

**IMPLICATIONS OF DROUGHT ON PASTORAL AND AGROPASTORAL
COMMUNITIES IN NAPAK DISTRICT KARAMOJA SUB_ REGION**

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DECLARATION

I Lobuche George William make it known that this dissertation is my own work and has never been submitted before for any other degree, part of a degree or examination at this or any other university.

Signature 

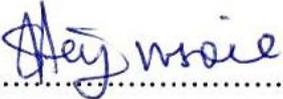
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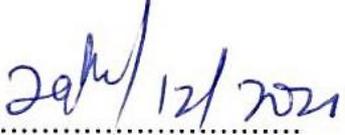
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APPROVAL

This research dissertation has been written under my supervision and is being submitted for examination with my approval as a supervisor

Signature 

Date..... 

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DEDICATION

I dedicate this work to my parents; Mr. Teko Peter Lomerichoto and Mrs Keem Lucia Jakaa, my sisters; Angela, Christine and brothers; Moses, Emmanuel and Joshua you have been committed to my wellbeing ever since and you are my inspiration.

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TABLE OF CONTENTS

DECLARATION.....	i
APPROVAL.....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENT.....	iv
LIST OF FIGURES.....	vii
LIST OF PLATES.....	vii
LIST OF TABLES.....	vii
ABSTRACT.....	viii
CHAPTER ONE: BACKGROUND OF THE STUDY.....	1
1.0 Introduction.....	1
1.2 Problem statement.....	2
1.3 Objectives of the study.....	2
1.4 Hypothesis.....	2
1.5 Significance of the study.....	2
1.6 Scope of the study.....	3
1.7 Conceptual framework.....	3
CHAPTER TWO: LITERATURE REVIEW.....	4
2.0 Introduction.....	4
2.1 Classification of droughts.....	4
2.2 Drivers of droughts.....	4
2.3 Implications of droughts on pastoral and agropastoral communities.....	4
2.4 Drought adaptation and reactive strategies in pastoral and agropastoral communities.....	5
2.5 Key knowledge gaps.....	7
CHAPTER THREE: DESCRIPTION OF THE STUDY AREA.....	8
3.0 Introduction.....	8
3.1 Location of the study area.....	8
3.2 Climate.....	10
3.3 Vegetation.....	10
3.4 geology.....	10
3.5 Land use.....	10
3.6 Economic activity.....	10
CHAPTER FOUR: MATERIALS AND METHODS.....	11
4.0 Introduction.....	11
4.1 Research design.....	11

4.2 Data types and sources	11
4.2.1 Secondary data	11
4.2.2 Primary data	11
4.3 Study population.....	11
4.4 Sampling framework and sampling techniques	11
4.5 Tools of data collection	12
4.6 Reliability and validity.	12
4.7 Methods of data analysis	13
4.8 Ethical consideration	13
CHAPTER FIVE: RESULTS AND DISCUSSIONS	14
5.0 Introduction	14
5.1 Demographic characteristics of the respondents	14
5.2 Livelihood activities in Lopee sub county.....	14
5.3 Implications of droughts on people’s livelihoods in Lopee subcounty.....	15
5.4 Drought adaptation strategies used by the people of Lopee sub -county.....	18
CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS	22
6.0 Introduction	22
6.1 Conclusion	22
6.2 Problems identified and Recommendations	23
6.3 Future research areas	25
REFERENCES	26
APPENDICES.....	27
Appendix 1: Questionnaire.....	27
Appendix 2: Interview guide	32
Appendix 3: Observation checklist.....	32

LIST OF FIGURES

Figure 1: Shows the conceptual framework.	3
Figure 2: Map of the study area.....	9
Figure 3: The livelihood activities in Lopeei sub county.	15

LIST OF PLATES

Plate 1: Children fetching water from a borehole. Photo taken by Lobuche, Oct, 2021.....	16
Plate 2:Cattle grazing. Photo taken by Lobuche, Oct, 2021.....	17
Plate 3: A water tank used to harvest rain water. Photo taken by Lobuche Oct, 2021.....	19
Plate 4: Local breeds of cattle taking water. Photo taken by Lobuche, Oct,2021.....	20
Plate 5: A garden of cabbages under irrigation at natoo river small dam. Photo taken by Lobuche Oct,2021.	21

LIST OF TABLES

Table 1: Shows the key informants interviewed	12
Table 2:Level of education	14
Table 3:Implications of drought in Lopeei sub county.....	18

ABSTRACT

Drought is among the most adverse climatic disasters affecting people's livelihoods. It has various socio-economic implications for example decrease in crop yields, low incomes, food insecurity, malnutrition, death of animals and people. However, very little has been documented to ascertain the extent of these effects in Lopeei sub county, Napak district. Provide the objectives here. This study used a cross sectional research design that accommodated both qualitative and quantitative methods. The study used random and purposive sampling methods to obtain the sample. Direct observation, questionnaires and key informant interviews were used to collect data. The collected data was entered in SPSS and analysed using descriptive statistics, content analysis and regression. The results from the analysis were displayed in tables, pie charts and graphs. Considering the first objective of identifying the impacts of drought on people's livelihoods, the study found out water scarcity (18.3%), low crop yields (16.7%) and low incomes (8.3%) to be the major problems resulting from droughts in Lopeei sub-county. Other problems identified included; death of people (5%), malnutrition (8.3%), cattle-raids (5.0%), domestic violence (1.7%), child labour (3.3%), high crime rates (3.3%) and high divorce rates (3.3%). Considering the second objective of ascertaining the effectiveness of drought adaptation measures used, the study found out the various measures employed to be less effective. Further the study found out various strategies to be used against droughts for instance harvesting of rain water, irrigation keeping of indigenous breeds and diversification of livelihood activities. These results provided a starting point to the local authorities on how to adapt and mitigate impacts of droughts in Lopeei sub county Napak district. The study results further emphasized the implementation of the various policies against climate change and droughts.

Keywords: Drought, Climate change, Pastoral, Agro-pastoral, livelihoods.

