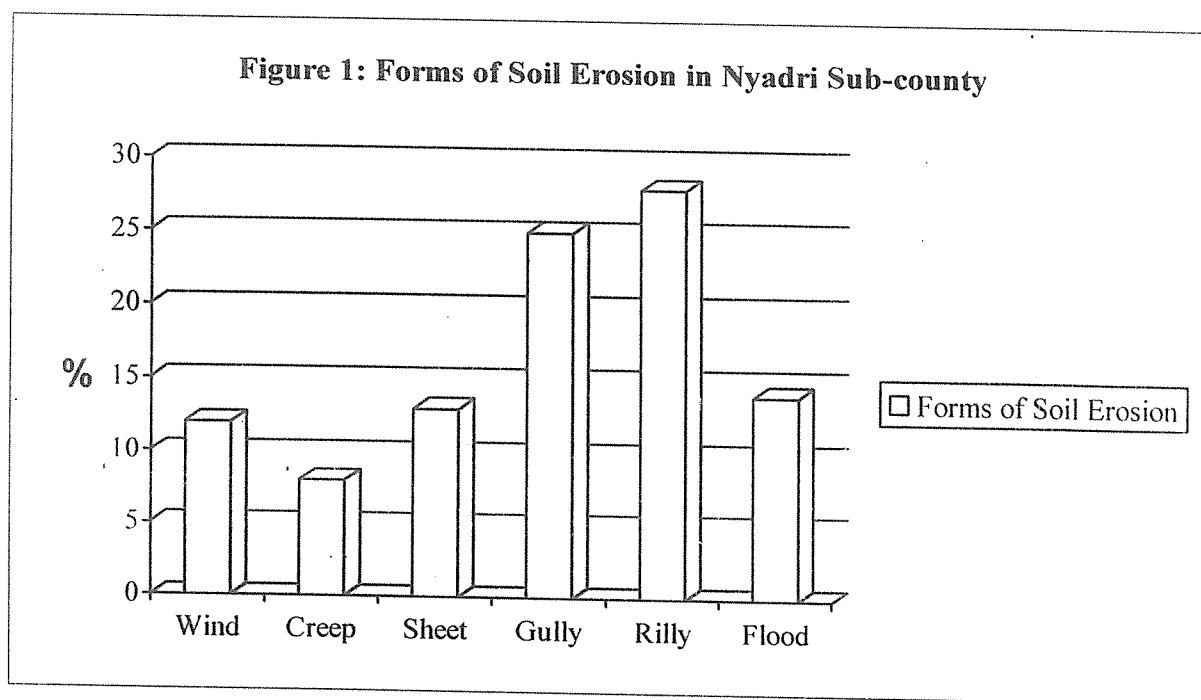
<b>Education Level (N=75)</b>	<b>Male (Freq)</b>	<b>%</b>	<b>Female (Freq)</b>	<b>%</b>	<b>Total %</b>
Primary	6	8	11	14.7	22.7
Secondary	10	13.3	12	16	29.3
Diploma	12	16	7	9.3	25.3
Degree	15	20	2	2.7	22.7
<b>Total</b>	<b>43</b>	<b>57.3</b>	<b>32</b>	<b>42.7</b>	<b>100</b>

Source: Primary Data

As indicated in Table 4.5, the nature of respondents based on their education level was taken in to consideration in this research. Men in Nyadri Sub-county were well educated as compared to their counterpart, the women. However, the general picture reveals that majority of the respondents (from secondary, diploma to degree) had sufficient education that enabled them to articulate into detail various aspects regarding soil erosion. This means that the largest informants in this researcher were those capable of understanding the questions and could give proper answers to them.

#### 4.2 Forms of Soil Erosion in Nyadri Sub-County

This was one of the significant issues investigated during the study. In the investigation, the researcher found out that both simple and compound types of soil erosion were found. The summary of forms of soil erosion is presented on Figure 1.



