GENDER ADAPTIVE CAPACITY TO CLIMATE VARIABILITY AND CHANGE IN PASTORAL COMMUNITIES: CASE STUDY OF TURKANA IN NORTH-WESTERN KENYA

by

Nancy Akinyi Omolo

Submitted in partial fulfillment of the academic requirements of

Doctor of Philosophy

Food Security

School of Agricultural, Earth and Environmental Sciences

College of Agriculture, Engineering, and Science

University of KwaZulu-Natal

Pietermaritzburg

South Africa

PREFACE

The research contained in this thesis was completed by the candidate while based in the discipline of Food Security, School of Agricultural, Earth and Environmental Sciences of the College of Agriculture, Engineering and Science, University of KwaZulu-Natal, Pietermaritzburg Campus, South Africa.

The content of this work has not been submitted in any form to any other university and except where the work of others is acknowledged in the text, the results reported are due to investigations by the candidate.

_____

Signed: Professor Paramu Mafongoya
(FZAS)

Date:

DECLARATION

I, Nancy Akinyi Omolo declare that:

i. The research reported in this thesis except where otherwise indicated or acknowledged is my original work;

ii. This thesis has not been submitted in full or in part for any degree for examination at any other university;

iii. This dissertation does not contain other persons' data, pictures, graphs or other information unless specifically acknowledged as being sourced from other persons;

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v. Where I have used materials for which publications followed, I have indicated in detail my role in the work;

vi. This dissertation is primarily a collection of materials prepared by myself, published as journal articles or presented as a poster and oral presentation at conferences. In some cases additional information has been included;

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_____

Signed: Nancy Akinyi Omolo

Date:

ACKNOWLEDGEMENTS

The following people and organizations are thanked for their valued contribution to this research project:

- Prof. Paramu Mafongoya, research supervisor for his exceptional commitment and guidance throughout my research period. Thank you for encouraging me not to give up, and keep being in the race even when things seemed impossible. Thank you for simplifying the aspect of my research which at some point seemed complex and difficult to handle. You just made the research simple and do able, that sometimes I wondered why I spent all those years on the same research.
- The University of KwaZulu-Natal (UKZN) for giving me opportunity to undertake my Ph.D. research at the institution;
- Part of the quantitative data is from the project: 'Climate Change Adaptation Africa (CCAA)' funded by DFID and IDRC. I would like to extend special thanks to the "Kenya Vulnerability Team": Practical Action, National Environmental Management Authority (NEMA), Maseno University, Kenyatta University and Foodlink Resources;
- The research has been supported by small grants from the African Climate Change Fellowship Program, Global Change for System Analysis, Research & Training (ACCFP/START), and additional support from the Climate Change and African Political Stability (CCAPS) program at the University of Texas – Austin in the United States of America.
- I wish to express special thanks to the surveyed Pastoralist Communities in Turkana for their cooperation and warm welcome during my visit to the field. Your strength and innovations in the face of climate variability/change has given me a lot of courage and made me to view life in a different perspective.
- Special thanks to friends who supported and encouraged me during the research period: Dr. Geoffrey Omedo, Dr. Mercy Ojoyi and James Eroni Miriago.
- Special thanks to Ken Nanga for the statistical support
- I am grateful to the research assistants support (Anonymous).

DEDICATION

I dedicate this thesis to my son Shujaa (the name means victory/strong/hero) indeed you proved to be very strong. I am sorry for being away from home most of the time, to work and to pursue PhD fellowship at that tender age when you needed me. I have always spent long hours on the computer working on the thesis while I should have taken you out to play football or swim on a warm day in Nairobi. Now that this process has come to an end, I would like to dedicate more time for you.

Secondly, I dedicate my thesis to my family my Dad and Mum, Elisha Omolo and Margaret Omolo who have always inspired, supported and taken pride in me. Special thanks to my brother in law and my sister Sospeter Obara and Beatrice Obara, their daughter and son Debra and Simon for taking care of my son while I was in the USA pursuing my Pre-Doctoral Fellowship. Special thanks to my sisters and brothers for their generous love and support, and belief in my abilities: Geoffrey, Emilly, Daphine and Victor.

Lastly, my dedication goes to my uncle Prof Wellington Otieno for being a mentor and inspiration. He exposed me to the world of research and academia, by being amongst first lot of PhD holders in Kenya in the 1980s. At grade 4 , (at 11 years) I was already inspired enough to tell my teacher that in the future I would like to pursue a PhD degree despite not knowing what it takes to achieve it.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Recurrent droughts due to climate change have led to the vulnerability of the pastoralist communities, leading to loss of assets and food insecurity. Climate change will have different impacts on women and men's livelihoods. This specific study examined the relationships between gender and adaptive capacity to climate variability among pastoral communities in Turkana in north-western Kenya.

This study used triangulation method which includes: the quantitative household survey data, focus group discussions (FGDs), a literature review of secondary data sources and key informant interviews (KIIs). Data was then analyzed using the Statistical Package for the Social Sciences (SPSS). Focus group discussions and key informant interviews were carried out to obtain qualitative data. . This survey adopted stratified random sampling. The unit of analysis was the individual household. The target respondents of the closed/structured survey questionnaires were based on gender (either a female-headed household or male-headed household). The total sample size used in this study was 379 households.

Findings from this study revealed that all respondents surveyed have witnessed a change in weather in the last 10 years. The study indicated that vulnerability to climate change is influenced by gender with elderly women being the most vulnerable in the area. The study revealed that participating in decision making and access to basic services were the most important in influencing the resilience of pastoralists.

Key words: Adaptation, Climate variability, Gender, Pastoralism, Resilience, Turkana, Vulnerability

CHAPTER 1

1.1 Background

Africa's vulnerability to climate change largely depends on its current and future adaptive capacities. Climate change predictions for Africa indicate that there will be reduced water availability and expansion of the arid and semi-arid regions in sub-Saharan Africa due to climate change (Intergovernmental Panel on Climate Change [IPCC], 2007). The impact of climate change will not be uniformly distributed in countries within Africa or within the same country (Busby et al., 2012). According to Shisanya and Mafongoya (2017), even within the same locality vulnerability to climate change will vary significantly. There cannot be blanket recommendations on dealing with vulnerabilities to climate change even at the household level. Climate change will have different impacts on women and men's livelihoods (Omolo et al., 2017). Building resilience at the individual, household and community level will largely depend on the suitability of interventions to the local context, particularly in relation to the social dynamics and power relations that create differences in vulnerability.

Kenya is vulnerable to climate change, like many other countries in sub-Sahara Africa. Pastoralism which is one key economic sector will be affected by the persistent droughts experienced in the country. "Pastoralism is a complex form of natural resource management, which requires maintaining an ecological balance between pastures, livestock and people, and it is an adaptive strategy to a stressful environment" (Nori and Davies, 2007:4). Pastoralism has been practised all over the world for many years. In Sub-Saharan Africa, pastoralists inhabit the arid and semi-arid regions which have diverse climate and receive low rainfall. Pastoralists adapt to these climatic conditions through mobile livestock rearing and keeping a wide range of animals (Kirbride and Grahn, 2008, Oba, 1987 and Lengoiboni, 2010).

Pastoralists in Kenya constitute 13.2% of Kenya's 30 million people (1999 population census), with livestock as their major source of livelihood. Pastoralists contribute a significant share of 70% of livestock to the country's market (Galvin et al., 2004). The arid and semi-arid lands (ASALs') pastoralism accounts for 90% of total employment opportunities and 95% of family income and

livelihood security (Kenya ASAL Policy, 2012). Rising temperatures, drought and floods in particular have devastating consequences for the environment, society and economy.

Extreme drought events are increasingly frequent and have impacted negatively on pastoral livelihoods (Opiyo, 2015a). Downing et al (1985) and Ngaira (2004) expose the occurrences of drought in Kenya in the last half of the 21st century in 1951, 1952-55, 1957-58, 1974-76, 1980-81, 1983-85, 1987, 1992-93, 1995-96, 1999-2000 and 2004-2006. The prolonged drought in 2008-2011 is estimated be at Ksh.968.6 billion (USD 12.1 billion), and recently Kenya has experienced a th prolonged drought 2016-2017. The 1997-98 El Niño floods are estimated to have caused damage equivalent to 11% GDP (Omeny, 2015). The 2010-2011 drought experienced in Kenya and the Horn of Africa proved to be a defining moment in drought management. The governments now emphasise on the structural causes of drought emergencies which is a departure from previous drought management efforts in Kenya (Republic of Kenya, 2015).

Eriksen et al (2005) state that vulnerability in pastoralist communities varies between individuals and social groups as well as over space and time. The negative effects of climate change will impact the poor more, this is because the poor are most vulnerable to climate change and variability. Since women form a large percentage of the poor in developing countries and are highly dependent on local natural resources, they are also more vulnerable to the effects of climate change. Skutsch et al (2004) argue that the effects of climate change are likely to affect men and women differently. This is because of the gender differences in property rights, access to information, and cultural, social and economic roles. Though globally women are considered the most vulnerable group, women pastoralists are doubly vulnerable because they are members of the largely marginalized communities (Katushabe, 2014).

1.2 Rationale for the Research

Study on gender and climate change adaptation is relevant because in sub-Saharan Africa women play a significant role in food security and adapting to climate change at the household level (United Nations Development Programme [UNDP], 2009 and Nellemann et al., 2011). Understanding women vulnerabilities and factors driving their choices of adaptation is essential to be able to advice policy makers (Nduma et al., 2001). Adaptive capacity is influenced by many factor like gender, ethnicity, religion, literacy levels, culture, disability and age (Denton, 2002 and Enarson, 2002). Gender differentiation in adapting to climate change is also affected by availability of natural resources, access to assets, international and national legal policy frameworks (Djoudi and Brockhaus, 2011).

Most research undertaken on climate change and livelihoods have not focused on collecting and analysing gender- disaggregated data, this has led to the assumption that climate change impacts on the livelihoods of women and men in the same way (Dankelman, 2002 and Food and Agricultural Organisation [FAO], 2003). Many women remain vulnerable not because of their gender, but because of the gender differentiation between women and men (Aguilar, 2010). Furthermore, most of the research have focused on national and regional studies. The impact of climate change will not be uniformly distributed in countries within Africa or within the same country. This specific research focuses on two diverse ecological zones at the local level in the same county of Turkana in north-western Kenya: agro-pastoral zone and primary pastoral zone.

1.3 Importance of the study

The importance of mainstreaming gender and adaptation to climate change has been recognized in a series of international instruments. Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) adopted in 1979 by the UN General Assembly, also

known as the international bill of rights for women ("CEDAW", n.d). The Beijing Platform for Action is the key global policy on gender equality, it addresses 12 critical areas of concern to women globally including women and environment. The Sendai Framework states that disaster risk reduction requires an all of social engagement and partnership ("The Sendai Framework," 2015). The framework elaborates that gender, age, disability and cultural perspective should be incorporated in all policies and practices. Sustainable Development Goals (SDG 5) aims to achieve gender equality and empower all women and girls. It further states that women and girls represent half of the world's population and thus half of the world potential ("SDG", 2015).

The African Union has been taking a leading role in championing the rights of women and girls dating back several decades. For example, the African Union (AU) dedicated 2016 as the year of Human Rights with a focus on Women's Rights Earlier 2015 was dedicated as the year of Women's Empowerment and Development towards Africa's Agenda 2063. The Agenda 2063 envisions that African countries will attain quality life through developing strategies for inclusive growth, gender equality, youth empowerment, increasing agricultural production, job creation, investments in science, technology, research and innovation, and the provision of basic services ("26th AU Summit," 2016).

Kenya Vision 2030 states the need to focus on equity in power and resource distribution (Republic of Kenya, 2007). The Constitution of Kenya of 2010 outlines that the state shall take legislative and other measures to implement the principle that not more than two-thirds of the members of elective or appointive bodies shall be of the same gender. The constitution aims to facilitate gender mainstreaming in national development (Republic of Kenya, 2010). Climate Change Act of 2016 aims to mainstream intergenerational and gender equity in all aspects of climate change responses (Republic of Kenya, 2016).

Pastoral livelihood system is a highly gendered society. Climate change poses both challenges and opportunities for pastoralists. The topic of gender and adaptation to climate change is receiving increasing emphasis, but it is hard to track the nature of 'change' in a short-term project/programme of 3 years. This study has used part of the quantitative data from *Climate Change Adaptation in Africa (CCAA) programme* which was funded by International

Development Research Centre [Canada] (IDRC) and Department for International Development [United Kingdom] (DFID). It is, therefore, important to further pursue the gender and adaptation to climate change among pastoralists in Turkana, north-western Kenya at a more in-depth level of doctoral studies.

This study will fill the knowledge gap because there are insufficient empirically-based and context specific research on gender, adaptation and climate change adaptation in pastoralism in Kenya and the rest of sub-Saharan Africa. Furthermore, most research have focused on national and regional studies. The impact of climate change will not be uniformly distributed in countries within Africa or within the same country. This specific research focuses on two diverse ecological zones at the local level in the same county of Turkana in north-western Kenya: agro-pastoral zone and primary pastoral zone. As a result, there is need to know and provide empirically-based information and in-depth case studies relating to real life 'stories' to inform those dealing with climate change on possible areas of adaptation.

1.4 Research Objectives

The overall research objective is to examine the relationships between gender and adaptive capacity to climate variability among pastoral communities in Turkana in north-western Kenya.

The specific objectives guiding this study are:

1. To evaluate gender differences in perceptions on vulnerability to climate variability in Turkana, north-western Kenya

2. To identify women and men's adaptation strategies to climate variability in Turkana, north-western Kenya.

3. To assess whether women and men participation in decision making process can increase their adaptive capacity in Turkana, north-western Kenya.

4. To ascertain whether reducing vulnerability and increasing adaptive capacity can lead to high resilience score in Turkana, north-western Kenya

1.5 Research Questions

Linked to the research objectives are the research questions which are detailed below.

1. Are there gender differences in perceptions on vulnerability to climate variability in Turkana, north-western Kenya? If yes, what are the reasons for their vulnerability and related differences?

2. What are women and men's adaptation strategies to climate variability in Turkana, north-western Kenya?

3. Can women and men's participation in decision making increase their adaptive capacity in Turkana, north-western Kenya?

4. Does reducing vulnerability and increasing adaptive capacity lead to high resilience score in Turkana, north-western Kenya?

1.6 Scope and Limitation of the Study

The scope of this study is to map social concerns and perceptions on women's adaptive capacity to climate variability in pastoral communities in north-western Kenya. Currently, there is insufficient gender disaggregated data on climate variability and especially on pastoralism and climate change. This study, therefore, aims to collect gender disaggregated data in order to be able to evaluate women's vulnerability, coping and adaptation strategies, as well as existing constraints and opportunities to climate vulnerability and change. This research will contribute to new knowledge on mainstreaming gender in climate change research and policies. The information

from the study will be important to the Government of Kenya and other sub-Saharan countries in Africa and other parts of the world where pastoralism is practiced.

Due to time and financial constraints, this study focuses on only two areas in Turkana (Loima and Namoruputh) in north-western Kenya. However, it is important to note that there are other pastoral communities in Kenya. This aspect will be explored in the literature review using secondary data sources. The focus on two case studies do provide the opportunity for comparative analyses and specifically ascertains the importance of locality-specific dynamics in understanding the gender dimensions of pastoralism and climate change adaptation.

1.7 Organization of the Thesis

Chapter one serves as an introduction and outline of the research problem. It defines the objectives, research questions and limitation of the study being investigated and highlights the importance of the study. Chapter two presents a discussion of literature related to gender climate change adaptation and pastoralism. Chapter three expounds on the conceptual and theoretical framework. Chapter four outlines the methods and materials used in the study. It describes the procedures that were followed in conducting the study. This includes a description of the case study areas and the research instruments used for obtaining and analysing data. Gender and pastoralists' perceptions on vulnerability to climate variability in pastoral rangelands of Kenya is presented in chapter five. Gender, social capital and adaptive capacity to climate variability is presented in chapter six. Gender and resilience to climate variability in pastoralist's livelihoods system: two case studies in Kenya is presented in chapter seven. Gender, decision making and resilience to climate variability among pastoralists in Turkana Kenya is presented in chapter eight. Chapter nine draws together the conclusions and recommendations of earlier chapters, summarising the key findings of the research in relation to the objectives. It synthesises literature on gender and adaptive capacity to climate variability and their implications on pastoral communities in Turkana in north-western Kenya.