CHAPTER ONE: BACKGROUND OF THE STUDY

1.0 Introduction

Climate change is one of the global developmental and environmental challenges threatening the existence of humanity today. An unprecedented concentration of greenhouse gases in the atmosphere is linked to an overall warming of the planet, which has been affecting climate and weather patterns (Diaz *et al.*, 2016). Changes in temperature and precipitation are expected to become more frequent with vast implications (Detges 2016). Evidence is emerging that climate change is increasing rainfall variability and the frequency of extreme weather events such as droughts, floods and hurricanes (Kansiime *et al.*, 2013). A drought is an insidious phenomenon, considered by many to be the most complex and least understood of all-natural hazards and affecting more people than any other hazard (Mogotsi *et al.*, 2013). Droughts, more than any other phenomenon, have therefore shaped and influenced rural communities' interaction with their environment on which they earn a living (Mogotsi *et al.*, 2013). Although definitions vary, droughts are generally extended periods of months or years in which precipitation is less than the annual average and results in severe water scarcity (Opiyo *et al.*, 2015).

Africa is likely to warm across all seasons during this century with annual mean surface air temperatures expected to increase between 3 and 4 degrees centigrade by 2099, roughly 1.5 times average global temperatures (Kansiime *et al.*, 2013). Projections in East Africa suggest that increasing temperatures due to climate change will increase rainfall by 5-20% from December to February, and decrease rainfall by 5-10% from June to August by 2050. Analyses from General Circulation Models (GCM's) indicate an upward trend in rainfall under global warming over much of Burundi, Kenya, Rwanda, Southern Somali and Uganda (Kansiime *et al.*, 2013). In large parts of Africa and in America, as well as in Southern, central and eastern Europe, the middle east, Australia and southeast Asia, climate change is expected to increase the frequency and severity of droughts (Kalumba *et al.*, 2021). It is widely recognised that developing countries stand to suffer disproportionately from the effects of drought, since they are in the weakest position of mitigation (Kalumba *et al.*, 2021). In the Sub Saharan Africa, drought is regarded as a leading cause of food insecurity affecting about 220 million people, one in every four people being undernourished (Obaa *et al.*, 2017). In Uganda, drought has become the order of the day. The most hit regions are along the so called 'cattle corridors' stretching from western Uganda through central region to Teso and Karamoja in north east (Adiiki 2017). The country has suffered from droughts on and off in the past years (Adiiki 2017). Vulnerability to these droughts is high due to poverty, large dependence on rain fed agriculture, marginalisation and other factors ((Ahmed 2020). Droughts therefore continue to incur a heavy toll to people, animals, environment and the economy (Ahmed 2020). For instance, droughts have resulted into food shortages posing great threats to the citizens and over a million refugees in the country (Adiiki 2017). In eastern Uganda, many families have been affected to an extent of now eating only one meal a day (Adiiki 2017). The droughts have not spared the animals either; the herdsmen are moving from one place to another in search for water and pasture (Adiiki 2017). Cattle traders claim to be making losses because the animals are weak, smaller and weigh less than usually (Adiiki 2017). These face rejections in some places with ensuing conflicts over access to water (Adiiki 2017). Weather experts warn that the droughts situation is far from over (Adiiki 2017).

Although a lot of focus by other scholars has been put on climate change as a general, little has been done to address droughts. Besides, despite all the implications of drought, little work has been documented about Napak an area considered to be a hot spot of droughts. This study

intends to bridge this gap. This research is therefore intended to find out the implications of drought on pastoral and agropastoral communities so as to bridge the knowledge gap. The study will be important to policy makers by informing decisions on how to adapt and mitigate the implications of droughts.

1.2 Problem statement

Droughts are among the most devastating natural disasters affecting food production, water resources and causing widespread human and animal mortalities in Karamoja. Droughts are increasingly becoming an issue of concern in Napak district North Eastern Uganda. The magnitude of droughts is high. Pastoral and agropastoral communities are the highly affected through decrease in food production and water resources. Drought has therefore affected all the productive sectors leading to a decrease in output and thus affecting the rates of economic growth. Drought early warning systems have been put in place to address the problem. Despite all these impacts, little had been documented about the gendered impact of drought and effectiveness of the adaptation and mitigation strategies towards this problem. Basing on the current climate change projections, the frequency and magnitude of this problem is expected to increase. Considering this, there was urgent need to investigate the implications of droughts on pastoral and agro-pastoral communities in Napak to bridge the knowledge gap.

1.3 Objectives of the study

The main objective of the study was to document the dynamics of drought episodes on pastoral and agropastoral communities in Napak district, Karamoja sub region. Specifically, this study addressed the following objectives

1. To identify the gendered impacts of drought on people's livelihoods in Napak district
2. To examine the effectiveness of the drought adaptation strategies employed by pastoral and agro pastoral communities in Napak.

1.4 Hypothesis

H₀ There is no significant relationship between animal weight and drought

H₁ There is significant relationship between animal weight and drought

H₀ There is no significant relationship between crop yields and drought

H₁ There is significant relationship between crop yields and drought

1.5 Significance of the study

The study analysed the implications of droughts on pastoral and agropastoral communities in Napak district Karamoja sub region. The results of this were aimed to inform policy makers about the urgency of mitigating climate change, the district agricultural officer about the major effects of droughts in the district, the district environmental officer about the possible drought mitigation and adaptation strategies to solve the drought problem, the community development officer about the hindrances towards livelihood sustenance and the residents of Napak district about the various ways of recovering from droughts. The study was also to enable other people carryout research on droughts in Karamoja sub region. This research also helped inform people more about the sustainable development goal 13 that is about taking urgent action to combat climate change and its impacts. The research results also helped to inform people about the ways on achieving a middle income status as an objective of Vision 2040.

1.6 Scope of the study

In its geographical scope, the study was carried out in Napak district, Karamoja sub region Eastern Uganda. This region has highly been affected by droughts. This study targeted the residents of Napak and also identified key informants that were officials from Napak district. In its temporal scope, the study considered literature between 2015– 2021 so as to know the new dynamics in the area. The study was carried out during the holidays. In its theoretical the study found out the gendered impacts of droughts on people’s livelihoods in Napak and also examined the effectiveness of drought adaptation strategies employed by pastoral and agro-pastoral communities in Napak.