Source: Primary Data

As it can be seen from Figure 1, 12 % of respondents acclaimed wind erosion one of the commonest forms of soil erosion observed in Nyadri sub-county. This type of soil erosion was common in Bura and Rubu parishes which were relatively bear due to massive deforestation in the parishes. This therefore allows movement and in a general sense, flow of soil particles under the influence of wind. The most rapid flow of all air soil, causes wind erosion.

As for 8 % of the respondents, creep erosion was one of the forms of soil erosions in Nyadri Sub-county. This type of soil erosion was commonly observed in Ribini hill in Bura Parish, Bura hill in Bura Parish, Kpukpu hill in Bura Parish and Rokoze hill in Pabura Parish. In trying to understand the aspect of creep soil erosion in Nyadri Sub-county, it was noticed that this type of soil erosion was largely accelerated due to poor methods of cultivation particularly on steeper slopes and grazing that moved down slope quite rapidly. This suggests that farm implements force loose soil down slope while stock movements on such slopes tear the soil off by hoof action therefore aggravating creep erosion.

Furthermore, one of the forms of soil erosion that was also observed in Nydri Sub-county by 13 % of the respondents was sheet erosion. This type of soil erosion was prominently observed in stock paddocks or on stock routes of Randra in Pabura Parish, Kolikolia in Bura Parish, Koyi in Rubu Parish where they the natives keep animals. In these areas, vegetation and grasses that cover the surface and subsoil are removed. This additionally, opens ways to more agents of soil erosion like wind and rainfall that even leads to further degradation.

Gully erosion that was described by 25 % of respondents as the cutting of channels by water was also one of the forms of soil erosion in Nyadri Sub-county. As it was observed in the field, this type of soil erosion was commonly in areas where the concentrated runoff had sufficient volume hence making new incisions. Some of the areas like Erivu in Pubura Parish and Olevu in Rubu Parish were some the areas were typical characterized by this kind of soil erosion. In these areas for example, increased runoff was said to be evident hence causing deepening of existing channels.

Another type of soil erosion frequently mentioned by 28 % of respondents was rill erosion. Just like Barbier (1994), majority of respondents conducted differentiated rill erosion from gully erosion basing on the channels created. This therefore suggests that rill erosion is just transitional between sheet and gully erosion and in the main, affects cultivated land, particularly where rainfall is intense. This kind of soil erosion was observed in fact in all the parishes visited for this study. This means the sub-county for this study stands at higher risk for the phenomenon of soil erosion with its associated effects.

Similar to rill erosion but distinct was flood erosion. Flood erosion was indicated by about 14 % of respondents investigated. Flood erosion was defined as the removal of surface soil by flood flows sweeping across flood plains. This kind of soil erosion was common in areas without vegetation cover and it commonly happens from the months of July to October where the area experience extremely heavy rainfall.

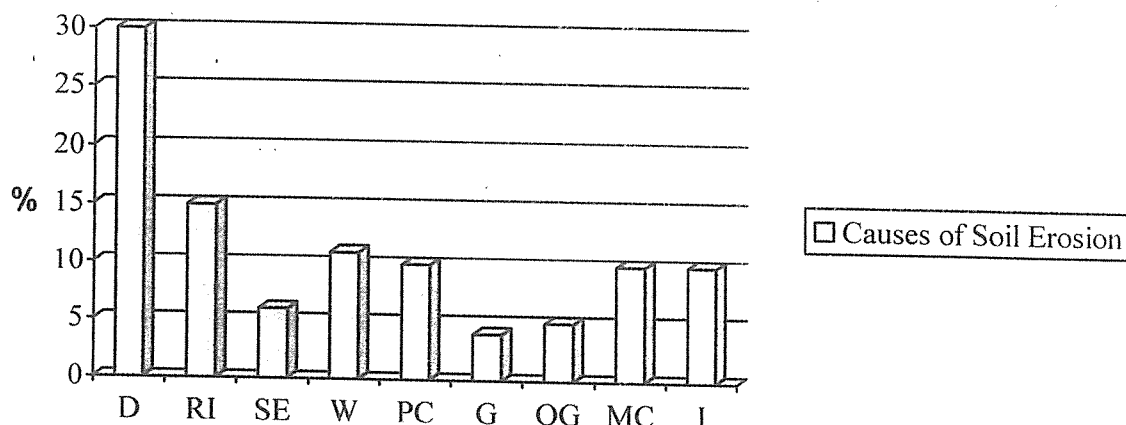
As it can be seen, many types of soil erosion were observed in Nyadri Sub-county. This was basically because almost all the trees in the sub-county have disappeared due to tobacco growing, brick laying and high demand for fuel.