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CHAPTER 2

LITERATURE REVIEW

2.1 Gender and Vulnerability to Climate Change

There will be highly differential impacts of climate change in East Africa to the middle of the 21st century. Parts of East Africa, mainly northern Kenya is predicted to become drier, with considerable reduction in the length of the growing season. In addition, southern Kenya and northern Tanzania, may become wetter, with increases in the length of the growing season (Thornton et al., 2002). Such changes will make fundamental alterations to ecosystem structure and function. These changes will have impacts on human land-use and livelihoods and have the potential to make local livelihoods that depend on climate sensitive sectors such as agriculture, including pastoralism, more vulnerable (Galvin et al., 2004).

Recurrent droughts due to climate change have led to vulnerability of the pastoralist communities, leading food insecurity and loss of assets. In the year 2011, Kenya and the Horn of Africa experienced one of the worst droughts which led to the starvation, malnutrition, human and livestock deaths mainly in the pastoralists inhabited areas in Northern Kenya (Haro, 2012 and Reuters, 2011). According to the National Climate Change Strategy (NCCRS) the increased reoccurrence of droughts in Kenya's have reduced famine cycles from twenty years between 1964 and1984, and then to twelve years between 1984-1996. Furthermore, the drought cycles reduced to two years between 2004 and 2006 and then to yearly basis in the following years of 2007, 2008 and 2009 (Government of Kenya [GoK, 2010]).

Pastoralists are among the poorest and most vulnerable groups in Kenya and the climate change has increased their vulnerability (Omolo, 2010). Northern Kenya has also experienced a long

history of marginalisation from both the colonial and the postcolonial administrations. Due to the prolonged isolation and underinvestment, the region has some of the lowest levels of human development in Kenya and is the most prone to conflict and insecurity- a root cause of which is unequal development (Elmi and Birch, 2013). Aukot (2008) states that the origins of these historical challenges go back a long way, to the model of political economy adopted by the colonial regime.

Studies on natural disasters state that more women than men die when disasters occur due to cultural restrictions on women ("Gender Climate Change," 2008). Moreover, women remain overburdened with reproductive roles at household levels. These activities reduce the time available for women to participate in leadership activities within the community (World Bank, 2006; Demetriades and Esplen, 2008).

Many women remain vulnerable not because of their sex, but because of the gender differentiation between women and men (Aguilar, 2010. Women pastoralists are vulnerable due to a number of factors such as cultural restrictions, poverty, conflicts, unfavorable government policies for the arid and semi-arid lands (ASALs) and national legal frameworks over the years have not promoted women participation in decision making (Food and Agriculture Organization of the United Nations [FAO], 2003 and (GoK, 2004). Empirical research has shown that there is poverty differentiation between women headed households (WHHs) and men headed households (MHHs), with women headed households more likely to be vulnerable than men headed households (Omolo, 2010). This is supported by a study by Opiyo et al (2014) which confirms that pastoralists' perception of climate change was significantly associated with gender of the household head. Whereby male-headed household are perceived to be less vulnerable than female-headed households. However, Buvinic (1993 cited in Appeleton, 1996) argues that not all WHH household are more vulnerable than the MHH and it is important to disaggregate data according to different types of WHHs. This is because WHHs by widows are more likely to be vulnerable as compared to WHHs by married women which are likely to be more prosperous.

Shisanya and Mafongoya (2017) argues that increased household incomes reduced household vulnerability. This is because incomes reduce dependency on climate sensitive resources like agriculture at the household level. McKinley et al (2016) study in Vietnam confirms that

perceptions of climate change do not appear to be individual but rather disaggregated at the household level.

2.2 Adaptation and Adaptive Capacity to Climate Change

Gender is very relevant in climate change adaptation. In addressing gender and adaptation to climate change, it is important to take into consideration sex, ethnicity, religion, literacy levels, culture, disability and age (Denton, 2002 and Enarson, 2002). Van Aelst et al (2016) argues that it is important to consider farmers/pastoralists marital status because it determines their access to various socio-economic resources, gendered entitlements and receiving material support from the family members needed for adapting to climate change. For example, research study by Sonwa et al (2016) revealed that in Turkana in northern Kenya, female-headed households lacked labour for herding and accessing better pastures, which tend to be located in conflict-prone areas.

Gender roles differ in the management of cattle, goats, chicken and other animals. A study done in Tanzania by Nguvava et al (2009), shows that for example in indigenous pastoral societies, almost all cattle belong to men, and women only control cattle allocated to them by men. Household management and decisions on animals are made by older men, young men are involved in herding animals. Women's role in pastoralism is significant. Women are involved in milk trading in pastoral livelihood system. Besides, when men migrate in search of pasture and water, women are left behind to take care of other duties (mainly, milking, young and sick animals) (Haile, 2008). The difference with agro-pastoral system is that men own most of the cattle while women owns crops and poultry. In certain instances women can own cattle through inheritance and they can also purchase animals with income from other activities, but through consultation with the men.

Water-Bayers (2012) states that climate change and livelihoods have focused more on the coping strategies of pastoralists as mere means of survival which sometimes is negative. It is, therefore, important to look at the positive aspect of innovations by pastoralist's women to diversify their livelihoods, especially among settled or semi-permanent pastoralists where there is women's increased involvement in processing and marketing livestock products. Little et al (2001) defines livelihood diversification as engagement in income generation activities besides pastoralism and which is determined by a number of factors including: social status, gender and geographical location (i.e. closeness to town center). Some of women pastoralists diversified activities include small-scale businesses, wage employment, migration, production and sale of crafts, fire wood sale, harvesting and sale of aloe, alcohol brewing and small scale vegetable production (Little et al., 2001; Nduma et al., 2001; Watson and Binsbergen, 2008).Adaptive Capacity

Strengthening local adaptive capacity is a critical aspect of adapting to climate change. Eriksen and Lind (2009) states the national political and economic structures and processes affect local adaptive capacity in various ways, such as through the unequal distribution of resources across regions, development policy biased against pastoralism, and competition for elected political positions. Despite the limited adaptive capacity, there are several adaptation strategies that are currently being practiced to cope with present climate variability in the pastoral system in Kenya. For example, these strategies range from the development and deployment of early warning systems, livestock insurance for pastoralists, water and pasture management, initiating better and more efficient irrigation systems in regions next to water bodies, introducing new livestock breeds which are adaptable to ASALs and new farming techniques.

2.3 Social Capital

Ostrom and Ahn (2003) defines social capital as the value of relationships that facilitate cooperation and collective action through trust. The role that social capital, state-civil society and networks play in adaptive capacity can be observed in historical and present-day contexts by analysing the institutions of resource management and collective action for climate-sensitive sectors and social groups. Unlike physical capital, social capital is not easy to see and measure.

Aßheuer et al (2013) states the social capital is a collective good, it is mostly relevant in poor and rural communities. The poor majorly uses collaboration for emergency response. Social capital can be important too in an economically more advanced context for communities' adaptation to climate change. A high score of social capital promotes self-organization, learning, increased information flow, promote civic engagement, reduced transaction costs and public participation (Petzold, 2016).

Social capital is vital at different times to different social groups and it is a necessary bonding for economic development. Furthermore Social capital can lead to pulling together of resources for economic development, therefore, the prevalence of different types of social capital are important at different times to different social groups. Adger (2003) argues that collective action requires networks and flow of information between individual groups to be able to influence decision making. These networks acts as assets of individuals and society and can be referred to as social capital.

2.4 Resilience

Adaptability form a core part of resilience. According to Folke et al (2010), it is evident that increasing resilience can be realised by reducing vulnerabilities and increasing adaptive capacity. Resilience can be achieved for every specific risk by reducing sensitivity, exposure and increasing adaptive capacity. These measures can be achieved by intervening into all different dimensions namely: biophysical, economic and social. IPCC (2014) defines resilience as the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation. Miller et al (2010) explains that there is a time dimension to the resilience concept: a system is resilient when it is less vulnerable to shocks across time, and can recover from them. Adger (2000) argues that these external stress and disturbances can be due to environmental, political and social change.

Three aspects are critical to resilience thinking: resilience, adaptability and transformability (Folke, 2010). Transformability can be defined as the capacity to create a completely new system when ecological, economic, or social structures make the existing system unsustainable (Walker

et al., 2004). It is evident that processes of social learning and communication across multiple institutional scales, community reorganization, and adaptive capacity are critical when building general resilience of marginal societies to climate change (Osbahr et al., 2008). The policies developed at national levels can be insensitive to local needs. At times they do not provide the rural poor with access to the assets and services they need to allow them to innovate and adapt to the ways that can increase resilience to climate variability and change. To facilitate climate adaptation actions to deliver resilience, local perspectives and knowledge need to be acknowledged and given due priority in formal planning systems (Sharma et al., 2015). At present, resilience thinking does not give sufficient recognition to the already existing accounts of, for instance, institutional change trajectories, the dynamics of path dependence, the distributional character of institutions, or the fundamental political determinants and drivers of institutional design and diversity (Sjöstedt, 2015).

2.6 Policy Framework for Adaptation and Resilience in Kenya

Kenya has put several measures to mitigate drought and ensure sustainable development. National Climate Change Response Strategy (NCCRS) of 2010 provided evidence of climate impacts on different economic sectors and proposed adaptation and mitigation strategies (Government of Kenya, 2010). The National Climate Change Action Plan (NCCAP) of 2013 (Republic of Kenya, 2013) aims to implement the NCCRS of 2010 strategy and set out actions to enable low carbon climate resilient development. The National Adaptation Plan (NAP) 2015-2030 (Republic of Kenya, 2015) builds on the NCCAP 2013 to establish adaptation priorities and facilitate Kenya's action in reducing vulnerability to climate change. The Climate Change Act 2016 (Republic of Kenya, 2016a) provides a regulatory framework for an enhanced response to climate change, and adopts a mainstreaming approach that includes integration of climate change considerations into development planning, budgeting and implementation in all sectors and at all levels of government. The National Drought Management Authority Act 2016 (Republic of Kenya, 2016b) function it to exercises overall coordination over all matters relating to drought management including implementation of policies and programmes relating to drought management. All these policies are in harmony with Kenya Vision 2030 (Republic of Kenya, 2007) an economic blue print aimed

at making Kenya a newly industrialized middle-income country providing a high quality of life to all its citizens in a clean and secure environment.

These policies demonstrate inertia for Kenya to effectively deliver on the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs), SDG 13, "Take urgent action to combat climate change and its impacts" is a clear recognition that climate change is a reality that cuts across sectors and presents a threat to attaining sustainable development. Kenya ratified the Paris Agreement on Climate Change in December 2016. The Agreement is applicable to all Parties, and aims to strengthen the global response to the threat of climate change and to limit the rise of global temperatures to well below 2°C above pre-industrial levels. The Sendai Framework for Disaster Risk Reduction (2015 – 2030), and which is the successor instrument to the Hyogo Framework for Action - HFA (2005-2015) focuses on building the resilience of nations and communities to disasters. Despite the progress Kenya has made in developing various policies in relation to climate change, the legislative process for policy enactment is long and characterised by political intrigues that often delay the process. There is the need to harmonise the above policies and implement them.

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CHAPTER 3

CONCEPTUAL AND THEORETICAL FRAMEWORK

3.1 Adopting a conceptual framework for the study

This study draws from three broad theoretical approaches: Sustainable Livelihoods Approach (SLA), Gender and Development (GAD) approach and political ecology approach. Thus, a multi-theoretical approach will be adopted to bridge the gaps between gender, pastoralism and climate change adaptation. Each theoretical approach will provide some insight into the topic under discussion. Furthermore, crucial aspects will be highlighted that could very well provide guidelines for policy-makers and implementers concerned about mainstreaming gender in climate change policy documents, projects and programmes.

3.2. Sustainable Livelihoods Approach (SLA)

This study will adopt the SLA, popularised by the United Kingdom Department for International Development (DFID). Livelihood thinking originated and is widely attributed to the work of Robert Chambers in the mid-1980s. He developed this alternative approach because the conventional development concepts did not yield the desired effects and that humankind was additionally facing an enormous population pressure. Chambers developed the idea of "Sustainable Livelihoods" (SL) with the intention to enhance the efficiency of development cooperation. Therefore his concept constitutes the basis for the SLA (Kollmair and Gamper, 2002:3). According to Krantz (2001:17), DFID integrated the approach in its programme for development cooperation from 1997. The adoption of a livelihood approach within DFID resulted with the publication of the 1997 UK Government White Paper on International Development, where it was affirmed that the overriding aim of DFID is the elimination of poverty in poorer countries.

Kollmair and Gamper (2002:4) state that the Sustainable Livelihood Framework (SLF) forms the core of the SLA and serves as an instrument for the investigation of poor people's livelihoods, at the same time visualising the main factors of influence. Livelihood is defined by Chambers and Conway (1992:7) "as comprising the capabilities, assets (stores, resources, claims and access) and activities required for a means of living; a livelihood is sustainable when it can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long-term". The DFID's SLF embraces a holistic concept of livelihood strategies which is based on human capital, physical capital, financial capital, natural capital and social capital deemed as a helpful approach in understanding the livelihoods of the poor (FAO et al., 2008). They are graphically depicted as a pentagon to underline their interconnections and the fact that livelihoods depend on a combination of assets of various kinds and not just from one category (Kratz, 2001). Below is an example of DFID SLA:

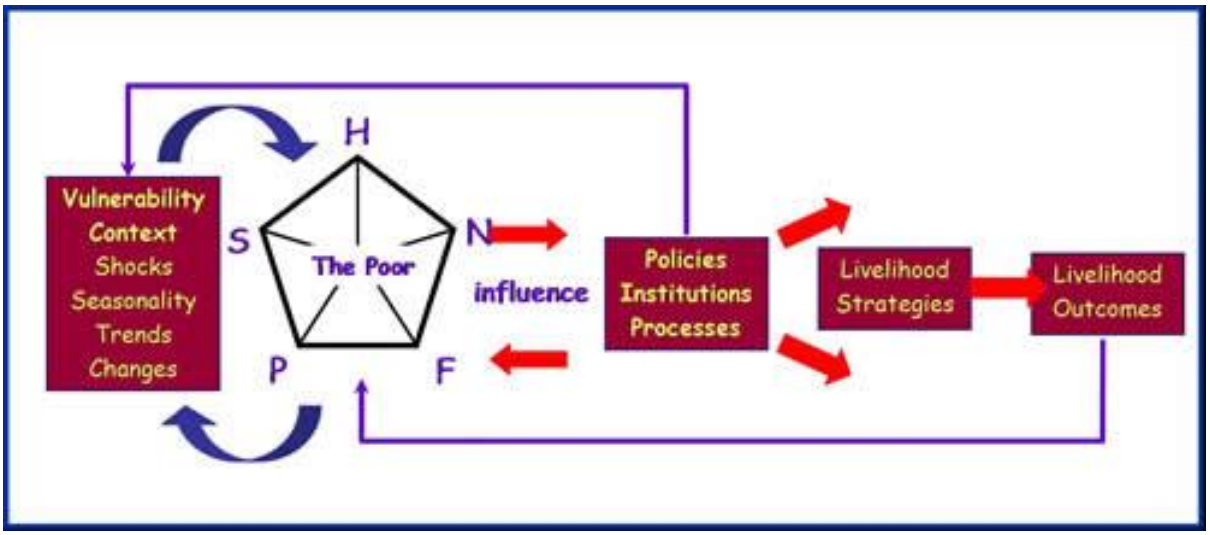

Figure 3.1: Diagrammatic representation of the Sustainable Livelihoods Framework (SLA)
Source: International Food and Agricultural Development (IFAD, undated)

According to Kollmair and Gamper (2002:3), DFID's core concepts of the livelihood approach include:

- *People centred: people rather than the resources they use are the priority concern in the livelihoods approach, because problems associated to development often root in adverse institutional structures impossible to be overcome through simple asset creation.*
- *Holistic: a holistic view is aspired in understanding the stakeholder's livelihoods as a whole, with all its facets. This is not intended to be an exact representation of the way the world is, but rather a manageable model to identify the most pressing constraints faced by people regardless of where these occur.*
- *Dynamic: just as people's livelihoods and the institutions that shape them are highly dynamic, so is the approach in order to learn from changes and help mitigating negative impacts, whilst supporting positive effects.*
- *Building on strengths: a central issue of the approach is the recognition of everyone's inherent potential for his/her removal of constraints and realisation of potentials, therefore contributing to the stakeholder robustness and ability to achieve their own objectives.*
- *Macro-micro links**:** development activity tends to focus at either the macro or the micro level, but the SLA tries to bridge this gap in stressing the links between the two levels. Since people are often affected by decisions at the macro policy level and vice-versa, this relation needs to be considered in order to achieve sustainable development.*
- *Sustainability: a livelihood can be classified as sustainable, when it is resilient in the face of external shocks and stresses, when it is not dependent upon external support, when it is able to maintain the long-term productivity of natural resources and when it does not undermine the livelihood options of others.*

DFID's livelihood approaches have various advantages because they are diverse and flexible, adaptable to many settings. Moreover, the SLF delivers a good tool to structure development research and increase the efficiency of development projects. Within projects or programmes, SLA can be used to sharpen the focus of monitoring and evaluation systems (Kollmair and Gamper, 2002).