1.7 Conceptual framework

The study considered a DFID sustainable livelihood framework that focuses on people and their livelihood assets. The livelihood assets include; human, social, natural, physical and financial capital. These livelihood assets are vulnerable to various shocks and seasonality. This vulnerability is only reduced by government structures and the private sector through various laws, policies and institution. This leads to more livelihood outcomes such as more income, increased wellbeing, reduced vulnerability, improved food security and more sustainable use of natural resource base.

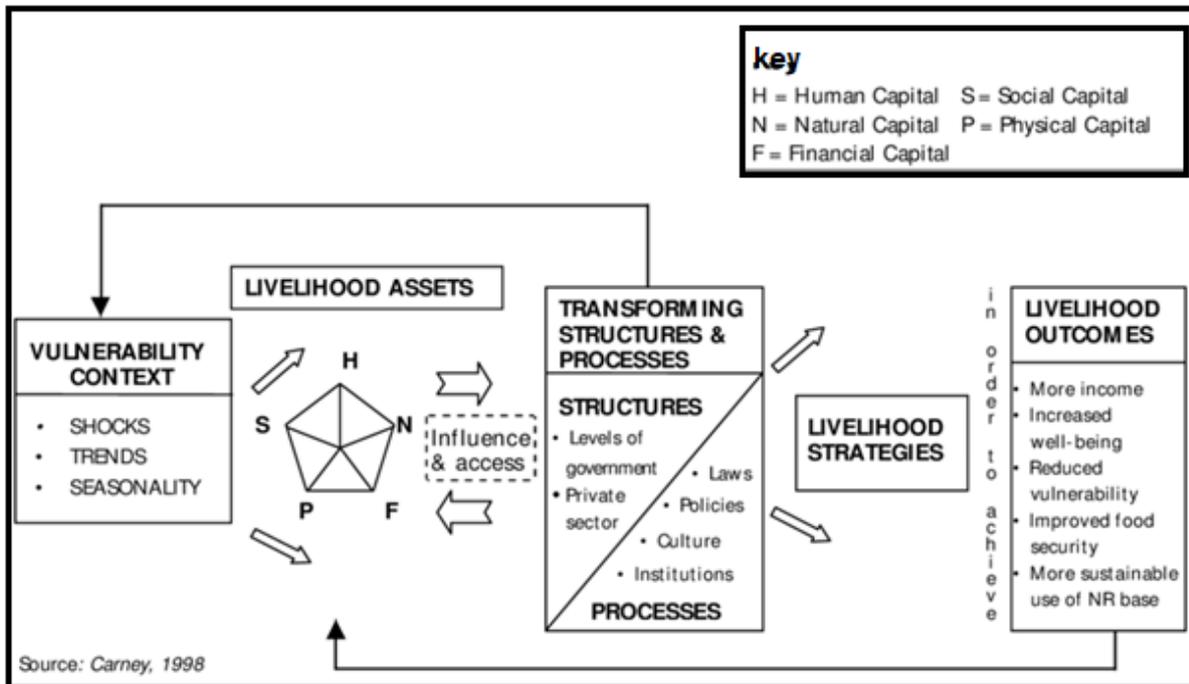


Figure 1: Shows the conceptual framework.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter presents the reviewed literature about the implications of droughts on pastoral and agro-pastoral communities.

2.1 Classification of droughts

Droughts are classified as either meteorological (lack of precipitation over a region for a period time), hydrological (a period with inadequate surface and subsurface water resources), agricultural (a period with declining soil moisture and consequent crop failure due to lack of surface water resources) or socioeconomic due to failure of water resources systems to meet demands, which impacts human activities both directly and indirectly (Opiyo *et al.*, 2015).

2.2 Drivers of droughts

Land and water temperatures result into droughts. As overall temperatures increase more water evaporates and severe weather conditions increase (Restuccia 2016). In addition, air circulation and weather patterns also cause droughts. Droughts are also caused due to soil moisture levels (Restuccia 2016). When soil moisture is depleted, there is less evaporation of water to create clouds. Surface temperatures rise, more water is needed and less is available and this leads to more severe drought (Restuccia 2016)

2.3 Implications of droughts on pastoral and agropastoral communities

Drought is a recurrent feature of most semiarid regions of Africa (Mogotsi *et al.*, 2013). These affect large geographical areas, often covering whole countries or part of continents and may last for several months and, in some cases, several years (Adiiki 2017). Drought affects segments of the population differently, the poor who constitute the highest proportion are the most affected due to lack of both tangible and intangible resources to buffer the adverse effects (Mogotsi *et al.*, 2013) All droughts have had various impacts on different sectors of the economy for instance the agricultural sector (Mogotsi *et al.*, 2013). As might be expected rainfall shortages are likely to affect livestock and cropping sectors differently especially when the two sectors are in the same ecological zone (Mogotsi *et al.*, 2013). In the horn of Africa, drought is one of the most inhibiting factors in pastoral and agropastoral production systems. Drought has had the following implications on pastoral and agropastoral communities.

Drought has led to low crop yields amongst farmers (Adiiki 2017). Farmers are counting losses after the food crops planted either dry up or yield very poor harvest (Adiiki 2017). This is mostly caused by the farmers' poor planning that results into panic and rush to plant with the first rainfall instead of waiting for enough rain (Adiiki 2017). Adiiki (2017) describes drought to be causing low crop yields but doesn't give a clear picture about these low yields. This study intends to quantify the yields harvested by farmers during droughts. Agropastoral communities in rural areas, who are heavily dependent on rain-fed agriculture for subsistence are exposed at increased frequencies leading to a fall in crop production (Mogotsi *et al.*, 2013). The fall in crop production, due to insufficient moisture levels leaving households food insecure (Mogotsi *et al.*, 2013). Karamoja is notoriously food insecure and has been in need of food aid for most years during the last two decades (Nakalembe 2017). Interruptions in food supplies often trigger nutritional challenges especially among resource poor households (Obaa *et al.*, 2017). Droughts increase malnutrition rates amongst the various societies (Morland, 2017). Droughts are therefore the most devastating natural disasters affecting food production and causing widespread human mortalities (Shenelle *et al.*, 2020). For instance, even at the best of times, the people of Turkana live on the edge (Morland 2017). Droughts

that are detrimental to crop production occur more frequently in Botswana than those seriously affecting the livestock sector (Mogotsi *et al.*, 2013).