#### **4.3 The Main Cause of Soil Erosion in Nyadri Sub-county**

Investigation in to the main causes of soil erosion in Nyadri Sub-county was very vital in this research. Respondents were asked to both mention and tick the appropriate causes of soil erosion in the Sub-county and the findings are demonstrated in Figure 2.



**Figure 2: Main Causes of Soil Erosion in Nyadri Sub-county**



Source: Primary Data

**Keys:** **D-** Deforestation **RI-** Rainfall Intensity **OG-** Overgrazing  
**SE-** Soil Erodibility **W-** Wind **PF-** Poor Methods of cultivation  
**G-** Land Gradient **MC-** Mining & Construction **I-** Ignorance

As it can be witnessed from Figure 2, both natural aspects and human induced factors are responsible for the cause of soil erosion in Nyadri Sub-county. The details of the findings illustrated on the above Figure are below.

#### **4.3.1 Human Induced Causes of Soil Erosion in Nyadri Sub-County**

The major cause of soil erosion in Nyadri Sub-county as indicated in Figure 2 is deforestation. According to respondents, deforestation forms 30 percent of all the causes of soil erosion in the sub-county. Tobacco growing, brick laying, high fuel demand and clearing of trees for settlement and agricultural expansion were mentioned as reasons for high rate of deforestation. One of the Sub-county administrators was quoted saying, *“Tobacco growing is the major economic activity of people in this sub-county. Curing tobacco demands a lot of fire wood. This has been disadvantage to our environment since it has not only led to the*

*disappearance of the few forests but also some of the few fruit bearing trees at homes.*" Tobacco growing together with brick burning beside demand for fuel among others have led to complete damage of trees leaving land surface bare or exposed to all agents of soil erosion. Wind erosion, creep erosion, sheet erosions, gully erosion, rill erosion among others were all said to be subject of deforestation.

Besides deforestation, one of the human induced causes of soil erosion observed in Nyadri Sub-county was poor methods of cultivation. Poor methods of cultivation is said to have formed 12 percent of all the causes of soil erosion in the sub-county. Poor methods of cultivation especially along slopes with no terraces and contours like those in Lokotoro hills in Bura Parish and Rokoze hills in Pabura Parish were cited as examples. This allows loose soil particles to be moved down easily causing creep erosion, gully erosion among others.

Ignorance was one of the causes of soil erosion in Nyadri sub-county. According to some respondents, many of the soil erosion activities are as a result of ignorance of the local population as regards causes and effects of soil erosion in area. Ten percent of the causes of soil erosion in the sub-county are said to be committed by human ignorance. As one of the respondents was quoted *"Many people perform activities leading to soil erosion such as mining, deforestation among others because they do not know dangerous their acts will round against them."* This means that if people were informed, they would take full responsibility of their acts including things leading to soil erosion.

Additionally, mining and construction works were also cited as some of the human induced causes of soil erosion in Nyadri Sub-county. Construction works and mining activities in the areas tend to leave or loosen soil particles and exposed to the agents of soil erosion such as

rainfall, wind among others. Areas around Kolikolia in Bura Parish, Ayi in Pabura among others where sand mining takes place had critical soil erosion conditions. Some of the areas in Nyadri Trading Centre in Bura Parish, Ayiko in Bura Parish and Nyoro in Pabura Parish where brick laying activities take place have all been endangered by soil erosion.