FAO et al (2009), SLA through a gender lens can be used to capture the gender inequalities in four central defining areas:

- The sustainable livelihoods depend on the access to and control over assets. Gender differences in access to and control over assets dictate power asymmetries and negotiating power between women and men within the household and community.
- Accessing agricultural markets is vital source of income, assets, and factors of production and consumption to sustain the needs of the household and welfare of the family. Agricultural markets include product, input, labour (in agriculture and agribusiness), financial, land, and water markets. In many areas, participation in lucrative markets is often dependent on access to and control of capital, mobility, and socio-cultural factors, where potential gender asymmetries persist.
- Risk and vulnerability: Risks include natural hazard risk, human conflict, human and animal disease epidemics, food insecurity, agro-ecological and geographic factors such as water variability and drought proneness, and market and price risks (including trade shocks). Vulnerability to these risks is a outcome of poverty and socio-economic position, influenced by social dimensions, for example, age, class, gender income levels, asset ownership, and ethnicity.
- Knowledge, information and organisation: Access to and engagement in organisations affect access to assets and markets as well as risk and vulnerability and, thus, impact sustainable livelihoods. Gender asymmetries in organisation and information often enhances gender inequalities.

However, DFID's SLA have some weaknesses. Hamilton-Peach and Townsley (2014) have criticised DFID's SLF arguing that the poor tend to be easily lost within the SLF pentagon and the attention tends to be focused more on the assets and other factors than on the poor as people. Due to lack of salience given to the poor at the centre of the framework, important elements of their livelihoods, such as their aspirations for change and the opportunities that they perceive for change, are left implicit when they often constitute a key element for identifying areas of intervention and entry points for facilitating change. Therefore, IFAD's SLF attempts to address this by placing the poor literally at the centre of the diagram and arranging the other elements in the framework in relationship to them (Hamilton-Peach and Townsley, 2014)

SLA does not represent a magical tool able to eliminate problems of poverty with a single design, nor is it a complete new idea that will be revolutionary for development research and cooperation. Also the claim that SLA is holistic leads to a consideration of very many aspects that can be overwhelming (Kollmair and Gamper, 2002). Livelihoods analysis is resource intensive and is demanding in terms of analytical capacity and information requirements (Kollmair and Gamper, 2002). Moreover, problems may arise with the analysis of the livelihood assets, for example, the difficulties to measure and to compare social capital (Kollmair et al, 2000). For those reasons, it is imperative that issues under examination are carefully identified to be manageable. Thus, the limitations can be avoided in this study by having key issues delineated in the questionnaire as well as the key informant interviews and focus group discussions schedules, which will be discussed later.

3.3. Gender and Development (GAD) Approach

Women and men face their social, economic and environmental realities in different ways. How they participate is also different and is closely related to age, socio-economic class and culture. It is, therefore, important to incorporate a gender approach in the analyses of climate change to help understand how the identities of women and men determine different vulnerabilities and capacities to deal with climate change. Furthermore, a gender approach can also be helpful in designing and implementing policies, programmes and projects that lead to greater equity and equality. Especially, it may contribute to building more capacity to adapt to and mitigate against climate change impacts, because it gives a clearer and more complete view of the relations people have built with ecosystems (UNDP, 2009).

According to Kyomuhendo and Muhanguzi (2008), women in development (WID) and gender and development (GAD) are sometimes used interchangeably, but there are some basic differences. The WID approach was developed in the 1970s, with the objective of designing actions and policies to integrate women fully into development. The GAD approach was developed in the 1980s with the objective of removing disparities in social, economic and political equality between women and men as a pre-condition for achieving people-centred development. Both approaches

are still in use and are applicable in different situations. Table 3.1 describes the key characteristics and differences of the WID and GAD approaches.

Table 3.1: Key characteristics and differences of the WID and GAD approaches

	WID	GAD
Approach	An approach which views women's lack of participation as the problem	An approach to people-centred development
Focus	Women	Relations between women and men
Problem	The exclusion of women (half of the productive resource) from the development process	Unequal relations (between women and men, rich and poor) that prevent equitable development and women's full participation
Goal	More efficient, effective Development	Equitable, sustainable development with women and men sharing decision-making and power

Source: Kyomuhendo and Muhanguzi (2008)

Gender and development issues have been addressed differently depending on the discourses and context of development. Divergent perspectives are greatly influenced by the way in which gender concerns and development practices are analysed and justified.

Kyomuhendo and Muhanguzi (2008) argue that there are several approaches that have been used to address the gender needs of women. They include welfare approach, equity approach or the original WID approach which emerged during 1976 to 1985 (UN Women's Decade), anti-poverty approach which is the second WID approach, a toned-down version of equity, adopted from the 1970s onwards in the context of basic needs approaches to development, the fourth is the efficiency approach, the third and now predominant WID approach, adopted particularly since the 1980s debt crisis and the fifth is the empowerment approach, the most recent approach, articulated by third world women.

At the level of development bodies, the concept of empowerment was adopted after the Beijing Conference in 1995 (Kabeer, 1994). Its purpose is to empower women through greater self-reliance. Women's subordination is expressed not only in terms of male oppression but also in terms of colonial and neo-colonial oppression. It recognises the triple role and seeks to meet strategic gender needs indirectly through the bottom-up mobilisation of practical gender needs (Kyomuhendo and Muhanguzi, 2008). However, the empowerment approach as used by development bodies and the offered quantitative indicators tend to reduce its scope to women's ability to take individual responsibility for their own. The indicators do not consider changes in economic and social structures, those that refer to collective empowerment, linked to social change (Kabeer, 1994).

According to Razavi and Miller (1995), the impact of the early WID movement can be seen on two fronts. Firstly, in terms of the discussions and research that it generated; and secondly, in the impetus, it gave to the growth of institutional machinery within development agencies and governments, their mandate is to integrate women into development. However, by the late 1970s, some of those working in the field of development were questioning the adequacy of focusing on women in isolation, which seemed to be a dominant feature of the WID approach.

The GAD approach begun in the 1980s as a result of the WID's approach shortcomings (UNDP, 2001:8). The GAD approach has many advantages. According to Reeves and Baden (2000), the GAD approach generally aims to meet both women's practical gender needs and more strategic gender needs, by challenging existing divisions of labour or power relations. Whitehead (1978) states that no study of women and development can start from the viewpoint that the problem is women, but rather women and men, and more specifically the relationship between them. Therefore, GAD focuses on the whole social, economic and political system, and the impact of policies and development intervention among different socioeconomic groups of both women and men.

However, the GAD approach has some challenges. To a certain extent the GAD approach has brought about real change, but in practice, some 'GAD' interventions may continue WID's one-

sided focus on women in isolation from their context cycle (Mayoux, 1995, cited in Akerkar, 2001). Several gender analysis frameworks have been developed as the tools of GAD, with the aim of enabling development planners to systematically understand gender issues in their local contexts and find ways of addressing them at every stage of the project cycle (Mayoux, 1995, cited in Akerkar, 2001). But, translating these gender analysis frameworks into practical tools to enable gender redistributive responses and strategies is easier said than done. Chant (2000) and Cornwall and White (2000, cited in Cornwall 2003) argue that the GAD approach is often rather top-down, superimposing particularly culturally specific frames of reference and barely allowing for broader participation in agenda setting or implementation. This is done through a simplified worldview and is thus projected onto diverse development situations, whether by superimposing essentialised images of ‘‘woman-as-victim’’ and ‘‘man-as-problem’’ or ignoring a lot of marginal men.

This study examines both men and women’s experiences, thus not falling into the trap of assuming that differences exist and they can be taken for granted. This is a serious limitation of studies that focus on women without incorporating the views, concerns and experiences of men. Many gender studies tend to focus almost exclusively on women in terms of the empirical data collected.

3.4. Political ecology approach

Political ecology is defined as an approach that combines the concerns of ecology and political economy to represent an ever-changing dynamic tension between ecological and human change, and between diverse groups within society at scales from the local individual to the Earth as a whole (Peterson, 2000). Political economy and, in recent times, political ecology approaches to vulnerability have in some sense evolved from and often in response to risk hazard assessments of climate impacts and disasters (Blaikie *et al*., 1994).

The political economy approach to vulnerability highlights the socio-political, cultural, and economic factors that together explain differential exposure to hazards, differential impacts, and, most importantly, differential capacities to recuperate from past impacts and/or to cope and adapt to future threats (Eakin and Luers, 2006). According to Sen (1990), concepts of entitlements and

capabilities (central concerns of food security, livelihood security and contemporary development theory) have served as the cornerstones to much of this work and have provided a theoretical bridge to research on poverty alleviation and food security. Bohle et al (1994) argue that vulnerability could be conceived as a "space" delimited by political economy, entitlements and empowerment.

Political ecology research explores vulnerability with respect to broad processes of institutional and environmental change. It shares the emphasis of political economy perspectives on the importance of scale, politics, and economic and social processes in explanations of human-environmental interactions and outcomes. Whereas political economic analyses of vulnerability tend to downplay the explanatory power of physical processes, political ecologists argue for a more balanced consideration of both biophysical and social dynamics, with explicit attention to the representation of those dynamics in policy and decision- making processes (Liverman, 2001; Adger, 2001).

Both political economy and political ecology approaches focus on the political dimensions of vulnerability, highlighting social inequities and points of conflict within societies. Their assessments therefore tend to be more sensitive to issues of power than indigenous risk hazard approaches which is useful when focusing on gender aspects. They also tend to focus on specific places within a broader context of historical, political and biophysical conditions of hazards and risks. According to Eakin and Luers (2006), in the absence of a clearly defined vulnerability outcome, some research conducted within the political ecology framework has produced generic descriptions of inequities in resource distribution and opportunity without demonstrating ties to differential susceptibility to harm. This study is cognisant of this limitation and focuses on unpacking differences at the local level by adopting the case study approach.

This study is cognisant of this limitation and focuses on unpacking differences at the local level by adopting the case study approach. Figure 3.2 illustrates the integrated, multi-conceptual framework used in this study.

3.5. Multi-conceptual theoretical framework adopted for the study

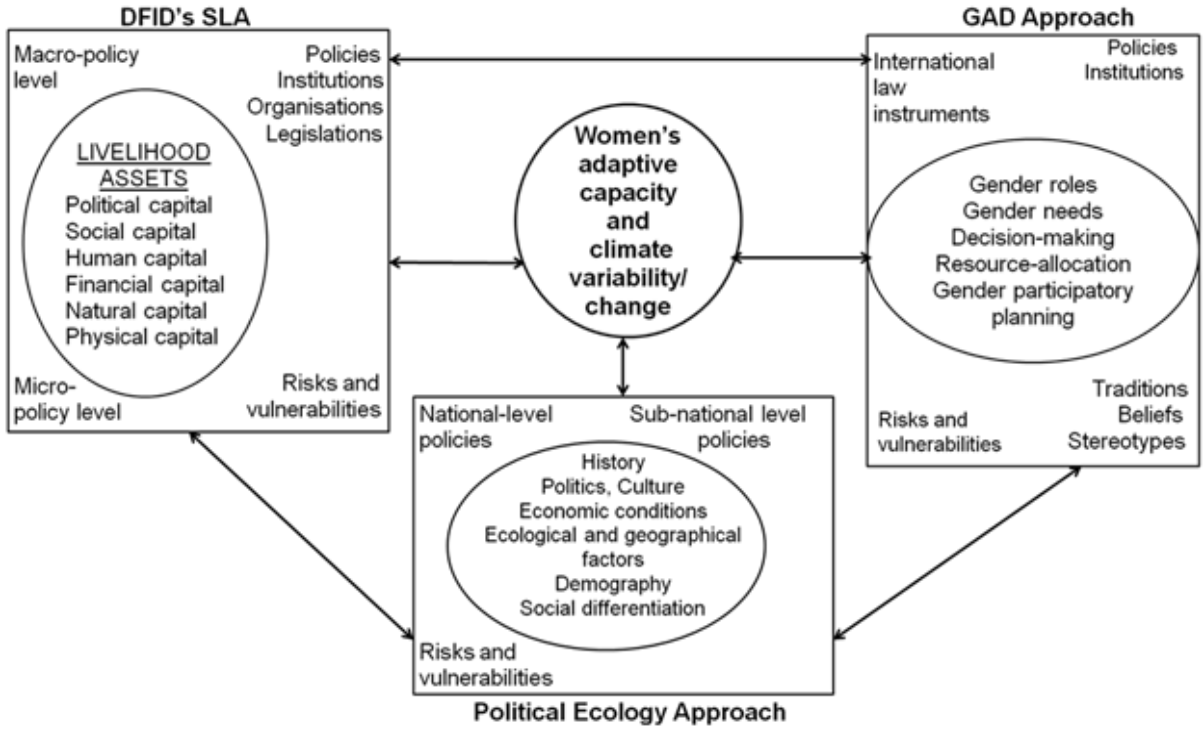

Figure 3.2: Multi-conceptual theoretical framework adopted

There are five types of assets that have been identified for all people need in order to make a living. (*DFID's SL framework*-sighted in L Krantz, 2001) These assets are:

Natural capital: Land and produce, forest products, wild foods & fibres, wildlife, water & aquatic resources, biodiversity and environmental services

Financial capital – Savings, remittances, pensions, wages, credit/debit –formal. Informal, NGOs, which are essential for the pursuit of any livelihood strategy.

Human capital – Education, knowledge and skills, knowledge, good health, physical capability to work and capability to adopt

Social capital – the social resources (networks and connections, patronage, neighbourhoods, kinship, Relations of trust and mutual support, formal and informal groups, common rules and sanctions, collective representation, mechanisms for participation in decision-making and

leadership) upon which people draw when pursuing different livelihood strategies requiring coordinated actions.

Physical Capital: livestock, seeds, fertilizer, indigenous technology, irrigation pumps, equipment, houses and vehicles. *Infrastructure* (transport - roads, vehicles, secure shelter & buildings water supply & sanitation, energy).

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CHAPTER 4

METHODS AND MATERIALS

4.1 Introduction

Research methodology forms the core part of any research activity. According to Welman (2005), research methodology is useful because it explains the reasoning behind research methods and techniques. “Research methods have been defined as tools to be used for answering specific questions and for solving different scientific or practical problems” (Enderud, 1984 cited in Mikkelsen, 1995:223). This chapter, therefore, outlines the scientific methods which will be applied in this research. This chapter will discuss the assumptions of the study, case study areas, research methods, data collection instruments (both secondary data and primary data), data analysis procedure, sampling procedure, meteorological data and field experience.

4.2 Background of the Study Location

Turkana County in northern Kenya borders Ethiopia, South Sudan to the north and Uganda to the west. It is universally renowned as the cradle of mankind in Turkana County and the Omo Valley in southern Ethiopia to northeast, archaeologists have found the oldest ancestors to modern humans, dating back more than one million years (Human Rights Watch, 2015)..