Pastoralism in the horn of Africa is one of the most important economic activities from which millions of people derive their livelihoods (Magda *et al.*, 2009). The contribution of the livestock sector to the national income across the horn of Africa is underestimated (Magda *et al.*, 2009). However, long dry spells and occasional droughts have always been part of the rhythm of pastoralism (Morland 2017). Pastoral livelihoods in the Sahel historically were underpinned by systems of negotiated access to water and pasture that did not assign exclusive rights and by reciprocal arrangements between pastoralists and agriculturalists (Brooks 2006). The current marginalisation of pastoralists makes them more vulnerable to the adverse impacts of drought (Brooks 2006).

Drought dries up the main source of livestock water of the ephemeral rivers hence farmers have to resort to hand dug wells along the river bed (Mogotsi *et al.*, 2013). It is at this point that poor farmers are often exposed while the well-off can afford to buy feed to supplement their animals and even ferry water to their animals in grazing areas (Mogotsi *et al.*, 2013).

Furthermore, drought dries up pastures. This leads to movement of animals further away in search of grazing pasture (Mogotsi *et al.*, 2013). Animals lose weight due to daily trekking of long distance between grazing and watering points (Mogotsi *et al.*, 2013). In addition, Drought weakens the animal draught power, thus impacting on subsequent power and planting seasons especially for areas that use oxen as draught power (Mogotsi *et al.*, 2013).

Drought reduces calving rates and sometimes increases death rates (Mogotsi *et al.*, 2013). Households with small herds suffer disproportionately greater losses as they do not have the resources to protect their investments (Mogotsi *et al.*, 2013). Drought also increases incidences of certain diseases, altered herd structure and a collapse of livestock markets (Opiyo *et al.*, 2015). Mogotsi *et al.*, (2013) claim drought to reduce calving rates but do not show how, this study is intended to provide more explanation about this finding.

Although numerous studies have been conducted on the physical aspects of droughts and communities in Africa (Mogotsi *et al.*, 2013; Opiyo *et al.*, 2015 and Magda *et al.*, 2009) few have sought to understand how the affected communities themselves perceive droughts, anticipate droughts or which groups in such communities are particularly vulnerable during these droughts. Understanding the often subtle and complex dynamics emanating from drought among these communities can lead to better planned intervention strategies for sustainable rural development and enhanced resilience to climatic shocks in the future. This study will therefore focus on identifying the affected communities, levels of vulnerability and the various drought adaptation strategies used in Napak.

2.4 Drought adaptation and reactive strategies in pastoral and agropastoral communities

Drought frequency is expected to increase in the coming decades due to climate change (Shenelle 2020). The vulnerability of communities is likely to increase due to fast growing populations, increasing water demands and degradation of land and environmental concerns (Barrow, 2017). Without a doubt, societies need water, however, water scarcity and quality due to climate change and other factors are threatening food security and other water reliant sectors around the world (Kalumba *et al.*, 2021). Adapting to climate change helps reduce the risk of water related disasters such as droughts (Kalumba *et al.*, 2021). Local communities therefore need to play a central role in informing planning in drylands and need to be equipped with information on climate change (Magda 2009). The following are the drought adaptation and reactive strategies in the reviewed literature.

Installation of drought early warning system so as to strengthen capacity of communities in managing and reducing drought effects through building preparedness and providing coping strategies (Obaa *et al.*, 2017). Karamoja is the only region with drought early warning systems in Uganda (Obaa *et al.*, 2017). Drought early warning systems provide information on timely planting hence contributing to food security (Obaa *et al.*, 2017). Communities have traditionally coped with drought utilizing robust traditional early warning systems based on nature signals such as patterns of vegetation, stars, moon shapes and insect movement patterns (Obaa *et al.*, 2017). Despite having drought early systems in place, Karamoja remains the most food insecure region in the country, this research will therefore ascertain the extent to which drought early warning systems contribute to household food security. Most agropastoral households are able to anticipate drought outbreaks and are therefore not necessarily caught unaware (Mogotsi *et al.*, 2013). However, due to the perceived high frequency of droughts some farmers feel they can do nothing to prepare for those droughts and thus exhibit a more fatalistic attitude and leave everything to God (Mogotsi *et al.*, 2013).

Communal land ownership is an important strategy in support of effective drought adaptation and coping mechanism (Opiyo *et al.*, 2015). This allows livestock mobility to take advantage of pasture and water resources (Opiyo *et al.*, 2015) The movement of livestock to areas with secure water and pasture resources in an effective strategy against drought (Opiyo *et al.*, 2015).

Ownership of indigenous livestock species that are resistant to drought and selected on the basis of survival and productivity as well as adaptation to the prevailing climatic conditions (Opiyo *et al.*, 2015). In Turkana, livestock species kept include camels, cattle, sheep, goats and donkeys all of which have different forage and variable levels of resistance (Opiyo *et al.*, 2015). Keeping herds containing a mixture of different livestock species is an insurance against total loss in case of drought (Opiyo *et al.*, 2015).

The Turkana community has a long history of proving its ability to respond to extreme environmental conditions, despite the challenges faced with prolonged drought events (Opiyo *et al.*, 2015). Diversification of livelihood is a major adaptation strategy practiced by the poor in Turkana (Opiyo *et al.*, 2015). Livelihood diversification refers to processes by which households construct a diverse portfolio of activities and social support capabilities in their struggle for survival and in order to improve their standards of living (Opiyo *et al.*, 2015). Pastoralists engage in activities such as wild fruits for food, honey production, basket making and handicraft products (Opiyo *et al.*, 2015). Most of the livelihood diversification activities in Turkana are adapted to complement pastoralism, rather than a substitute for livestock production (Opiyo *et al.*, 2015).

The government of Uganda appeals to regions with food to share grains with their neighbours during droughts and due to the high levels of solidarity, locals mobilised funding and purchased tons of grains (Adiiki, 2017) . Trying to encourage farmers to counter the droughts, Ugandan president Yoweri Museveni demonstrated low-tech drip irrigation techniques by using plastic bottles filled with water saying that ‘such innovations can save plants’ although some people criticised his approach (Adiiki 2017). The government and nongovernment organisations contribute aid to boost drought affected communities (Nakalembe, 2018). The current poor socioeconomic conditions in pastoral East Africa bring lots of questions about the worthiness of aid program in these marginalised areas. This research is therefore intended to give answers to these questions. In addition, farmers have been encouraged to plant drought resistant crops in order to avoid losses and famine (Adiiki 2017).