As it was already witnessed in the back ground information, Nyadri division is highly populated. This means that there is shortage of land to rearing animals and cultivation. Over grazing and paddock in some of the areas in Randra, Odongoro, Kobiri were all cleared up by over grazing. These areas were characterized by rill erosion, sheet erosion even gully erosion. Paddock and over grazing were said to constitute 5 percent of all the causes of soil erosion in the sub-county.

#### ***4.3.2 Natural Induced Causes of Soil Erosion***

Below are some of the natural factors that are said to have contributed to soil erosion in Nyadri Sub-county.

One of the most powerful natural elements leading to soil erosion in Nyadri Sub-county is rainfall intensity. Heavy rainfall from August to October are said to have contributed greatly. Much as rainfall intensity was said to have contributed to 20 percent of all the causes of soil erosion in the sub-county, the researcher noted that it was merely secondary cause since rainfall intensity removes soil particles in areas already deforested and poorly cultivated land especially those on slopes.

Wind as natural induced aspect was second to rainfall intensity in its strength to cause soil erosion as regards research findings. Wind is said to have caused 13 percent of all the causes of soil erosion in the area. Although wind was blamed for sweeping away soil particles causing wind erosion and sheet erosion, the researcher noted that wind only acts as an

agent on bare land left by deforestation, over grazing, paddock, mining and construction activities.

Soil erodibility is referred to as the ability of soil particles to either be easily carried away or resist forces of soil erosion. This therefore makes it possible to soil particles that are loose to be carried away by agents of soil erosion, hence causing soil erosion. Areas in Gobiri in Bura Parish, Baria and Nyaria in Baria Parish all have weak soil particles that are easily carried away by agents of soil erosion unlike those in Bura Opidri in Bura Parish which was somewhat clay like. Rill erosion, gully erosion, sheet erosion and wind erosion are all subjects of soil erodibility in these areas with weakly packed soil particles.

Lastly, the gradient of land as a natural factor was also pinpointed for having made it possible for agents of soil erosion to act upon. As some respondents indicated, unprotected steep areas (with no terraces) are more exposed to agents of soil erosion than their counter parts. As a matter of fact, some of the hilly areas such as Koloa, Rokoze in Pabura Parish, Bura Opidri, Kpu Kpu were more eroded than those areas that were quite plain.

As it has been illustrated, both natural factors and human activities. From the findings illustrated, the researcher was tempted to contend that human activities cause more havoc to soil than natural factors.

#### **4.4 Detriments of Soil Erosion on Agricultural Activities in Nyadri Sub-county**

Investigation into the detriments of soil erosion on agricultural activities in Nyadri Sub-county was central in this research. Respondents were asked to mention how soil erosion affects agricultural production and the findings regarding this motion are explained below:

According to 60 percent of the respondents (in estimation) conducted, soil erosion removes fertile loam soil that supports agriculture. This means that the soil particles that remain do not in any way support crop farming or yield produced in such areas are not sufficient enough to support families. Crop production in some of the areas like Baria, Nyaria in Baria Parish, Olevu in Rubu Parish were some of the places mentioned with low agricultural production because of removal of top loam fertile soil. As one of the respondents interviewed on (12<sup>th</sup> of June 2010) mentioned "People in Nyaria and Baria for example now rent fertile areas of Alivu and Emva for crop farming." The researcher observed some of the areas that were greatly hit by soil erosion and contends that poor soil left by erosion can not support agricultural production.

Forty percent of the respondents (in estimation), indicated that eroded land do not also support pasture development. In supporting their point, some of the respondents mentioned Randra, Odongoro and Kobiri as areas that have not been supporting pasture development. As for these respondents, poor pastures in these areas have led to low meat and milk production. One of the respondents in Gobiri was quoted saying "I used to get at least 8 litters of milk daily, but due to poor pasture development, I only get two to three litters every day. This suggests how poor pasture development in an eroded land has affected agricultural production in terms of meat and milk in the area. The researcher also supports the respondents view regarding poor milk and meat production resulting from erosion since the top soil that supports grass growth is taken away.