The two study sites are Katilu (agro-pastoralist zone) and Namoruputh (primary pastoral zone) in Turkana County in North Western Kenya. Katilu location is in Katilu Division in Turkana South District. It is an irrigation scheme along the Turkwel River. Namoruputh location is in Loima division in Turkana Central District. Namoruputh is not situated next to any river or lake. Turkana covers a total area of 77,000 km^2. Pastoralism is the leading main source of livelihood in Turkana at 64% and crop farming at 26.6% (GoK 2008a). The livestock kept in the district include: camels,

cattle, donkeys, goats, sheep and poultry. The major crops grown in the district include: sorghum, maize, green grams and cowpeas. Other horticultural crops are mangoes, kales, spinach, water melons, banana and tomatoes.

Turkana County is experiencing rapid population growth. Turkana County government states that the current population growth rate is 6.4% per annum, with an estimated 1,256,152 people in the year 2015 (Human Rights Watch, 2015). Turkana County is administratively divided into 6 sub-counties, 17 divisions, 56 locations that are further sub-divided into 156 sub-locations. The Table 1 below shows administrative units by division.

Table 4.1: Administrative Units by Division

District	Division	Area (km^2)	No. of Locations	No. of Sub-locations
Turkana South	Lokichar	4536.6	3	7
	Kainuk	1684.1	2	6
	Katilu	1143.1	1	4
Turkana East	Lomelo	4215.9	5	9
	Lokori	7091.2	4	11
Turkana North	Kaaling	8225.8	4	13
	Lapur	2436	3	7
	Lokitaung	1857.8	4	11
	Kibish	5633.2	3	7
Turkana West	Oropoi	5534.8	3	11
	Kakuma	3466.5	3	10
	Lokichoggio	8264.8	6	13
Turkana Central	Kerio	2704.2	3	8
	Kalokol	2139.9	3	8
	Central	831.8	2	5
Loima	Turkwel	5485.8	4	14
	Loima	3429.0	3	12
Total		**68,680.3**	**56**	**156**

4.2.1 Climatic Characteristics of the Study Areas

Turkana County was selected for the study on the basis that it has been subjected to historical and recurrent droughts that have left the regions vulnerable. Turkana like other pastoralist areas in East African countries tend to have the highest incidence of poverty and the least access to basic services compared with non-pastoralist areas. Due to recurrent droughts, the Turkana people have long struggled to access sufficient food and water. Historic marginalization and their livelihood in a fragile ecosystem make them especially vulnerable to the effects of any changes in the environment and climate. Turkana County is in arid and semi-arid land (ASAL) area where managing short-term climatic fluctuations as well as adapting to long-term changes is critical to sustaining livelihoods. Turkana situation illustrates how climate change could aggravate existing obstacles to the realization of basic human rights and challenge the ability of governments to protect and fulfil those rights enshrined in their constitution.

Turkana County experiences long rainfall which are usually erratic and unreliable between the months of April and July. While short rains are experienced between the months of October and November. The rainfall ranges 52mm and 480mm annually with mean of 200mm. The temperature ranges between 20oC and 30.5oC. Turkana County has a poverty index of 94%, and is one of the poorest regions in Kenya (Turkana County Integrated Development Plan – CIDP, 2013). According to Turkana Annual Development Plan (2015) states that despite the high level of poverty in Turkana, the proportion of Kenya's population living below the poverty line declined from 52.6 percent in 1997 to 45.9 percent in 2005/06. The population of the food poor in Turkana County is at 72.7%. The multiple tragedies such as postelection violence, severe droughts and recession during the years 2008, 2009 and 2011 have led to increase the poverty levels. The two study sites of Katilu and Namoruputh were selected to demonstrate the varied livelihood activities within the ASAL region.

4.3. Study Locations: Katilu and Namoruputh

This study took place in Namoruputh in Loima division in Turkana Central and Katilu in Katilu division in Turkana South in Turkana County in Rift Valley province. Below is a map of case study areas:

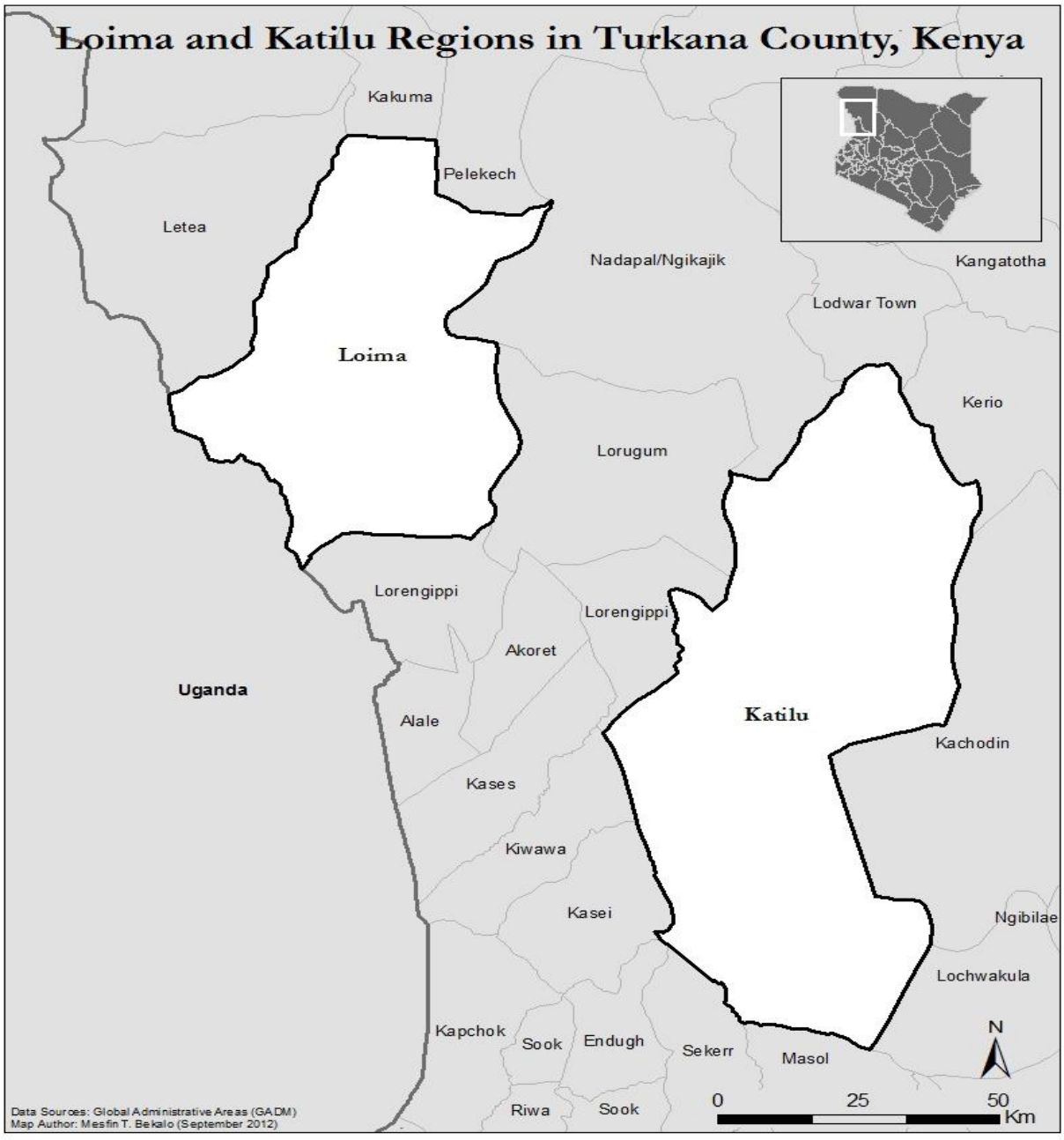

Figure 4.1: Namoruputh (Loima Division) and Katilu (Katilu Division) in Turkana

4.3.1 Katilu Location

Turkana South district total area is approximately 18, 621.5. Katilu location has a total area of 1,212.1. It lies 37° 27' East and has an altitude of 3,979. The district receives an average of 120-500mm per annum of rainfall. According population census in 1999, Katilu division population is 12,548, the population projections for 2008 and 2012 are 17,574 and 19,427 respectively (GoK 2008). The only 30% of arable land in the district is located around the Turkwel and Kerio rivers that cross the district. The land dedicated to irrigation in the district is 1,100ha which provides livelihood to approximately 5,400 households.

Turkana South district is made up of 5 divisions, 15 locations which are further divided into 35 sub-locations. The divisions in Turkana South include: Kainuk, Katilu, Lokichar, Lokori and Lomelo (GoK 2008c). Katilu is the only location in Katilu division. Below is a map of Katilu location:

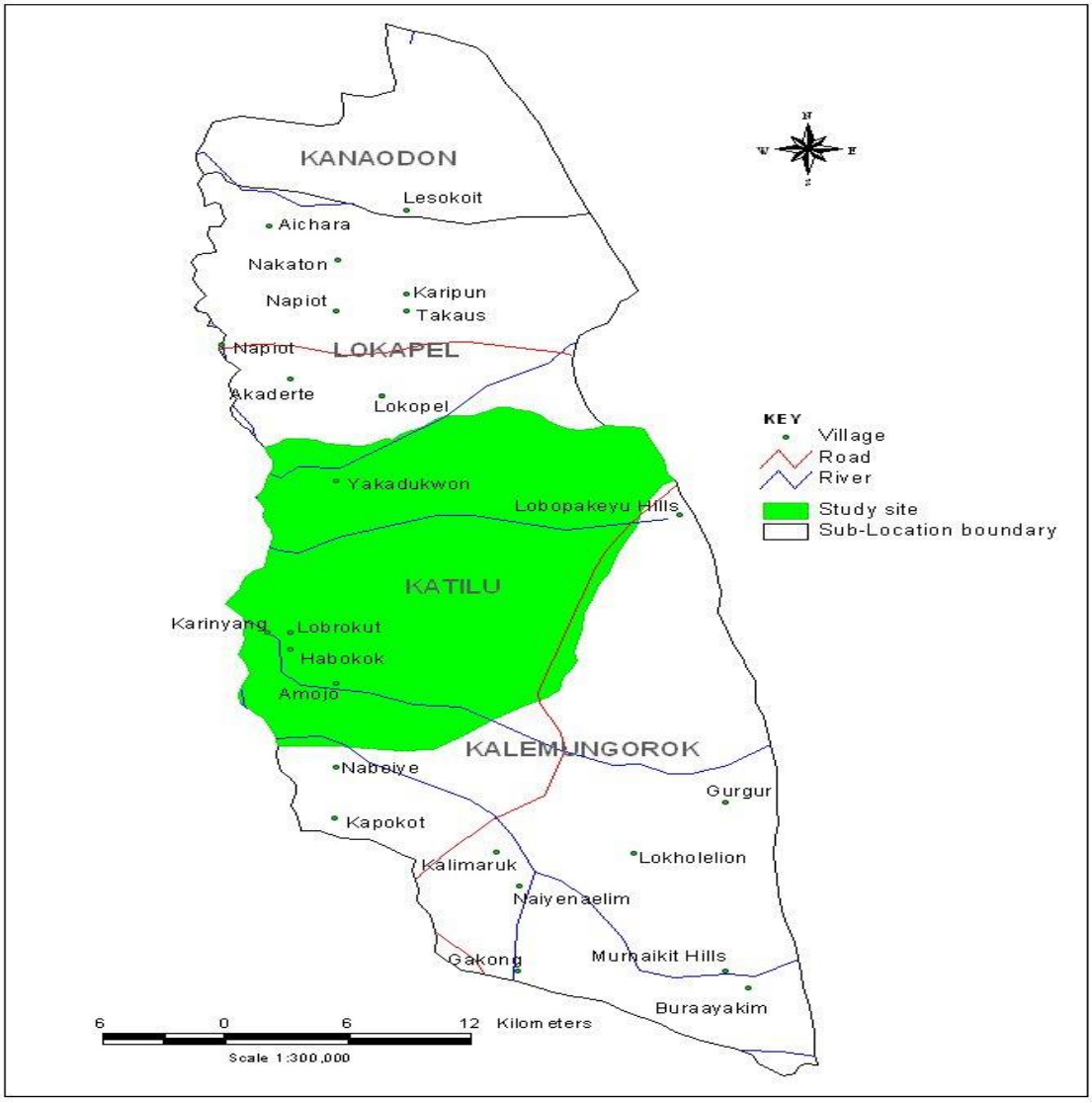

Figure 4.2: Katilu Location

4.3.2 Namoruputh Location

Namoruputh location is in Loima division in Turkana Central district. Turkana Central district is made up of 5 divisions: Central, Turkwel, Loima , Kalokol and Kerio. The divisions are further

divided into 15 locations and 47 sub-locations. Loima division is divided into 3 locations. Loima covers an area of 3,475.4 km^2. According to population census in 1999, Loima has a population of 33, 979, population projection for 2008 and 2012 are 47, 590 and 52, 605 (GoK 2008b).

The altitude of mountains of Loima and Lorengippi ranges between 1500 and 1800 meters above the sea level. The temperature in Turkana Central ranges between 20^0C and 38ºC, the mean temperature is 30ºC. The short and long rains range between 52mm and 480mm annually, with the mean of 200mm. The district latitude lies between 00 45' and 10 07 South, and longitude 360^0 and 370^0 27' East (GoK 2008b). Pastoralism is the main economic activity in Namoruputh.

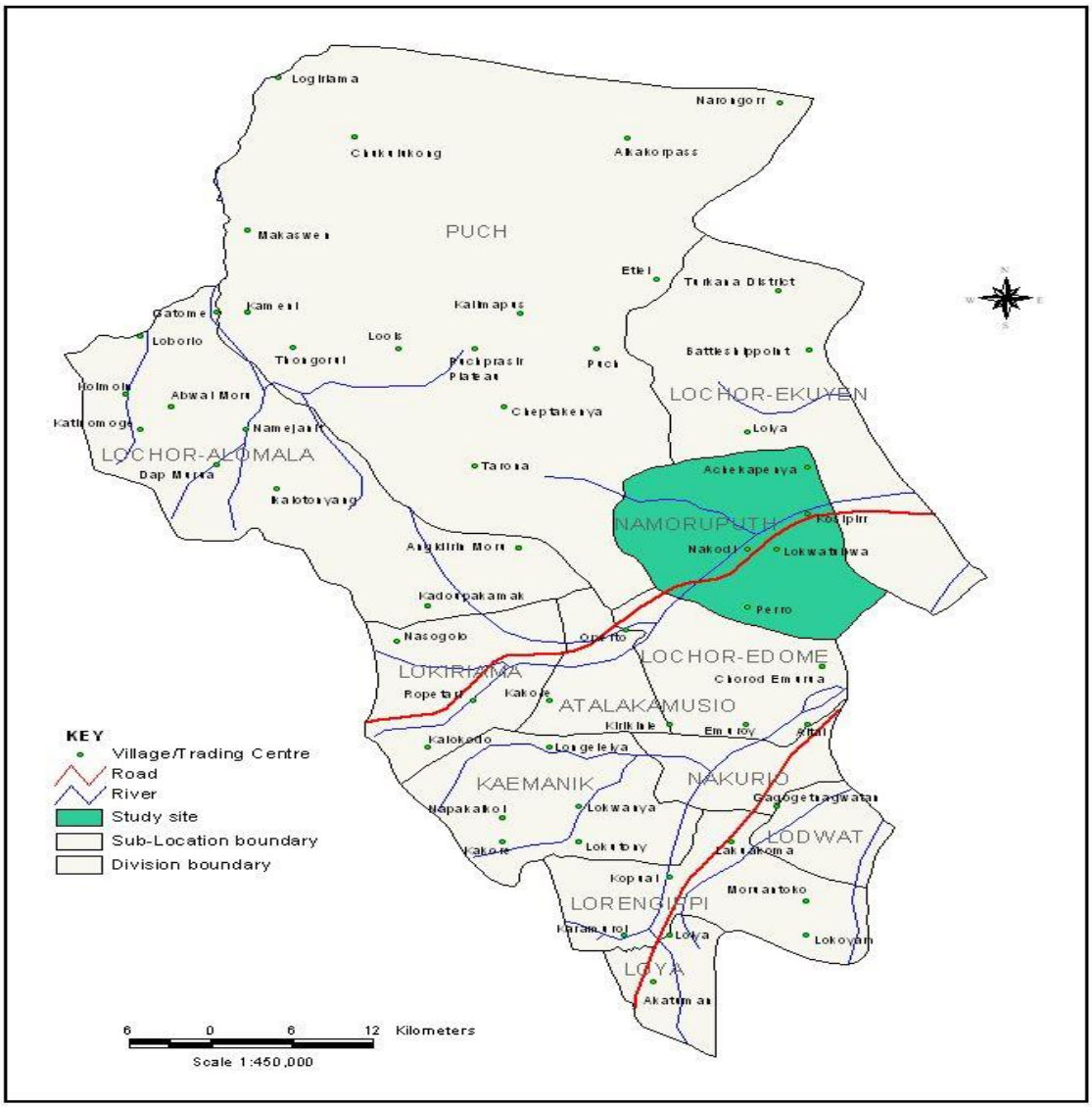

Figure 4.3: Namoruputh Location

4.4. Sampling Procedure

4.4.1 Determination of Sample Sizes in Turkana

The determination of the sample size was based on the demographic data and the clustering of households in the settlement areas using statistics from the Kenya Bureau of Statistics (KBS), Turkana County Government and Arid Lands Resource Management Project (ALRMP) in Turkana and from the public administration officers (Chiefs). The data sample size is usually determined by the cost, bigger sample size means higher cost but more accurate results. The higher cost of bigger sample size is in relation to the staff, time, funds and the availability of transport Nichols (1991).