Selling off of livestock before droughts is also another strategy to reduce on the negative impacts of droughts (Opiyo *et al.*, 2015). Some slaughter old and weak animals prior to droughts (Opiyo *et al.*, 2015).

2.5 Key knowledge gaps

Reviewed literature mostly showed the impacts of droughts on the pastoralists. This study focused on both pastoralists and agro-pastoralists. Although Mogotsi et al (2013), clearly analyse the impacts of droughts, they do not provide strategies to the problem. Adiki (2017) then narrows the strategies to pastoralists and botched to offer comprehensive strategies that can be used by agro- pastoralists. This study provided possible localised drought adaptation strategies for the agro pastoralists. Additionally, the review did not discover existing write up about the issue to be investigated in Napak. This study therefore looked to fill this knowledge gap.

CHAPTER THREE: DESCRIPTION OF THE STUDY AREA

3.0 Introduction

This chapter describes the study area in terms of its location, climate, vegetation, population soils and geology.

3.1 Location of the study area

Napak is located in northern eastern Uganda, in the Karamoja sub region. The district was named after mt. Napak. It is bordered by Abim district to the northwest, Kotido district to the north, Moroto district to northeast and east, Nakapiripiriti district to the southeast, Katakwi district to the south, Amuria district to the southwest and Otuke district to the west. The district covers an area of 4978 square kilometres. Approximately 2046 square kilometres is available for cultivation excluding game reserves (2864 square kilometres) and 58 square kilometres for mountains. The population density on this arable land is 22.3 persons per square kilometre.

LOPEEI SUB-COUNTY STUDY AREA IN NAPAK DISTRICT.

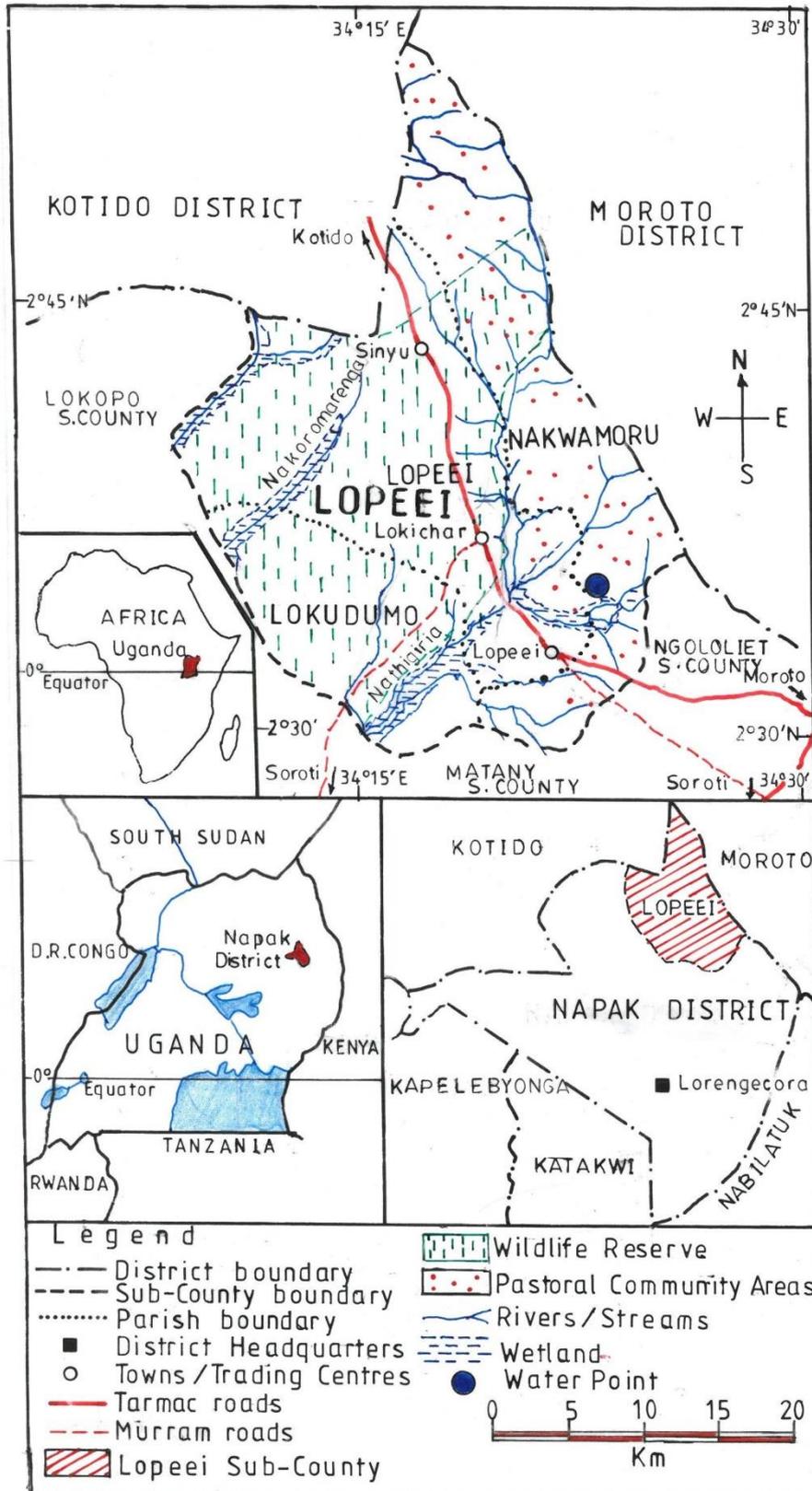


Figure 2: Map of the study area

3.2 Climate

The climate in Napak is semiarid characterised by an intense hot season lasting from November to March (Akwango 2017). The wet season is from April to August with marked minimal in June and marked maxima in May and July. Rainfall is in the range of 300 to 1200 mm per year with a mean annual rainfall of 800mm. The mean daily maximum temperature ranges from 28°C -33°C during the dry season. Generally, the hottest months are January and February when the average daily maximum temperature may reach 33.5 degrees centigrade; in October to December average daily maximum temperature is 29.50 degrees centigrade mean daily minimum temperature ranges from 15-17 degrees centigrade and the average relative humidity of 63% during morning hours and 46% during the afternoon. As expected, the lowest relative humidity values are experienced during the months of drought, higher values are recorded in the morning hours (Akwango 2017).