Many respondents (about 50 percent in estimation) also blamed soil erosion for rampancy of pests and diseases affecting both their plants (crops) and animals. Although the respondents could not exactly mention the connection between soil erosion and rampancy of pests and diseases

affecting their animals and crops, cases of crop and animal attacks by pests and diseases in more eroded areas was noticed than areas that were fairly not eroded. The researcher believes crops and animals might have been affected by pollutants brought by water's erosion and wind hence causing crop and animal death. Perhaps some other factors like harsh climatic conditions should have been behind rampancy of pests and diseases in such areas.

As narrated by some respondents, there used to be a lot of trees in the sub-county and the area used to have longer wet seasons since trees helped in rainfall transformation of rainfall through the process of transpiration. As per now, the area has become with almost no forest and any big tree, only characterized by soil erosion. This means that the area now has longer drought than wet season. As one of the respondents interviewed mentioned, *"There used to be clear demarcation between wet season and dry season. This enabled us to plan our farming activities very well and achieve good yield. But as per now, things have changed, climatic changes are un predictable. It may rain for two weeks and this may be followed by two months of drought."* This means that unpredictable climatic changes resulting from soil erosion now greatly affect crop farming in the area and some times crops just dry up.

The ditches created by soil erosion resulting from mining and construction activities are also said to be detrimental to crop farming. As some respondents believe, soil erosion in mining and construction sites are "just beyond redemption for agricultural activities". This suggests that no crop can give a yield in such areas if planted since all the soil particles that support agriculture are carried away. One of the respondents believes that crops planted in ditches created by mining and construction activities tend to stunt and give no yield since there are no nutritious soil particles to support their growth.

The channels created by soil erosion are also detrimental to crop farming in sense that they encourage flooding. As one of the sub-county administrators mentioned, channels created by soil erosion lead to flooding during heavy rainfall. This means that flooding from such channels damages crops in field.

From this, it can be noted that soil erosion greatly affects agricultural activities. This demands that serious actions be taken to prevent and work on the affected areas if poverty in the area is to be stamped since agriculture is the only major economic activity in the area.

## **CHAPTER FIVE**

### **5.0 CONCLUSION AND RECOMMANDATIONS**

#### **5.1 Conclusion**

A keen observation of analysis of this work draws a conclusion that the phenomenon of soil erosion in Nyadri Sub-County is rampant. Soil erosion in the sub-county manifests itself in different forms. However, the commonest and rampant forms of soil erosion in the sub-county are rill erosion and gully erosion constituting 28 % and 25 % respectively out of the total percentage of soil erosion occurrence in the area.

Regarding the major causes of soil erosion in Nyadri Sub-county, it was noted that both natural and human induced activities are responsible for the cause of soil erosion in the Sub-county. However, human induced activities constitute more to the cause of soil erosion (55 %) than natural factors (45 %). The commonest cause of soil erosion in the area was deforestation, bearing 30 percent of the total percentage.

The findings affirm that soil erosion is detrimental to agricultural activities in sense that it depletes the most top and fertile land leaving the soil particles that do not support agriculture, discouraging pasture growth to feed animals hence affecting milk and meat production, encouraging pests and diseases, enabling flooding through its channels that damage crop production, leading to harsh climatic conditions like drought, making crops stunt especially in ditches created by erosion from mining and construction activities.

Since the danger of soil erosion to agricultural activities is real, more care to combat the phenomenon should be taken. This suggests that massive sanitization and campaign regarding the phenomenon should be



put in place. Additionally, involvement of different stakeholders in the protection of environment would be important.

## **5.2 Recommendations**

This research presents some recommendations to prevent soil erosion as well as recovering soil fertility on eroded land so as to increase or better agricultural production.

### ***5.2.1 Recommendations to Prevent Further Soil Erosion***

As a way to prevent further soil erosion from occurring, the researcher the study recommends that good and appropriate crop farming practices should be put in place. Farming practices such as terracing and contour plough along slopes should be emphasized by those in authority. This will help to stop soil particles from moving down and remain fertile to support agriculture.