The unit of analysis was the individual household, with every third household being selected for data collection. The target respondents of the closed/structured survey questionnaires were based on gender (either a woman or a man household head). Every third household was selected for data collection. The selection of the study sites in Turkana was based on the following:

- variability of socio-economic activities/types of livelihoods (that is, primary pastoralists and agro-pastoralists)
- the distance of case study areas from each other (to provide ecological, physical and livelihood differences)
- security/access of the study site (this is because of frequent inter-ethnic and cross-border conflicts related to access to natural resources like water and pasture).

The total populations of the study sites were as follows: Namoruputh – 2 075; Katilu – 5 509. The numbers of households in the two study areas were: Namoruputh – 346 and Katilu – 918 respectively. To enhance statistical accuracy during data analysis, 30% of the households were sampled, giving the following sample sizes: Namoruputh – 104 households; Katilu – 275 households. Thus, a total of 379 households were interviewed.

Table 4.2: Sample Sizes for Turkana

Study Sites	Total Population	Total Number of Households	Number of Households Sampled (30% of households samples	Total Number of Women Interviewed	Total Number of Men Interviewed
Namoruputh	2,073	346	104	74	30
Katilu	5,509	918	275	204	78
Total	**7,582**	**1,264**	**379**	**278**	**108**

4.4.2 Stratified random sampling

The stratified random sampling method was adopted for the study. In stratified random sampling "the population is composed of various clearly recognisable, non-overlapping sub-populations (called strata or in singular stratum) that differs from one another in terms of specific variables" (Welman et al., 2005:61). The variation in different groups may be based on single variable like gender and age (Nichols, 1991). There are many advantages of using a stratified random sample. In a random sample from a normal population that is stratified in terms of gender, the probability of a sample consisting of members of one gender only is zero. This is irrespective of the sample size because sample representativeness has been built into the sampling strategy right from the very beginning. Secondly, in order to ensure that important strata are represented in the sample, stratified random sampling requires a smaller sample which requires less time and money than simple random sampling (Welman et al., 2005). However, there are disadvantages of stratified sampling. In a stratified random sample one need enough information about the complete target population to be able to divide it into sub-groups. There is need to use weights when results for different sub-groups are combined (Nichols, 1991).

4.5 Research Methods

This study used both quantitative and qualitative research methodologies. Triangulation was used in this study. Mathison (1988) argues that good research practice obligates the researcher to triangulate, that is, to use multiple methods and data sources to enhance the validity of research findings. FAO et al. (2009) supports this argument by stating that a powerful and multifaceted case can be built, if qualitative data are used to triangulate quantitative results. The use multiple methods and sources of data in undertaking of a study is essential in order to withstand critique by colleagues (Mathison, 1988). Triangulation is important to ensure that cultural biases do not affect the results. Lastly, triangulation makes it possible to reduce the sample size and at the same time increase the reliability and validity of the data (FAO et al., 2009). Figure 3 below shows all the research methods to be used in this study.

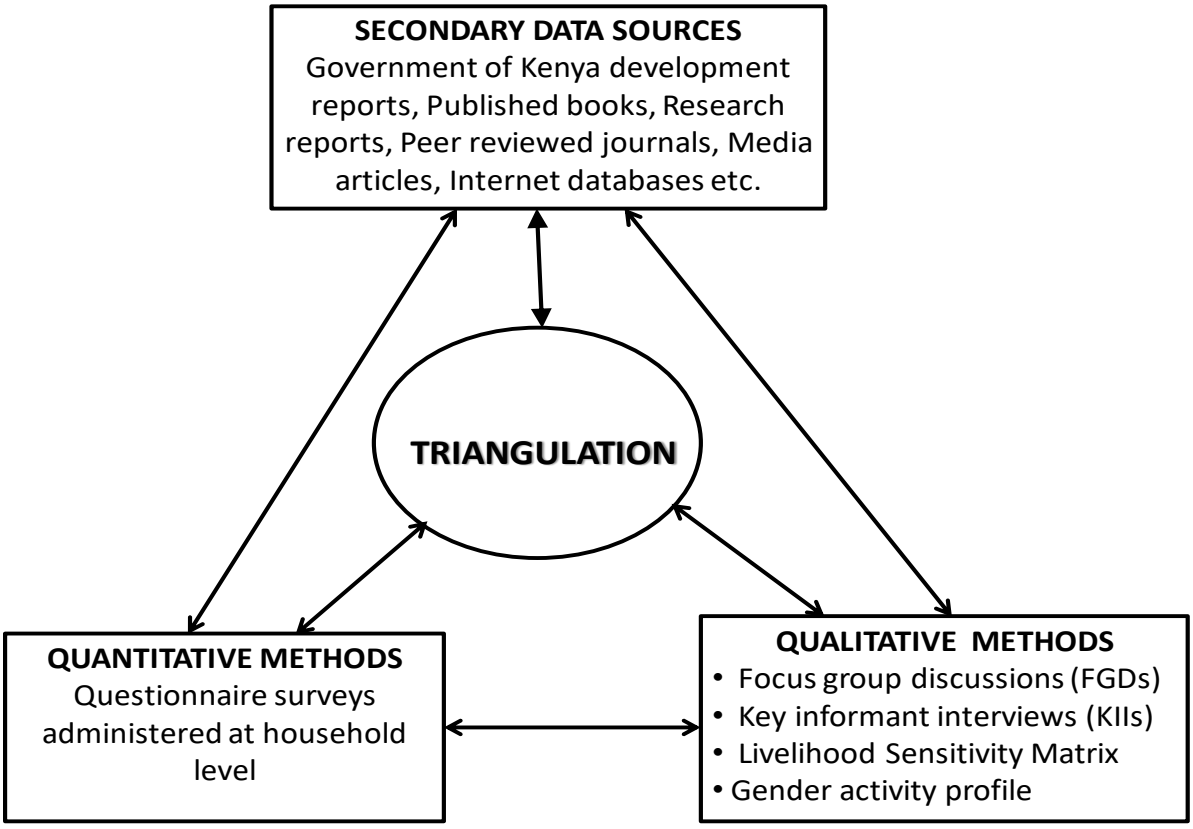

Figure 4.4: Multiple Sources of Information and Methods for the Study

4.5.1 Literature Review

This study involved reviewing of secondary data. Secondary data was collected through an extensive literature review of library books, maps, journal articles, general media, census data, meeting minutes, conferences and seminar proceedings, project proposals, progress reports, and evaluations of past and ongoing climate change projects in the area and websites. This will provide relevant data that has been collected, analyzed and discussed by other researchers in the field.

4.5.2 Questionnaires

Questionnaires are useful tools for collecting data when information is sought from a large population over a relatively large geographical area. It is useful if the information sought is not complex but evidence based. Questionnaires are important when you want to study particular

groups, or people in a particular problem area because you want to generalise about them, to make comparisons with other groups or use their responses and comparisons with other groups or use their responses and comparisons for development (Hinds, 2000). The questions in the questionnaire will either be open-ended questions or closed or pre-coded questions. Open-ended questions allow the respondent to insert her or his views, ideas or suggestions about the question posed. However, closed or pre-coded questions require that the respondent chooses one or more from the pre-defined category of 'answers' to the question (Hinds, 2000).

This study involved the administration of open and closed questionnaire interviews to retrieve data (based on individual perceptions and practices) pertaining to climate variability and change in the sampled communities, in both primary pastoralists livelihood zones and agro-pastoralists livelihood zones, in Turkana, north-western Kenya. The survey questionnaire for the quantitative component of the study (see Appendix 1) included socio-demographic information (age, gender, place of birth, level of education, religion, occupation and marital status). Other questions included: the type of household (for example, female or male-headed household), sources of information by gender, perceptions on climate risks and their effects, economic activities/income by gender, ownership of assets by gender, participation in decision making by gender, gender roles, access to structural infrastructure (i.e. market, health centers, schools..), support from the role of the government, international institutions and local institutions in adapting to climate variability and change, and various existing adaptation strategies by gender.

4.5.3 Focus Group Discussions (FGDs)

FGDs provide in-depth understanding of certain information obtained using closed/structured survey questionnaires. Kreuger (2014) defines a focus group as a "carefully planned discussion designed to obtain perceptions in a defined area of interest in a permissive, non-threatening environment". FGDs have various advantages, they provide sources of information that can be obtained rapidly and at a low cost. It can be carried out within a wide range of settings and a vast range of respondents can be selected (Welman, 2005). Secondly, the researcher communicates directly with the respondents, she or he can easily clarify some aspects of the questions put to the respondents. It also gives the researcher the chance to ask the respondents to elaborate on their

answers (Stewart and Shamdasani, 1990). Thirdly, FGDs enable the participants in the groups to discuss their opinions and experiences in such a way that a consensus of opinion regarding research problems can be reached. FGD has its disadvantages in comparison to an individual in-depth interview in that it sometimes inhibits the responses of participants. Some respondents are afraid to express themselves freely because they are intimidated by the presence of other respondents in the group (Welman, 2005).

The FGDs were homogenous (made up of separate women only groups and men only groups) with between 8-12 participants. The selection of participants to FGDs was based on gender of household head, age and livelihood activities. A total of 4 FGDs (2 in Katilu and 2 in Namoruputh (see Appendix 2 - FGDs interview guide).

Purposive and snowball sampling

This study used both purposive and snowball sampling to identify the participants for the FGDs. Purposive sampling involves judgment sampling and was the most significant type of non-probability sampling (Bernard, 2012). The researcher relied on their experience, resourcefulness and earlier research findings to purposely obtain units of analysis so that the sample obtained may be regarded as being representative of the relevant population (Welman, 2005). Meanwhile snowball sampling can be referred to as chain sampling, it can be useful for smaller units (Nichols, 1991). Snowball involves identifying few individuals from the population, who intern invites other people through their connections from the same population for inclusion in the sample. The process may continue when the invited people identify other relevant participants for the sample, the process is then like a rolling snowball (Welman, 2005).

4.5.4 Key Informant Interviews (KIIs)

Key informant interviews aim to obtain special knowledge in a given topic. This can be done by collecting valuable data from a few members of the community who are particularly knowledgeable about certain matters (Nichols, 1991). Key informant interview (KII) has various advantages in that it is flexible, can be carried out quickly, brings out emerging ideas, respond to

individual differences and situational changes. KII can provide in-depth information if trustful relationships are established with informants and it is inexpensive method of gathering data (Mikkelsen, 1995). The limitation of KIIs is that lack of acquaintance or confidence among interviewers may cause distortions in information. Furthermore, KII is liable to 'interviewer bias, inaccurate or distorted perceptions and interpretation or preconceived ideas or conceptions on the part of the interviewer. Purposive and snowball sampling will be used to identify key informants for this study.

Key informant interviews were conducted, at least 10 people were interviewed. They were composed of people from the Government ministries based in Turkana, NGOs, FBOs and members of the local communities. Both purposive and snowball sampling were used.

4.5.5 Gender Activity Profile

Reeves and Baden (2000:2) define gender analysis as "the systematic gathering and examination of information on gender differences and social relations in order to identify, understand and redress inequities based on gender." Moreover, Kyomuhendo and Muhanguzi (2008) state that fundamental to this process is the availability of sex-disaggregated data. This study applied the gender activity profile (Activity, access and control profile) in order to understand different gender roles, access to resources and the decision making.

4.5.6 Meteorological Data

Climate data used in this study includes meteorological data from the Kenya Metrological on temperature and precipitation patterns from 1960 to 2009; and climate scenarios of temperature and rainfall for the period of 2020-2040. The climate data were analysed together with the quantitative and qualitative data collected to provide scientific evidence of climate variability and change.

4.5.7. Field Experience

Turkana is a marginalised region in Kenya. It has poor road infrastructure and is also prone to conflict both internally from the neighbouring communities like the Pokots and Samburu in Kenya

and externally from the Karamajongs of Uganda and the Toposas from South Sudan. The first visit to Turkana by road took at least 16 hours from Nairobi to Kitale and then from Kitale to Lodwar the next day. Mid-way through the journey between Kitale and Lodwar there was need to get a police escort because of the insecurity in the region. Accessing the field sites (Katilu and Namoruputh) is still very difficult as there are no tarmac feeder roads leading to these locations. The Chief's offices (local government administrator) in both Katilu and Namoruputh were very instrumental. They provided an entry point into the community.

On the last visit to Turkana in February 2015, I used Fly540 jet, a commercial flight, with daily flights from Nairobi to Lodwar. The flight duration between Nairobi and Lodwar is 2 hours. This is a new progress on Nairobi - Lodwar route in the last 5 years, before then there were no commercial flights from Nairobi to Turkana. Recently oil deposits have been discovered in Turkana, and the oil refining processes are underway. There is an infrastructure project underway to construct a highway road from Lamu (coastal town) to Turkana then into South Sudan, and the new state of South Sudan which boarders Turkana will lead to economic development in this region. All these provide transformational change and opportunities for the Turkana County.

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CHAPTER 5

GENDER DIFFERENCES IN PERCEPTIONS OF VULNERABILITY TO CLIMATE VARIABILITY IN PASTORAL RANGELANDS OF KENYA[1]

ABSTRACT

This study evaluates the differences in women and men's perceptions on vulnerability to climate variability in pastoral rangelands of Kenya. The Statistical Package for the Social Sciences (SPSS) was used to analyse data for the quantitative part of the study. The various themes from focus group discussions and in-depth interviews were discussed and contents analysed. The participants of the study included pastoralists, officials from the government, faith-based organizations and non-governmental organizations. This paper draws from political ecology approach.

Particular interesting findings from this study are that all participants surveyed have witnessed a change in weather in the last 10 years. At least 94% and 98% of the participants interviewed in Katilu and Loima respectively felt that drought is one of the factors which has contributed to changes in vegetation in the last 10 years. At least 12.1% and 10.6% of the participants in Katilu and Loima respectively said that floods have led to changes in the livestock over the last 10 years. At least 12.9% and 0.96% of the participants in Katilu and Loima respectively said that diseases have led to changes in the livestock over the last 10 years.

[1] ***Submitted to: Submitted Paper to Journal of Arid Land, (Springer Heidelberg)***

By **Nancy Omolo**

School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Scottsville, Pietermaritzburg, South Africa

Paramu Mafongoya

School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Scottsville, Pietermaritzburg, South Africa

Though women still play a low role on decision making in relation to resource use and allocation at family level at 7.8% as compared to men at 41.2%. However, the level of consultation between the woman and the men at the family level is very high at 50%.

Besides climate variability and change pastoralism faces political marginalization and decrease pastureland. Vulnerability is influenced by age, gender, disability, marital status and socio-economic status. Elderly women are considered to be the most vulnerable to climate variability at 27/% because they are the poorest in the community, followed by elderly men at 25%, the disabled at 24.7%, female-headed households at 13.7%, married women at 5%, men at 3.6% and youth at 1.8%. Only 27% of men and 21% of women in both Katilu and Loima are able to read and write. There is a significant association between gender and estimate income per month (p=0.001). It is evident that issues related to climate change are managed at the household level rather than at the individual level.