3.3 Vegetation

The vegetation pattern in Napak district is typically semiarid with dry savannah tree species and predominately grass species (Nakalembe 2018). The main vegetation communities in the district include forests at high altitudes (dry montane forests), savannah woodland, semi evergreen thickets, deciduous thickets, riparian communities and grass steppe communities. Forests are localized groves on hills and mountains such as Kamalinga forest on mt. Napak. Forest cover is estimated at 100square kilometres.

3.4 geology

Napak is underlain by Precambrian rocks, intensely metamorphosed and deformed series of predominantly sedimentary origin. These are mainly represented by gneisses and granites bearing numerous minor intrusions (Nakalembe 2018). The original lithological horizons have been affected by successive phases of regional metamorphism that partially obliterated the major structures.

3.5 Land use.

Land in Napak is generally semi-arid. This is generally being used for settlement, conservation, agriculture, transportation, and forestry.

3.6 Economic activity.

The people of Napak are engaged in various economic activities. Agro-pastoralism is the major economic activity in the area. Other economic activities include; mining, quarrying, tourism, trading and hunting.

CHAPTER FOUR: MATERIALS AND METHODS

4.0 Introduction

This chapter represents the materials and methods that were employed in data collection

4.1 Research design

A cross sectional research design was used during the study. This research design was descriptive in form of a survey. A cross sectional research design was used because it is cheap and faster. A cross sectional research design also used both qualitative and quantitative methods to bring out all the details in the study population. The qualitative data described the population while the quantitative data was generally numerical. The quantitative and qualitative techniques used in this design counter balanced each other's weaknesses.

4.2 Data types and sources

This study used both primary and secondary sources in data collection

4.2.1 Secondary data

This was the literature about the implications of droughts on pastoral and agro-pastoral communities. A systematic approach was used to search published literature from 2015 to 2021 about the implications of droughts on pastoral and agro-pastoral communities from google scholar, Ebscohost and web of science internet search engines. Secondary data included; books, scientific articles, reports and conference papers. Internet search was through the use of keywords such as drought, pastoral and agro-pastoral communities. This use of keywords helped in getting the relevant literature.

4.2.2 Primary data

This data was obtained from the field during the study. Primary data sources included the residents of Napak district and the key informants such as Napak district community development officer, the district environmental officer and the district agricultural officer. The key informants were used because they were knowledgeable. The residents of Napak were used because they were the exact people who encountered the problem.

4.3 Study population

Study population is the group of people from which samples is selected (Nakalembe 2018). During the 2014 national population census, Napak district had 266,800 people with over 27,048 households. (UBOS2014). Most of the people live in rural areas. Women of productive age 15-49 years were 53894 people and children below 5 years were 50,692 (UBOS 2014). Abouts 10,672 people were 65+ years. The formal education level of household head was estimated at 24.4% with 15.6% primary, 5.7% O level and 3.1% others (UBOS 2014).

4.4 Sampling framework and sampling techniques

Napak district has 7 sub-counties namely; Lopeei, Ngoriet, Iriri, Lokopo, Lotome, Matany and Lorengecora. The Sub-county of Lopeei was purposively chosen because it has pastoralists and agro-pastoralists. From Lopeei Sub-county, the sampling framework was the households. From these households, the household heads were randomly selected to be part of this study. A list of all households in Lopeei Sub-county was obtained from the Sub-County Chief. In the list, each household was given a number and these numbers were put in the box for random picking. A total of 60 households formed the sample size. Purposive sampling was used to select 4 key informants knowledgeable about the subject matter in the study area. The sample size was determined basing on the population size in the field. With regard to Krejcie and morgan (1970), a widely used formula of determining sample size was used as indicated below.

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

Where s= required sample size, X^2 = the table value of chi-square for one degree of freedom at the desired confidence level, N = the population size, P = the population proportion was assumed to be .50 since this provided the maximum sample size. Then d = degree accuracy expressed as a proportion (.05).

4.5 Tools of data collection

The study used various tools to collect data and this helped to meet the requirements of triangulation while increasing the credibility and validity of the study findings. These methods included direct observation, questionnaires and key informant interviews. These reduced on the biases that would arise from the use of one method.

a) Direct observation

This involved use of eyes to see and sort out geographical phenomena and information in the field. An observation checklist was used (Appendix 3). This was basically used to identify the types of animals reared, types of crops grown and the general landscape. Observation was used because there was some information that could not be asked but observed. Observation was therefore used to get information that could not be got using other methods.

b) Key informant interviews

Key informant interviews involved a verbal conversation with the people in the field. An interview guide was used (Appendix 2). These were subjected to local leaders and residents because they were knowledgeable and well informed. Interviews were conducted on the Napak district environmental officer, district agricultural officer, district community development officer and a meteorologist in Napak.

Table 1: Shows the key informants interviewed

No	Key informants
1	District Environment Officer
2	Sub county community Development Officer
3	District Agricultural Officer
4	District Commercial Officer
5	UPDF officer

c) Questionnaires

These involved structured questions designed to achieve the various study objectives to answer the research questions. Questionnaires (Appendix 1) collected data about the implications of drought on agro-pastoral communities, the demographic characteristics of the respondents, types of animals kept and crops grown in the area. Questionnaires were used because they were cheap and gave standardized answers that made it easy to compile data.

d) Photography

This involved the use of a camera to capture the current status of the area. It was used to get photographs of the landscape in Napak.

4.6 Reliability and validity.

Reliability reflects consistency over time. This is a degree to which a test is free from measurement errors. Validity refers to how well the collected data covers the actual area of investigation. It therefore intends measuring what is intended to be measured. Reliability and

validity were therefore to ensure accuracy, reduce measurement errors and ensure that results obtained can be reproduced using the same measurement.