Furthermore, local people should adapt and be encouraged to practice crop rotation and mulching. Through these practices, soil texture and nutrients will be kept intact and damages that would occur from rainfall and wind are avoided hence good agricultural production.

People should all be encouraged to plant trees like eucalyptus that tend to grow up in a period of short time. This will enable the local people to stop abusing forests around especially as fuel for their bricks and tobacco cure.

Local government should set some bye-laws that can enable people both in town and rural to plant some trees before they start construction work. This will help to boost tree population in the area hence enhancing climatic condition.

Farmers should also be discouraged from participating in some of the activities that are likely to cause disastrous effect on environment. This means that instead of people participating in tobacco growing and brick laying activities, they should be encouraged to grow coffee to earn money they are seeking for.

To avoid further loss of soil particles occurring from over grazing, zero grazing should be encouraged among farmers.

As ignorance among people regarding causes and effects of soil erosion has led many of people to get involved in destruction of environment, sensitizing the masses about the phenomenon would enable them to act and perform different activities with responsibility and this could help to reduce chances that are likely to endanger environment.

#### ***5.2.2 Recommendations to Improve Degraded Land***

The use and importance of organic manure in reinstalling soil fertility should be encouraged and emphasized among the local population. This could be done with the help of NAADS and local government.

Some of the ditches and channels that have completely been damaged by mining and construction activities should be planted with trees and this could enable the degraded land to regain its fertility in a long run. This could be done with the help of National Afforestation programs and local leaders.

## REFERENCES

- Allen, J. C. (1983).** Deforestation, Soil Degradation, and Wood Energy in Developing Countries PhD Dissertation. Department of Geography and Environmental Engineering, Johns Hopkins University, Baltimore, MD, USA.
- Barbier, E. B. (1994).** The Environmental Effect of the Forestry Sector, Paris, France, *Econ.*71/3:703-711.
- Chichilnisky, G. (1994).** North-South Trade and the Global Environment. *Am. Econ. Rev.* 84:851-874.
- Daily, G. (eds.). (1997).** Nature's Services: Societal Dependence on Natural Systems Island Press. Washington, D.C.
- Deacon, R. T. (1995).** Assessing the Relationship between Government Policy and Deforestation. *J. Environ. Econ. Manage.* 28:1-8.
- Ehui, S. K., T. et al., (1990).** Forest Depletion, Soil Dynamic, and Agricultural Development in the Tropics. *J. Environ. Econ. Manage.* 18/2:136-154.
- Food and Agriculture Organization. (2001).** State of the World's Forests 2001 Food and Agriculture Organization. Rome.
- Glowka, L., F. et al., (1994).** A Guide to the Convention on Biological Diversity. *Environ. Policy Paper No. 30* The World Conservation Union-IUCN.
- López, R. (1995).** The Tragedy of the Commons in Côte d'Ivoire Agriculture: Empirical Evidence and Implications for Evaluating Trade Policies. *Mimeo.* Department of Agriculture and Natural Resources. University of Maryland, College Park, MD, USA.
- López, R. and M. Niklitschek. (1991).** Dual Economic Growth in Poor Tropical Areas. *J. Dev. Econ.* 36:189-211.
- Nepstad, D. C., et al. (1999).** Large-Scale Impoverishment of Amazonian Forests by Logging and Fire. *Nature* 398:505-508.
- Ruthenberg, H. (1980).** Farming Systems in the Tropics Clarendon Press. Oxford, p.206-219.

## APPENDICES

### APPENDIX 1 :Questionnaire

I, PITA STELLA, a Bsc Environmental Management student of Kampala International University, Kampala. I am doing a research on the topic: Impact of Soil Erosion on Agricultural productivity in Arua District, North Western Uganda. This research is part of the requirements for the bachelor's degree in Environmental Management from the above University. I therefore kindly request you to answer the following questions. All the information will be handled confidentially.