Keywords: *Gender, Perceptions, Climate Variability, Vulnerability and Pastoralist*

5.1 Introduction

It has been predicted that climate change will impose new stresses on both natural and socio-economic systems, and several assessments have concluded that Africa is most vulnerable and will suffer the most from the impacts of climate change. There will be highly differential impacts of climate change in East Africa to the middle of the 21st Century. Parts of East Africa, mainly northern Kenya is predicted to become drier, with considerable reduction in the length of the growing season. In addition, southern Kenya and northern Tanzania, may become wetter, with increases in the length of the growing season (Thornton et al., 2002). Such changes will make fundamental alterations to ecosystem structure and function. These changes will have impacts on human land-use and livelihoods and have the potential to make local livelihoods that depend on agriculture, including pastoralism, more vulnerable (Galvin et al., 2004).” Intergovernmental Panel on Climate Change (IPCC 2014) report states that there is likely to be a manifest increase in drought severity over much of Eastern Africa by 2050, this will threaten climate sensitive economy like agriculture and pastoralism in the region.

In Kenya Pastoralists constitute 13.2% of Kenya's 30 million people (1999 population census), with livestock as their major source of livelihood. Pastoralists contribute a significant share of 70% of livestock to the country's market (Galvin et al., 2004). The arid and semi-arid lands (ASALs') pastoralism accounts for 90 % of total employment opportunities and 95 % of family income and livelihood security (Kenya ASAL Policy 2012). Rising temperatures, drought and floods in particular have devastating consequences for the environment, society and economy.

Extreme drought events are increasingly frequent, and have impacted negatively on pastoral livelihoods (Opiyo, 2015a). Downing et al (1985) and Ngaira (2004) expose the occurrences of drought in Kenya in the last half of the 21st Century in 1951, 1952-55, 1957-58, 1974-76, 1980-81, 1983-85, 1987, 1992-93, 1995-96, 1999-2000 and 2004-2006. The prolonged drought in 2008-2011 is estimated be at Ksh.968.6 billion (USD 12.1 billion); and recently the prolonged drought 2016-2017. The 1997-98 El Niño floods is estimated to have caused damage equivalent to 11% GDP (Omeny, 2015). The 2010-2011 drought experienced in Kenya and the Horn of Africa proved to be a defining moment in drought management. The Government of Kenya is currently emphasising on the structural causes of drought emergencies which is a departure from previous drought management efforts in Kenya (Republic of Kenya, 2015).

Pastoralists are among the poorest and most vulnerable groups in Kenya, the climate change has enhanced their vulnerability (Omolo, 2010). Northern Kenya has also experienced a long history of marginalisation from both the colonial and the postcolonial administrations. Due to the prolonged isolation and underinvestment, the region has some of the lowest levels of human development in Kenya and is the most prone to conflict and insecurity- a root cause of which is unequal development (Elmi and Birch, 2013). Aukot (2008) states that the origins of these historical challenges go back a long way, to the model of political economy adopted by the colonial regime.

Eriksen et al (2005) states that vulnerability in pastoralist communities varies between individuals and social groups as well as over space and time. The negative effects of climate change will impact the poor more, this is because the poor are most vulnerable to Climate Change. Since

women form a large percentage of the poor in developing countries and are highly dependent on local natural resources, vulnerable to the effects of Climate Change. Skutsch et al (2004) argues that the effects of climate change are likely to affect men and women differently. This is because of the gender differences in property rights, access to information and cultural, social and economic roles. Though globally women are considered the most vulnerable group, women pastoralists are doubly vulnerable because they are members of the largely marginalized communities (Katushabe, 2014).

5.2. Method

5.2.1 Study Area

The two study sites are Katilu (agro-pastoralist zone) and Namoruputh (primary pastoral zone) in Turkana County in North Western Kenya. Katilu location is in Katilu Division in Turkana South District. It is an irrigation scheme along the Turkwel River. Namoruputh location is in Loima division in Turkana Central District. Namoruputh is not situated next to any river or lake. Turkana County was selected for the study on the basis that it has been subjected to historical and recurrent droughts that have left the regions vulnerable. Turkana County is in arid and semi-arid land (ASAL) area where managing short-term climatic fluctuations as well as adapting to long-term changes is critical to sustaining livelihoods. It also experiences several structural challenges characterising low development and high poverty levels.

Turkana County experiences long rainfall which are usually erratic and unreliable between the months of April and July. While short rains are experienced between the months of October and November. The rainfall ranges 52mm and 480mm annually with mean of 200mm. The temperature ranges between 20^{o}C and 30.5^{o}C. Turkana County has a poverty index of 94%, and is one of the poorest regions in Kenya (Turkana County Integrated Development Plan – CIDP, 2013). The two study sites of Katilu and Namoruputh were selected to demonstrate the varied livelihood activities within the ASAL region.

5.2.2 Materials and Methods

This PhD study used the quantitative household survey data and focus group discussions (FGDs). Additionally, the study undertook further literature review of secondary data sources and conducted key informant interviews (KIIs).

Figure 5.1: Focus Group Discussions in Namoruputh in Turkana

The Statistical Package for the Social Sciences (SPSS, Version 20) was used to analyse data for the quantitative part of the study. The various climate change themes were discussed and content analysed in in-depth surveys. Data was structured into major variables i.e. sources of information, economic livelihood activities, coping and adaptation strategies, the role of social networks, and institutional support. Statistical tests were performed for the distinct patterns that emanated from key themes. Pearson correlation tests were used to establish any possible correlation between main variables. Cross tabulation was used to determine the relationship between variables and frequency tables to determine the frequencies of various variables. The research study involved meeting various stakeholders working in Turkana (for example, County Government representatives, Ministry of Livestock, the Non-Governmental Organizations [NGOs], religious groups and the community opinion leaders.

5.2.3 Precipitation data

Historical precipitation data was obtained from 57 years of recorded monthly rainfall from Lodwar meteorological station (Longitude: 35.06, Latitude: 3.12, Altitude: 515 m) which is in Turkana

Central. This is the only station with long running historical data serving the greater Turkana district.

5.3. Approach

This chapter draws from political ecology approach discussed in chapter four of this thesis.

5.4. Results and Discussions

5.4.1 Pastoralists Perceptions and Biophysical Vulnerability

The study revealed that at least 80% of respondents agreed that there was shorter time intervals between droughts in Turkana. Pastures are not able to regenerate and rangelands continue to be bare even when rainfall is recorded (CCAA 2009). Babadoye et al (2016) concurred with the study, the perception of the level of risk of drought to the pastoral economy of Kajiado in Kenya is at 81.4%. Fratkin (2008) argues that the drought sequence in the second half of the last century and in the beginning decades of this century are changing, while there used to be droughts in every 15-20 years, it is now occurring every fifth year in the region.

In the past our gods really loved us, we had large herds of animals, plenty of milk, a lot of pasture and bumpy harvest of crops. We experienced droughts once in 10 years. But these days our gods have moved far away from us, we don't know whether we have sinned, droughts are frequently occurring every year, our animals are dying from diseases we don't know how to cure, there is less pasture and water is scarce….

A pastoralist view, Sonwa et al (2016).

Ogindo et al (2009) concurred with the study findings in Turkana. The periodicity of the cumulative drought events which span a number of years were irregular. Generally, the earlier drought occurring in the 1950s (1950-1957) were mild and took longer to recur (cumulative drought recurred again in 1970-1972). The 1980s and 1990s had more severe drought from the

cumulative Standardized Precipitation Index (SPI) and had a shorter duration between them (approximately 10 years).

Meteorological climate data confirms pastoral livelihoods are at risk from rising surface temperatures, more intense rainfall and more frequent droughts. Figure 5.2 shows a slight decline in rainfall at Lodwar, Turkana in north western Kenya, where mean rainfall decreased by 13 mm between the first 23 years of record (1950-1973) and the last 34 years (1974-2008). Primarily, the frequency and severity of droughts have increased in recent decades, with episodes of moderate to severe drought occurring more frequently since the 1980s (CCAA, 2009).

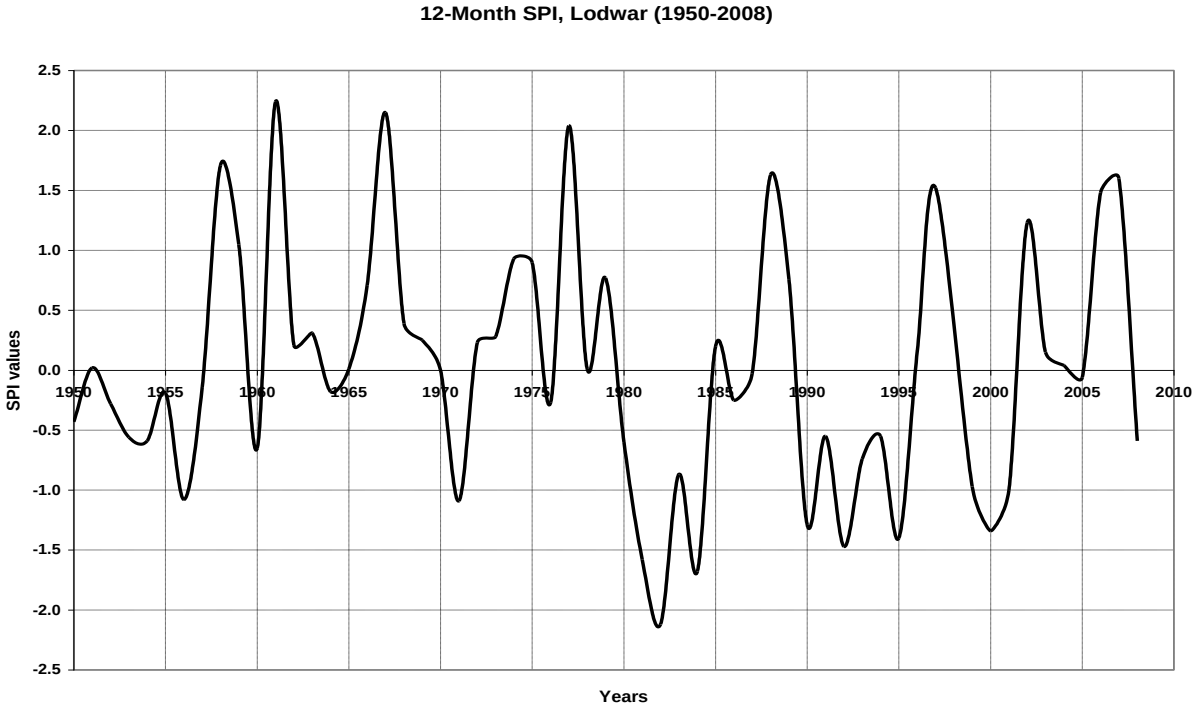

Figure 5.2: Annual Standardized Precipitation Index value for 57 years for Lodwar rainfall, Turkana.

Source: Ogindo et al (2009).

5.4.2 Factors that have contributed to the changes in vegetation over the last 10 years

Table: 5.1 Changes in vegetation

		Factors that have contributed to the changes in vegetation over the last 10 years		Total
		Droughts	Floods	
Location	Katilu	263	15	278
	Loima	102	2	104
Total		365	17	382

At least 94% and 98% of the participants interviewed in Katilu and Loima respectively felt that drought is one of the factors which has contributed to changes in vegetation in the last 10 years. This is in agreement with Jiri et al (2017) study which revealed that most farmers in Zimbabwe perceived a decline in bush encroachment (38.14%) and decline in herbaceous cover (37.12%) and a decline in vegetation heights, due to climate variability and change.

5.4.3 Factors contributing to changes in livestock

Table 5.2. Factors contributing to changes in livestock

		Factors contributing to changes in livestock			Total
		Droughts	Floods	Diseases	
Location	Katilu	209	34	36	279
	Loima	92	11	1	104
Total		301	45	37	383

At least 74.9% and 88.5% of the participants in Katilu and Loima respectively said that droughts has led to changes in the livestock over the last 10 years. 12.1% and 10.6% of the participants in Katilu and Loima respectively said that floods has led to changes in the livestock over the last 10

years. 12.9% and 0.96% of the participants in Katilu and Loima respectively said that diseases has led to changes in the livestock over the last 10 years.

5.4.4 Social Vulnerability

5.4.4.1 Linkage between Gender and Households Head

Turkana has more male-headed households than women headed households. During this study 75% of the participants were male-headed households, 24.17% female-headed households and 0.83% child headed households.

Though women still play a low role on decision making in relation to resource use and allocation at family level at 7.8% as compared to men at 41.2%. However, the level of consultation between the woman and the men at the family level is very high at 50%. These findings are in agreement with Opiyo et al (2014) study that revealed that pastoralists' perception of climate change was significantly associated with gender of the household head. Whereby male-headed household are perceived to be less vulnerable than female-headed households. McKinley et al (2016) study in Vietnam confirms that perceptions of climate change do not appear to be individual but rather disaggregated at the household level.

5.4.4.2. Perceptions on Vulnerability to Climate Variability by Gender and Age

Table 5. 3 Vulnerability due to Age and Gender in Turkana

	Percentage
Elderly women	27.0
Elderly men	25.0
Disabled	24.7
Female-headed house hold	13.7
Married women	5.0
Married Men	3.6

Youth	1.8

Elderly women are considered to be the most vulnerable at 27% of respondents, followed by elderly men (25%) followed by the disabled (24.7%), female-headed households (13.7%), Married women (5%), men (3.6%) and youth (1.8%).

Elderly women and men are likely to vulnerable because of their dependence on their families; they are weak, and sometimes get no assistance even from their families. The disabled on the other hand are likely to be vulnerable because they have no jobs and are treated as outcasts by the family, they depend on remittances, don't own property and their physical challenge cannot allow them to do physical work. The respondents stated that men become vulnerable as a result of the death of their livestock due to drought. Other contributing factors to vulnerability of men include include conflict due to scarcity in water and pasture.

The findings are in agreement with Shisanya and Mafongoya (2017) that even within the same locality vulnerability to climate change will vary significantly. There cannot be blanket recommendations on dealing with vulnerabilities to climate change even at household level. In addition, Jiri et al (2017) study has revealed that age of the household head, gender, and members fitness for work in the household are important in the choice of an adaptation strategy.

5.4.4.3. Linkage between Gender and Education

Table 5.4. Ability to read and write

		Ability to read and write		
		Yes	**No**	**Total**
Gender of Respondent	**Male**	38	99	137
	Female	36	315	351
Total		74	414	488

Only 27% men and 21% women in both Katilu and Loima are able to read and write. Majority of both males and females were unable to read and write across the two regions studied. Jost et al. (2015) states that in various parts of the world, women are more vulnerable to climate variability and change as they have less access to education and information necessary to manage climate-related risks to agriculture (including pastoralism).

5.4.4.4. Linkage between Gender and Income

Based on the chi-square tests, there is a significant difference between monthly income earned by males and females (p-value=0.000<0.05). Evidently, more males (71%) earn relatively higher incomes (more than Kes 5,000) compared to their female counterparts who dominate lower incomes (63%-85% earn than Kes 5,000 and below).

Table 5.5: Linkage between Gender and Income

Gender of respondent	Please estimate how much you earn in a month (in Ksh)?						
	Nil	Less than 100	101-500	501-1000	1001-5000	5001-10000	Over 10000
Male	26%	15%	24%	24%	37%	71%	71%
Female	74%	85%	76%	76%	63%	29%	29%

Chi-Square value=28.66; df=6; p=0.000 <0.05

Shisanya and Mafongoya (2017) confirms increased household incomes reduced household vulnerability. This is because incomes reduces dependency on climate sensitive resources like agriculture at the household level. It's evidenced that females are more vulnerable to climate change vulnerabilities than males given the latter's' relatively higher income levels.

5.4.4.5. Access to Structural Infrastructure

The walking distance to the nearest livestock market is 40 minutes and 50 minutes for Katilu and Namoruputh; walking distance to nearest health centre is 82 minutes and 42 minutes for Katilu

and Namoruputh; walking distance to nearest primary school is 28 minutes and 38 minutes for Katilu and Namoruputh; and walking distance to nearest secondary school is 7 minutes and 60 minutes for Katilu and Namoruputh.

Kirbride and Grahn (2008) argues that pastoralists are the most politically marginalized group in the Horn of Africa region. Hassan (2015) states that due to their distance from populated centres and the harsh climatic conditions in the areas they live, pastoralist's agendas remain in the periphery of policy initiatives.