4.7 Methods of data analysis

Data collected from the field was first cleaned and then processed into desired form using predefined sequences of operations manually. This data was entered into SPSS. Data analysis was to get meaning out of the data collected. SPSS was used to analyse data due to its ease in summarising the data collected. Descriptive statistics were used to analyse quantitative data. Content analysis was used to analyse qualitative data so as to get the most perfect opinion. Results were presented using bar charts, pie charts and tables because these clearly showed comparison of the various elements. Regression analysis was used to test the nature of relationships between independent variables and the dependent ones.

4.8 Ethical consideration

Prior to data collection in the field permission was got from the university. To prevent respondents from shying away and withholding information, confidentiality was assured and guaranteed given the fact that the information collected was only used for academic purposes. Covid 19 standard operating procedures of wearing a mask, maintaining a social distance and use of a sanitizer were put into consideration.

CHAPTER FIVE: RESULTS AND DISCUSSIONS

5.0 Introduction

This chapter presents analyzed and interpreted data processed in line with the study objectives.

5.1 Demographic characteristics of the respondents

This section describes demographics of respondents in terms of age, gender, level of education, marital status and household composition. The literacy levels in the area are very low. There is a division of labor where men participate in pastoralism and women engage in agriculture. The levels of education in the area are very low (See table 2).

Table 2: Level of education

Level of education	Frequency	Percent	Valid Percent	Cumulative Percent
University	3	5.0	5.0	5.0
Tertiary	6	10.0	10.0	15.0
A level	9	15.0	15.0	30.0
O level	16	26.7	26.7	56.7
Valid Primary level	22	36.7	36.7	93.3
No education	4	6.7	6.7	100.0
Total	60	100.0	100.0	

Table 2 shows 5% of the respondents had finished university, 10% had gone through tertiary institutions, 15% had completed A level, 26.7% O level, 36.7% primary level and 6.7% didn't attain education. The level of education in this area is generally low due to extreme poverty.

5.2 Livelihood activities in Lopeei sub county

There are various livelihood activities in Lopeei sub-county. Pastoralism and agro pastoralism are the major activities in the area. The study found out 80% of the households to participate in pastoralism. Pastoralism is done throughout the year. Pastoralism is mainly for meat, hides, skins, milk and blood. Pastoralists also consider cattle to be a source of prestige and wealth in the community. Cattle and goats are the main animals reared. To a small extent sheep is also reared. Other activities carried out in the area include; crop growing with millet and cassava being mostly grown, bee keeping, charcoal burning, brick laying, quarrying to mention but a few. (See figure 2)

Drought has escalated on the divorce rates in Lopeei sub-county, Napak district. Rural urban migration that is caused by droughts lead to divorce as women tend to go to urban areas most especially the capital of Kampala to look for better alternatives. These resort to the various activities in the informal sector for instance vending of mangoes, maize, brooms and bungsles. In most cases these take long to go back to Lopeei hence making family breakups and divorce inevitable. This finding was not found in any of the reviewed literature.

Drought has also resulted into domestic violence in Napak. The failure to get what to eat in the family results into ‘blame games’ by the family heads. These blame games usually start with verbal exchanges that later escalate to insults and physical fights.

Table 3: Implications of drought in Lopeei sub county

	Frequency	Percent	Valid Percent	Cumulative Percent
Water scarcity	11	18.3	18.3	18.3
Low crop yields	10	16.7	16.7	35.0
Low incomes	5	8.3	8.3	43.3
Death of animals	6	10.0	10.0	53.3
Limited pasture	10	16.7	16.7	70.0
Death of people	3	5.0	5.0	75.0
Valid Malnutrition	5	8.3	8.3	83.3
Cattle raids	3	5.0	5.0	88.3
Domestic violence	1	1.7	1.7	90.0
Child labour	2	3.3	3.3	93.3
High crime rates	2	3.3	3.3	96.7
High divorce rates	2	3.3	3.3	100.0
Total	60	100.0	100.0	

5.4 Drought adaptation strategies used by the people of Lopeei sub -county.

Field observations noted harvesting of rainwater to be an adaptation strategy used by some pastoralists to react against droughts. Water reserves have been used to store water in periods of plenty. Some residents of Lopeei use water tanks to harvest rain water that is later used during periods of droughts. It was also noted that this strategy is always used by the well off in the area.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This chapter presents the study findings and proposes various possible solutions to the problems identified

6.1 Conclusion

The study investigated the implications of droughts on pastoral and agro-pastoral communities in Lopeei sub-county, Napak district, Karamoja sub region. Considering the objective of identifying the gendered impacts of droughts on people's livelihoods in Napak the study found out drought to have adverse impacts on people's livelihoods through leading to low crop yields and in the due course enhancing food security, drought reduced income from agro pastoral activities, it led to death of animals and rural urban migration. In the second objective of examining the effectiveness of drought adaptation strategies employed by pastoral and agro-pastoral communities in Napak, the study found out various strategies to be used against droughts. These included; harvesting of rain water, selling of livestock, diversification of livelihood strategies and rearing of indigenous drought resistant species. The study also found out these strategies to be ineffective due to long periods of droughts. It can therefore be concluded that drought has had adverse effects on the people of Napak and the strategies employed have not been effective enough to solve this problem.

6.2 Problems identified and Recommendations

No	Problem identified	Economic	Environmental	Social	Legal	Institutional
1.	Water scarcity	Construction of water reserves	Harvesting of rain water during the rainy seasons to be kept and used during droughts.	Sensitization of the community about the basic water management skills	Enact ion of laws against water pollution	Ministry of water and environment should consider construction of more bore holes and dams in the area
2	Low crop yields		Planting of drought resistant crops, Irrigation of crops during droughts.	Food reserves to store food during periods of plenty to be used in periods of scarcity.		Sensitization of people by government and nongovernment institutes about ways of adapting to droughts
3	Low incomes	Diversification of livelihood activities. For example engaging in other activities for example quarrying, brick laying and bee keeping.				Fixing of prices of agricultural products to control price decreases during droughts.
4	Food insecurity and malnutrition			Construction of food reserves and granaries to store food during wet seasons to be consumed in periods of		Sensitization of people on how to be food secure during droughts

				droughts		
5	Death of animals	Selling off of old and physically weak animals prior to droughts		Keeping indigenous animals that are more resistant. Keeping more animals as insurance during droughts.		
6.	Rural urban migration	Establishment of more income generating activities in rural areas			Enaction of street laws against street kids and street vendors.	Sensitization of people about the demerits of rural urban migration
7	Domestic violence	Encouraging women to engage themselves in some income generating activities.			Implementation of the law against gender based violence.	Women empowerment should be encouraged and promoted by both government and nongovernment organizations

6.3 Future research areas

Research should be carried out on the impacts of drought on food security in Napak district

Research also ought to be done on the effectiveness of drought early warning systems in Napak district.