#### **SECTION A (DEMOGRAPHIC CHARACTERISTICS)**

1. Personal Data of the Respondent

2. Sex: male ☐ Female ☐ (tick one)

3. Marital Status: Single ☐ Married ☐ Divorced ☐ Widowed ☐

4. Age Group: 20-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ 60-69 ☐  
70-79 ☐ (tick one)

5. Education: Primary ☐ Secondary ☐ Diploma ☐ Degree ☐

#### **SECTION B (RESEARCH RELATED QUESTIONS)**

1. What forms of soil erosion do occur in Nyadri Sub-county? (tick where appropriately)

A) Sheet erosion ☐ B) Rill erosion ☐ C) Gully erosion ☐

D) Others (Specify): .....  
.....  
.....

2. Many people in this area believe that the major cause of soil erosion in this sub-county is deforestation. Do you agree? Yes ☐ No ☐

3. What are factors lead to soil erosion in this sub-county? (tick where appropriately)

A) Rainfall intensity ☐ B) Sol erodibility ☐ C) Poor farming practice ☐

D) Length and steep of soil ☐

E) Others (Specify) .....

.....

.....

.....

4. According to your observation, how has soil erosion affected agricultural activities in this sub-county?

.....

.....

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.....

5. What solutions can you suggest to:

a) Prevent soil erosion from further occurring in Nyadri sub-county?

.....

.....

.....

b) Improve on soil structure that has already been eroded?

.....

.....

.....

6. What other things would you like to say about soil erosion especially in relation to agricultural activities to:

A) Government officials

.....

.....

.....

B) Farmers

.....  
.....

C) Local Council

.....  
.....

D) Local Population

.....  
.....

***Thanks for your time to respond to these questions***

## **APPENDIX 2: Interview Guide**

1. Soil erosion is said to be a common phenomenon in Nyadri Sub-county. Is that true?
2. What forms of soil erosion are evident in this sub-county?
3. What are some of the core causes of soil erosion in this sub-county?
4. What are other causes of soil erosion in this sub-county?
5. It is true that soil erosion has disastrous effect in many areas. In what ways does soil erosion affect agricultural activities in this sub-county?
6. What solutions do you suggest to curb soil erosion from further happening in this sub-county?
7. What other ways do you suggest improve on the structures already being eroded in this sub-county?
8. What other thing would you like to say about soil erosion and agricultural activities in this sub-county especially to:
  - a) Government official
  - b) Local Council
  - c) Local Population
  - d) Farmers

### **APPENDIX 3: Question for Focus Group Discussion**

1. How would you define the term soil erosion?
2. What forms of soil erosion do you know?
3. According to your answer to question 2, which forms of soil erosion are evident in this sub-county?
4. What do you think are the causes of soil erosion in this sub-county?
5. How does soil erosion affect agricultural activities in sub-county?
6. How do you think soil erosion can be prevented from further occurring in this area?
7. How can the land already eroded in this area be taken care or be improved?
8. What other thing would you like to say about erosion in relation to agricultural activities especially to:
  - a) Government officials
  - b) Local population
  - c) Local Council
  - d) Farmers



**APPENDIX 4 :Budget**

<b>PARTICULAR</b>	<b>RATES (UGX)</b>
Stationary	50,000
Computer Related work	70,000
Flash Disks	20,000
Library and Internet	30,000
Travels	80,000
Airtime	30,000
Meals	50,000
Binding	40,000
Research Assistants	80,000
Miscellaneous	40,000
<b>Total</b>	<b>490,000 UGX</b>

**APPENDIX 5 :Time Schedule**

<b>PARTICULARS</b>	<b>DURATION</b>
Selecting and Approval of Topic	February 2010
Secondary Data Collection	February 2010
Writing Proposal	March-April 2010
Primary Data Collection	May 2010
Analyzing and Compiling Data Collected	June 2010
Editing the Work	July 2010
Presentation of the Final Work	July 2010