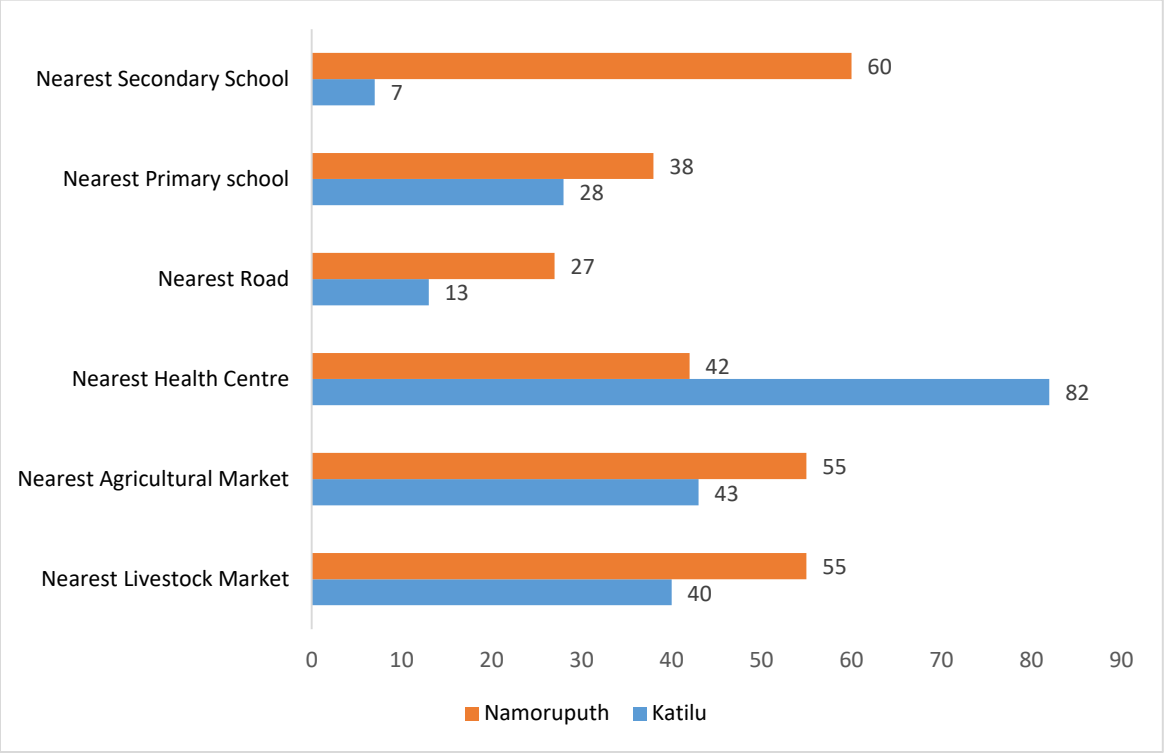

Figure 5.3. Distances in Walking Minutes to Access Basic Services

5.5 Conclusion and Recommendation

This study evaluated the differences in women and men's perceptions on vulnerability to climate variability in pastoral rangelands of Kenya. All participants surveyed have witnessed a change in weather in the last 10 years. The respondents in Katilu and Loima felt that drought is one of the factors which has contributed to changes in vegetation in the last 10 years. The respondents also perceived floods to have led to changes in the livestock over the last 10 years. At the same time, diseases have led to changes in the livestock stock over the last 10 years. There is increased frequency in drought occurrences than in the past, and which is in agreement with the meteorological climate data. Besides climate variability and change pastoralists are experiencing political marginalization and decreased pastureland. Vulnerability is influenced by age and gender. Elderly women are considered to be the most vulnerable to climate variability and change because they are the poorest in the community, followed by elderly men, the disabled, female-headed households, married women, men and lastly the youth. Less than 30% of women and men in both Katilu and Loima are able to read and write. There is a significant association between gender and estimate income per month. It is evident that issues related to climate change are managed at the household level rather than at the individual level.

Recommendations

It is oblivious that the people in Turkana have lived with drought for many years, and understand the occurrences and impacts. Perceptions of communities to climate change should be considered by policy makers in advancing strategies to mitigate impacts of climate change. Vulnerability of pastoralists to climate change could be reduced by investing in early warning systems, providing pastoralists with information on climate change, promoting livestock insurance index, introducing livestock breeds adaptable to the semi-arid regions, promoting diversified livelihoods, promoting fodder farming and water harvesting. Household specific interventions should be considered in mitigating climate change. Age, gender, and income should be considered in all interventions as vulnerability is linked to age, gender and income. There exists a gap between the technical-scientific approaches and the community information and knowledge status. It is important to know which institutions, policies, knowledge and information gaps to get to, this will contribute to addressing the current drought induced problems.

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CHAPTER 6

GENDER, SOCIAL CAPITAL AND ADAPTIVE CAPACITY TO CLIMATE VARIABILITY: A CASE OF PASTORALISTS IN ARID AND SEMI-ARID REGIONS IN KENYA[2]

Abstract

The purpose of this paper is to investigate the relationship between gender and social capital in adapting to climate variability in the arid and semi arid regions in Turkana in Kenya The research undertook literature review of secondary data sources, conducted focus group discussions and key informant interviews. The Statistical Package for the Social Sciences was used to analyse data for the quantitative part of the study. The research main findings revealed that the state of adaptive capacity is reflected in the main economic activities in Turkana: pastoralism at 56.99%, farming at 27.72% and business at 5.44%. There is a significant relationship between occupation and age. More of the older generations are involved in livestock keeping while the younger generation are in farming.

The most common adaptation strategies include: construction boreholes/reservoirs at 21%, migration at 19%, and digging shallow wells. The pastoralists in Turkana are still largely dependent on indigenous adaptation strategies built on social capital to cope and adapt to drought. Pastoralists are transforming into semi- pastoralists 46% are staying where they were born, 34 have lived in the same place for 20 years and only 13.3% have lived in Katilu and Namoruputh for less than 5 years. The Majority of pastoralists communities in Turkana still rely on indigenous/local

[2] ***Submitted to: International Journal of Climate Change Strategies and Management***

By **Nancy Omolo**

School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Scottsville, Pietermaritzburg, South Africa

Paramu Mafongoya

School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Scottsville, Pietermaritzburg, South Africa

systems to access information and skills necessary to adapt to climate change: at least 46% access information through elders, Chief barazas at 25%, Self-help groups at 17.7%, Non-Governmental Organizations (NGOs) at 13%, Government institutions at 7%. The use of modern media (television and radio) to access climate information is still limited to only 4%. There is a significant association between attending a training and using the information to cope/adapt to climate change.

Key words*: Adaptation, Climate variability, Gender, Pastoralists, Turkana and Kenya.*

6.1 Introduction

Africa's vulnerability to climate change largely depends on its current and future adaptive capacities. Intergovernmental Panel on Climate Change states that climate change will interact with non-climate related drivers and stressors to increase the vulnerability of Africa's arid and semi-arid regions, with high confidence (IPCC, 2014). Kenya is extremely vulnerable to changing climate because most livelihoods and economic activities are reliant on climate-sensitive natural resources. Rising temperatures, drought and floods in particular have devastating consequences for the environment, society and economy. Climate projections indicate that Kenya will experience a 20% decrease in rainfall by the year 2030, which will translate to losses in agricultural production in leading to human and animals' deaths. The livestock sector is very sensitive to climate change. It employs 50% of the agricultural labour force and is the mainstay for over 10 million Kenyans living in the Arid and Semi-Arid Lands (ASALs). It contributes approximately 5% of agriculture's GDP (Republic of Kenya, 2015)

6.1.1 Pastoralism and ASAL's

The arid and semi-arid regions cover at least 40% of the earth's surface and is home to approximately 38% of the global population (Dobie, 2001). In Kenya, the ASALs occupy 89% of the country and is home to at least 70% of the national livestock herd. Most of the national wildlife parks in Kenya are located in the ASALs. Kenya has a total of 47 counties of which 23 counties are classified as ASALs. Out of the 23 ASAL counties, 9 of them are classified as arid and 14 as semi-arid (Njoka et al., 2016). Pastoralists supply livestock products to the domestic and regional markets, however their contribution has often been underestimated. The pastoralists' production systems are highly adaptive, constantly responding to market and climatic trends (AUC, 2010). The ASALs have the lowest development indicators and the highest rates of poverty (Kirbride and Grahn, 2008). In the ASALs the basic foundations of development are inadequate for example access to health, education, water, energy, diverse dietary intake, technology and infrastructure are all well below the national average. Omolo et al., 2017 states that access to basic services has the highest loading factor on resilience.

The Policy Framework for Pastoralism in Africa developed by the Africa Union is the first continent-wide policy initiative that aims to secure, protect and improve the lives, livelihoods and rights of African pastoralists. The policy framework act as a platform for mobilizing and coordinating political commitment to pastoral development in Africa, and underscores the need to fully involve pastoralist women and men in the national and regional development processes in order to benefit from which they are supposed to benefit. The framework also emphasizes the regional nature of many pastoralist ecosystems in Africa and therefore, the need to support and harmonize policies across the Regional Economic Communities and Member States (AUC 2010).

The ASALs are currently experiencing major changes. The towns across both arid and semi-arid areas are increasingly growing and creating an urbanised population with different needs and aspirations (Orindi et al., 2007). The other factors driving changes include: population growth, globalisation, shifting land use including fragmentation of rangelands. The changes have been accelerated by increased climate variability and frequency of extreme weather events (Barnes et

al., 2014). Despite the challenges facing the ASALs, Turkana county has a lot of untapped wealth including: oil, various minerals, wildlife, biodiversity, and diverse cultural characteristics.

The devolution process which begun in the March 2013 and anchored in the Kenya Constitution 2010 has led to a shift in the governance process. The devolution impacts are already being felt in the arid and semi-arid regions of Northern Kenya which have formerly been marginalised from power structures and development investments for decades (Carabine et al., 2015). Currently 15% of the national revenue is allocated to the 47 Counties. The county governments are in charge of overseeing some functions such as the provision of primary education, health care and maintenance of local roads, which were previously the responsibility of Kenya's national government (Kimenyi, 2013). The amount of financial resource allocation to the counties are determined by the population size, poverty rate and the size of the land mass.

6.1.2 Policy Framework for Adaptation and Resilience in Kenya

Kenya has put several measures to mitigate drought and ensure sustainable development. National Climate Change Response Strategy (NCCRS) 2010 (Republic of Kenya, 2010) provided evidence of climate impacts on different economic sectors and proposed adaptation and mitigation strategies (Government of Kenya, 2010). The National Climate Change Action Plan (NCCAP) 2013 (Republic of Kenya, 2013) aims to implement the NCCRS 2010 strategy and set out actions to enable low carbon climate resilient development. The National Adaptation Plan (NAP) 2015-2030 (Republic of Kenya, 2015) builds on the NCCAP 2013 to establish adaptation priorities and facilitate Kenya's action in reducing vulnerability to climate change. The Climate Change Act 2016 (Republic of Kenya, 2016a) provides a regulatory framework for an enhanced response to climate change, and adopts a mainstreaming approach that includes integration of climate change considerations into development planning, budgeting and implementation in all sectors and at all levels of government. The National Drought Management Authority Act 2016 (Republic of Kenya, 2016b) function it to exercises overall coordination over all matters relating to drought management including implementation of policies and programmes relating to drought management. All these policies are in harmony with Kenya Vision 2030 (Republic of Kenya,

2007) an economic blue print aimed at making Kenya a newly industrialized middle-income country providing a high quality of life to all its citizens in a clean and secure environment.

The above policies demonstrates a good start for Kenya to effectively deliver on the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs), SDG 13, "Take urgent action to combat climate change and its impacts" is a clear recognition that climate change is a reality that cuts across sectors and presents a threat to attaining sustainable development. Kenya ratified the Paris Agreement on Climate Change in December 2016. The Agreement is applicable to all Parties, and aims to strengthen the global response to the threat of climate change and to limit the rise of global temperatures to well below 2°C above pre-industrial levels. The Sendai Framework for Disaster Risk Reduction 2015 – 2030, and which is the successor instrument to the Hyogo Framework for Action (HFA) 2005-2015 focuses on building the resilience of nations and communities to disasters. Despite the progress Kenya has made in developing various policies in relation to climate change, the legislative process for policy enactment is long and characterised by political intrigues that often delay the process. There is the need to harmonise the above policies and implement them.

6.1.3 Adaptation

Strengthening local adaptive capacity is a critical aspect of adapting to climate change. Eriksen and Lind (2009) states the national political and economic structures and processes affect local adaptive capacity in various ways, such as through the unequal distribution of resources across regions, development policy biased against pastoralism, and competition for elected political positions.

The existing limited adaptive capacity in Africa is as a result of the region's weak institutions, poor financial resources, low technical and technological capabilities, and limited awareness of the devastating impacts of climate change (Nkomo et al., 2006). Gender is very relevant in climate change adaptation. In addressing gender and adaptive capacity to climate change, it is important to take into consideration: sex, ethnicity, religion, literacy levels, culture, disability and age (Denton, 2002 and Enarson, 2002). Van Aelst et al 2016 argues that it is important to consider farmers/pastoralists marital status because it determines their access to various socio-economic

resources, gendered like entitlements and receiving material support from the family members needed for adapting to climate change. For example, research study by Sonwa et al (2016) revealed that in Turkana in northern Kenya, female-headed households lacked labour for herding and accessing better pastures, which tend to be located in conflict-prone areas.

Despite the limited adaptive capacity, there are several adaptation strategies that are currently being practiced to cope with present climate variability in the pastoral system in Kenya. For example, these strategies range from the development and deployment of early warning systems, livestock insurance for pastoralists, water and pasture management, initiating better and more efficient irrigation systems in regions next to water bodies, introducing new livestock breeds which are adaptable to ASALs and new farming techniques.

6.1.4 Social Capital

Ostrom and Ahn (2003) defines social capital as the value of relationships that facilitate cooperation and collective action through trust. The role that social capital, state-civil society and networks play in adaptive capacity can be observed in historical and present day contexts by analyzing the institutions of resource management and collective action for climate-sensitive sectors and social groups. Unlike physical capital social capital is not easy to see and measure.

Aßheuer et al (2013) states the social capital is a collective good, it is mostly relevant in poor and rural communities. The poor majorly uses collaboration for emergency response. Social capital can be important too in an economically more advanced context for communities' adaptation to climate change. A high score of social capital promotes self-organization, learning, increased information flow, promote civic engagement, reduced transaction costs and public participation (Petzold, 2016).

Social capital is vital at different times to different social groups and it is a necessary bonding for economic development. Furthermore Social capital can lead to pulling together of resources for economic development, therefore the prevalence of different types of social capital are important at different times to different social groups. Adger (2003) argues that collective action requires

networks and flow of information between individual groups to be able to influence decision making. This networks acts as assets of individuals and society and can be referred to as social capital.

6.1.5 Why Gender and Climate Change

The importance of mainstreaming gender and adaptation to climate change has been recognized in a series of international instruments. Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) adopted in 1979 by the UN General Assembly, also known as the international bill of rights for women ("CEDAW", n.d). The Beijing Platform for Action is the key global policy on gender equality, it addresses 12 critical areas of concern to women globally including women and environment. The Sendai Framework states that disaster risk reduction requires an all of social engagement and partnership ("The Sendai Framework," 2015). The framework elaborates that gender, age, disability and cultural perspective should be incorporated in all policies and practices. Sustainable Development Goals (SDG 5) aims to achieve gender equality and empower all women and girls. It further states that women and girls represent half of the world's population and thus half of the world potential ("SDG", 2015).

The African Union has been taking a leading role in championing the rights of women and girls dating back several decades. For example, the African Union (AU) dedicated 2016 as the year of Human Rights with a focus on Women's Rights Earlier 2015 was dedicated as the year of Women's Empowerment and Development towards Africa's Agenda 2063. The Agenda 2063 envisions that African countries will attain quality life through developing strategies for inclusive growth, gender equality, youth empowerment, increasing agricultural production, job creation, investments in science, technology, research and innovation, and the provision of basic services ("26th AU Summit," 2016).