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APPENDICES

Appendix 1: Questionnaire.

Dear Respondent,

I am Lobuche George William, pursuing a Bachelor of Geographical science at Makerere University. As a requirement to complete this degree program, I am required to conduct an independent research. I am conducting a study on “The Implications of Drought on Pastoral and Agro pastoral Communities in Napak District Karamoja Region”. You have been randomly selected as a research participant to assist in the filling of this survey questionnaire. Be rest assured that this survey questionnaire is for academic purposes only. Your responses will be anonymous and you are requested to try as much as possible to answer all the questions in this survey so that I can generate as much information for this study as possible. Thank you for your participation.

SECTION A: DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

- a) Age of the respondent
 - 1. 18-24 []
 - 2. 25- 34 []
 - 3. 35- 44 []
 - 4. 45-54 []
 - 5. Above 55
- b) Gender of the respondent
 - 1. Male
 - 2. Female
- c) Level of Education.
 - 1. University Level
 - 2. Tertiary
 - 3. A-level
 - 4. O-Level
 - 5. Primary Level
 - 6. No Education at all
- d) Marital Status of the respondent.
 - 1. Married
 - 2. Single
 - 3. Divorced
 - 4. Separated
 - 5. Others,
specify.....
- e) Household composition
 - 1. 1-2 persons []
 - 2. 3-5 persons []
 - 3. 6-10 persons []
 - 4. Above 10

SECTION B: Section B: Gendered impacts of drought on people's livelihoods

a) House owned

1. Permanent house 2. Semi_permanent house
3. Temporary 3. Renting

b) Land owned

1. Less than 2 acres 2. 2-5 acres
3. 5-8 acres 4. Above 9 acres

c) What livelihood activities do you carry out for this household, please rank accordingly [1) Most carried out, 2) moderately Carried out, 3) not carried out)

s/n	Livelihood activities	Done during the rainy season	Done during the drought	Done both in the rainy and drought seasons
i	Agriculture			
ii	Pastoralism			
iii	Mining			
iv	Bee keeping			
v	Charcoal burning			
vi	Other, specify			

d) What kind of livestock and poultry do you rear? Please rank accordingly [1) Most reared, 2) moderated reared, 3) not reared)

S/n	Livestock and poultry reared	Livestock and poultry reared during the rainy season [Rank]	Numbers during the rainy season	Livestock and poultry reared during the dry season [Rank]	Numbers during the dry season
1	Cattle				
2	sheep				
3	Goats				
4	Pigs				
5	Hens				
6	Ducks				
7	Others, specify				

e) What crops does your household grow. Please rank according to most grown

[1. Most grown, 2) medium grown, 3) not grown]

s/n	Crops	During the Rainy season	During the Dry season
1	Bean		
2	Maize		
3	Cassava		
4	Bananas		
5	Sweet potatoes		
6	Millet		
7	Others, specify		

i) What is your source for your livestock and domestic use? Please rank according to importance [1. Most important 2) important, 3) Less important, 4) Not important

S/n	Source of water	During the rainy season	During the dry season
1	River		
2	Tap water		
3	Well		
4	Borehole		
5	Rainfall		
6	Others, specify		

As per the livestock, how much milk do you get during the dry and rainy season?

1) Milk obtained during the rainy season (ltrs) []

2) Milk obtained during the dry season (ltrs) []

How much income do you get from the following during the rainy and dry seasons?

S/n	Crops	During the Rainy season	During the Dry season
1	Beans		
2	Maize		
3	Cassava		
4	Bananas		
5	Sweet potatoes		
6	Millet		
7	Milk		
8	Ghee		
9	Skin and hides		
10	Calves		
11	Sell of meat		
12	Sell of live livestock		

According to your experience are the implications of droughts on pastoralism and agro-pastoralism? Please rank according to severity [1-most severe, 2- moderate, 3-don't know, 4- less severe, 5- not severe.

s/n	Drought implications	Ranks
1	Water scarcity	
2	Low crop yields	
3	Low incomes	
4	Death of animals	
5	Limited pasture	
6	Death of people	
7	Malnutrition	
8	Cattle raids	
9	Child labour	
10	Domestic violence	
11	High crime rates	
12	Teenage pregnancies	
13	High divorce rates	
14	Others, specify	

SECTION D DROUGHT REACTIVE, ADAPTATION AND MITIGATION STRATEGIES

1. Which of the following statement is true about the **effectiveness of the drought adaptation strategies employed by communities** in this Subcounty

Statements	Very Effective (1)	Effective(2)	Not sure(3)	Least Effective(4)	Not Effective(5)
Irrigation has helped communities to adapt to climate change impacts					
Selling property has helped communities to adapt to climate change impacts					
Selling of livestock has helped communities to adapt to climate change impacts					

Planting drought resistant crops has helped communities to adapt to climate change impacts					
Having food reserves has helped communities to adapt to climate change impacts					
Having water reserves has helped communities to adapt to climate change impacts					
Support from government and NGOs has helped communities to adapt to climate change impacts					

b) Which drought early warning systems do you use?

1. Local meteorological stations
2. International media
3. Community media
4. Local media
5. Others, specify.....

c) How reliable are the drought early warning systems?

1. Very reliable
2. Reliable
3. Less reliable
4. Not reliable

Appendix 2: Interview guide

1. What are the major causes of droughts in Lopee sub-county?
2. Which sectors of the economy are majorly affected by the droughts in Lopee sub-county?
3. What are the implications of droughts in Lopee sub-county?
4. How have the people of Lopee sub-county adapted to droughts in the area?
5. What do you think should be done to mitigate the impacts of drought in Lopee sub-county?

Appendix 3: Observation checklist.

1. Major water sources
2. Type of animals kept in Napak.
3. Major livelihood activities carried out.
4. Status of crops in Napak
5. Status of the animals.