Kenya Vision 2030 states the need to focus on equity in power and resource distribution (Republic of Kenya, 2007). The Constitution of Kenya of 2010 outlines that the state shall take legislative and other measures to implement the principle that not more than two-thirds of the members of elective or appointive bodies shall be of the same gender. The constitution aims to facilitate gender

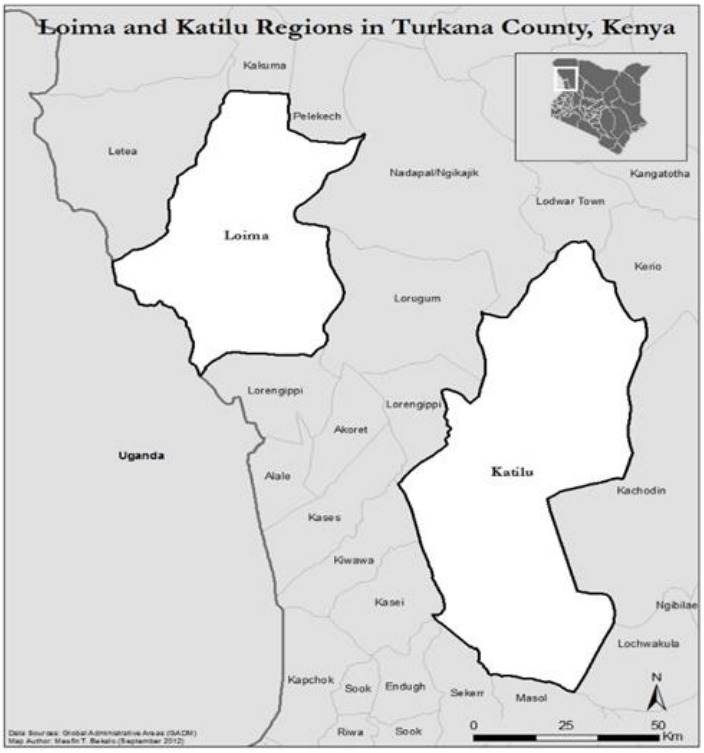
mainstreaming in national development (Republic of Kenya, 2010). Climate Change Act of 2016 aims to mainstream intergenerational and gender equity in all aspects of climate change responses (Republic of Kenya, 2016). According to the World Bank (2012) most gender equitable laws in Kenya were enacted between 2009 and 2011, and the highest number in the world. Despite, the enactment of the gender laws, many women and judicial officials are ignorant of the fact that for the first time, the new laws overtake customary laws governing gender roles.

The gender roles in Kenya mostly vary by ethnic groups and by rural-urban setting. Gender equity is highest in the cities/urban settings, thus Nairobi and its surrounding urban towns have higher gender equity as compared to the marginalised ASALs of northern Kenya (The Nature Conservancy, 2013). The Kenya Vision 2030, Sector Plan for Environment, Water and Sanitation (2013 – 2017), states that men and women have differentiated interests' in agriculture and environmental management due to their distinctive roles, responsibilities and knowledge. Women in Kenya are poorer than men. The poverty level of men in rural areas is at least 52.5% and 49.2% in urban areas. The figures for poverty levels among women in rural areas is at 54.1% and 63% in urban areas. Women in Kenya constitute approximately 50.7% of the total population yet under presented in the environmental decision making.

6.2. Method

6.2.1 Study Area

The two study sites are Katilu (agro-pastoralist zone) and Namoruputh (primary pastoral zone) in Turkana County in North Western Kenya. Katilu location is in Katilu Division in Turkana South District. It is an irrigation scheme along the Turkwel River. Namoruputh location is in Loima division in Turkana Central District. Namoruputh is not situated next to any river or lake. Turkana County was selected for the study on the basis that it has been subjected to historical and recurrent droughts that have left the regions vulnerable. Turkana County is in arid and semi-arid land (ASAL) area where managing short-term climatic fluctuations as well as adapting to long-term changes is critical to sustaining livelihoods. It also experiences several structural challenges characterising low development and high poverty levels.



Turkana County experiences long rainfall which is usually erratic and unreliable between the months of April and July. While short rains are experienced between the months of October and November. The rainfall ranges 52mm and 480mm annually with mean of 200mm. The temperature ranges between 20^{o}C and 30.5^{o}C. Turkana County has a poverty index of 94%, and is one of the poorest regions in Kenya (Turkana County Integrated Development Plan – CIDP, 2013).

Figure 6.1: Location Map Showing Loima and Katilu Divisions

The two study sites of Katilu and Namoruputh were selected to demonstrate the varied livelihood activities within the ASAL region.

6.2.2 Materials and Methods

This PhD study used the quantitative household survey data and focus group discussions (FGDs). Additionally, the study undertook further literature review of secondary data sources and conducted key informant interviews (KIIs).

The Statistical Package for the Social Sciences (SPSS, Version 20) was used to analyse data for the quantitative part of the study. The various climate change themes were discussed and content analysed in in-depth surveys. Data was structured into major variables i.e. sources of information, economic livelihood activities, coping and adaptation strategies, the role of social networks, and institutional support. Statistical tests were performed for the distinct patterns that emanated from

key themes. Pearson correlation tests were used to establish any possible correlation between main variables. Cross tabulation was used to determine the relationship between variables and frequency tables to determine the frequencies of various variables. The research study involved meeting various stakeholders working in Turkana (for example, County Government representatives, Ministry of Livestock, the Non-Governmental Organizations [NGOs], religious groups and the community opinion leaders.

6.3. Approach and Scale of Analyses

Theorizing the linkage between Gender, Social Capital and Climate Change

This study draws from two broad theoretical approaches: Gender and Development Approach and Sustainable Livelihoods Approach.

6.3.1 The Gender and Development approach

Women and men face their social, economic and environmental realities in different ways. How they participate is also different and is closely related to age, socio-economic class and culture. It is therefore important to incorporate a gender approach in the analyses of climate change to help understand how the identities of women and men determine different vulnerabilities and capacities to deal with climate change. Furthermore, a gender approach can also be helpful in designing and implementing policies, programmes and projects that lead to greater equity and equality. Especially, it may contribute to building more capacity to adapt to and mitigate against climate change impacts, because it gives a clearer and more complete view of the relations people have built with ecosystems (United Nations Development Programme, (UNDP, 2009).

6.3.2 Sustainable Livelihood Approach

Livelihood thinking originated and is widely attributed to the work of Robert Chambers in the mid-1980s. He developed this alternative approach because the conventional development concepts did not yield the desired effects and that humankind was additionally facing an enormous population pressure. Chambers developed the idea of "Sustainable Livelihoods" (SL) with the intention to enhance the efficiency of development cooperation.

Kollmair and Gamper (2002) state that the Sustainable Livelihood Framework (SLF) forms the core of the SLA and serves as an instrument for the investigation of poor people's livelihoods, at the same time visualising the main factors of influence. Livelihood is defined by Chambers and Conway (1992:7) "as comprising the capabilities, assets (stores, resources, claims and access) and activities required for a means of living; a livelihood is sustainable when it can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long-term." The DFID's SLF embraces a holistic concept of livelihood strategies which is based on human capital, physical capital, financial capital, natural capital and social capital deemed as a helpful approach in understanding the livelihoods of the poor (FAO et al., 2009).

6.4. Results and Discussion

6.4.1 Economic Livelihood Activities/ Occupation in Turkana

The main economic activities in Turkana are: pastoralism at 56.99%, farming at 27.72% and business at 5.44%. Information from the focus group discussions showed that both women and men are involved in livestock keeping within the pastoral systems. The results shows that pastoralists in Katilu (an irrigation area) are more involved in livestock keeping and crop farming as compared to Namoruputh**.**

According to the Vision 2030 Development Strategy for Northern Kenya and other Arid Lands (Republic of Kenya, 2011) the arid parts of northern Kenya is dominated by mobile pastoralism, while in the better-watered and better-serviced semi-arid areas is a mixed economy. There exist rain-fed and irrigated agriculture, agro-pastoralism, small-scale businesses based on dryland products, and conservation or tourism-related activities in semi-arids.

Galvin (2008) argues that as pastoralists diversify their livelihood strategies into agriculture, business, and wage labour, their dependency on livestock often decreases. Livestock may or may not remain the main source of income, nonetheless for people who have livestock, they must still be able to access resources like water and pasture for their stock as long as they have them.

Table 6.1: Linkage between occupation/economic activities and age

	Which economic/income generating activities are you involved in?					
Age of respondent	Livestock keeping	Crop farming	Shop	Cutting firewood	Local brewing	Charcoal burning
20 years and below	50.0%	25.0%	8.3%	8.3%		
21-30 years	51.1%	42.0%	2.3%			1.1%
31-40 years	67.8%	23.7%	0.8%	2.5%	0.8%	1.7%
41-50 years	63.6%	18.2%	1.5%	6.1%	4.5%	3.0%
more than 50 years	66.3%	23.9%		4.3%		2.2%

Chi-Square value=75.00; df=56; p=0.046

Testing at 5%, 2 tail test, the study findings in table 6.1 indicate that there was a significant relationship (p= 0.000 <0.05) between occupation and age. More of the older generations are involved in livestock keeping while the younger generation are in farming.

Table 6.2: Occupation/economic activity and Division/Geographical location

	Which economic/income generating activities are you involved in?					
Location/ Division	Livestock keeping	Crop farming	Shop	Cutting firewood	Local brewing	Charcoal burning
Katilu	53.6%	37.1%	0.7%	3.6%	0.4%	2.2%
Loima	83.7%	1.9%	2.9%	1.9%	2.9%	1.9%
Ch-Square Value= 69.014; df=14; p=0.00<0.05						

Testing at 5%, 2 tail test, the study findings in table 6.2 indicate that there was a significant relationship (p= 0.000 <0.05) between occupation and location/ area of residence. Respondents from Loima significantly more of pastoralists than Katilu who are predominantly crop farmers.

Table 6.3: Gender and Occupation/Economic activities

	Which economic/income generating activities are you involved in?					
Gender of respondent	Livestock keeping	Crop farming	Shop	Cutting firewood	Local brewing	Charcoal burning
Male	71.0%	21.5%	1.9%			
Female	58.2%	29.8%	1.1%	4.4%	1.5%	2.9%
Total	61.8%	27.5%	1.3%	3.1%	1.0%	2.1%
Ch-Square Value= 28.97; df=14; p=0.01<0.05						

There is significant difference between the main occupations of males and females. More males are in livestock keeping as the main source of livelihood as opposed to females who dominate (at

a low scale), crop farming, firewood collection, charcoal burning and brewing) which are less rewarding when compared to large ruminant keeping.

Water-Bayers (2012) stated that climate change and livelihoods have focused more on the coping strategies of pastoralists as mere means of survival which sometimes is negative. It is therefore important to look at the positive aspect of innovations by pastoralist's women to diversify their livelihoods, especially among settled or semi-permanent pastoralists where there is women's increased involvement in processing and marketing livestock products. Little et al (2001) defines livelihood diversification as engagement in income generation activities besides pastoralism and which is determined by a number of factors including: social status, gender and geographical location (i.e. closeness to town centre). Some of women pastoralists diversified activities include: small-scale businesses, wage employment, migration, production and sale of crafts, fire wood sale, harvesting and sale of aloe, alcohol brewing and small scale vegetable production (Little et al.,. 2001; Nduma et al., 2001 and Watson and Binsbergen, 2008). The prevalence of diversification and increasing reliance on livelihood assets signals stress in pastoral livelihood systems (Omolo, 2010).

6.4.2 Coping and Adaptation Strategies

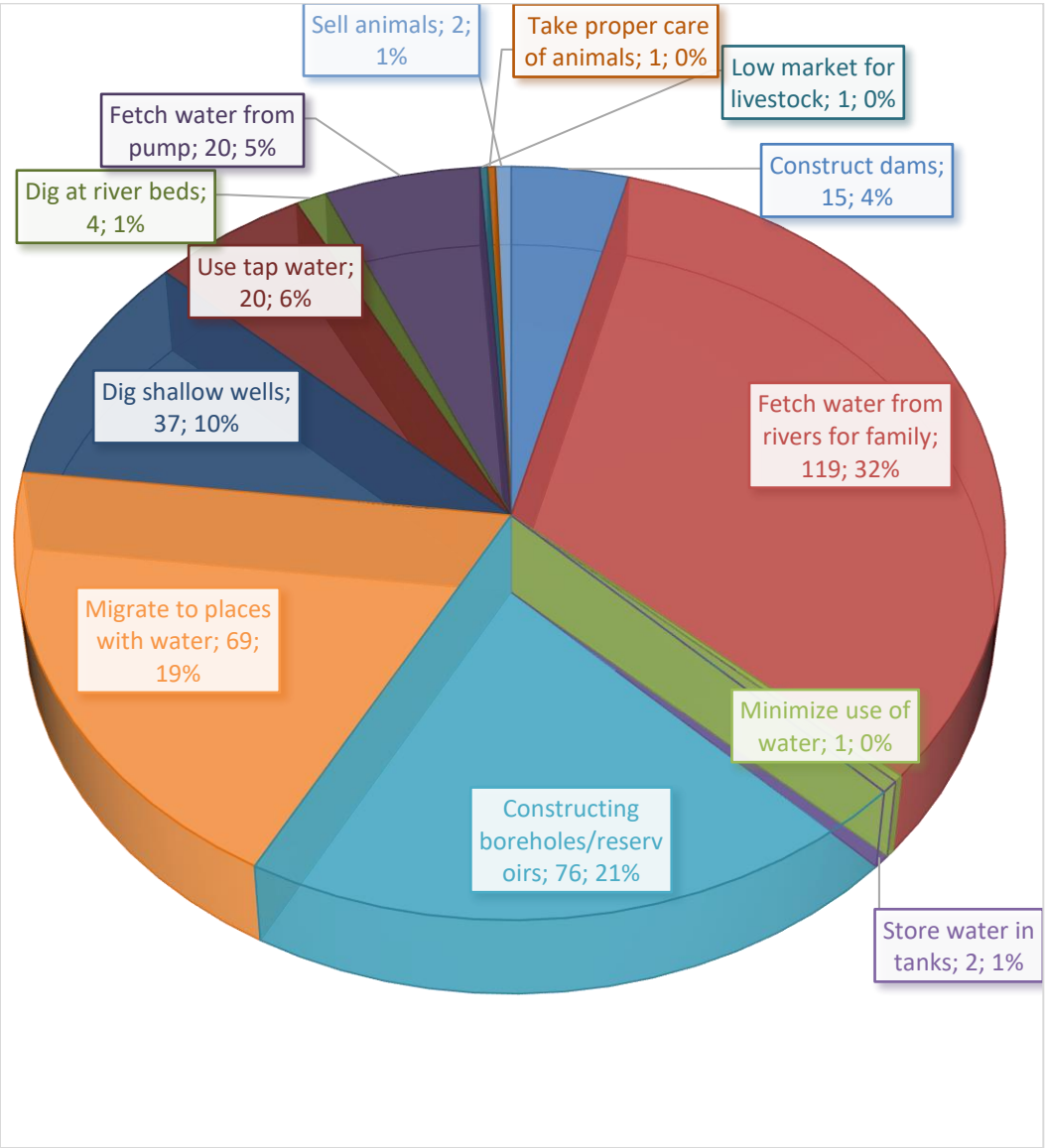


Figure 6.2: Adaptation to Changes in Water Resources in times of Drought

Figure 6.2 above shows the most common adaptation strategies include: construction boreholes/reservoirs at 21%, migration at 19%, and digging shallow wells. The pastoralists in Turkana are still largely dependent on indigenous adaptation strategies built on social capital to cope and adapt to drought. However present socio-economic situation combined with climatic risks cannot support the vulnerable households who are exposed to climatic risks (Kareithi, 2010).

Research undertaken by Baird and Gray (2014) revealed that indigenous social networks of exchange and reciprocity are critical components of household security and well-being. The inter-household exchanges of material goods (IHE) and the association between IHE and livelihood diversification are both evolving and declining and are negatively associated with livelihood diversification. Ojoyi et al (2015) states the need for laying emphasis on advancement of both indigenous and imported technologies. It is essential for governance structures to capitalize on effective adaptive strategies and innovative solutions as a positive measure for responding to the adverse effects of climate variability

6.4.3. Migration as an Adaptation Strategy to Climate Change in Turkana

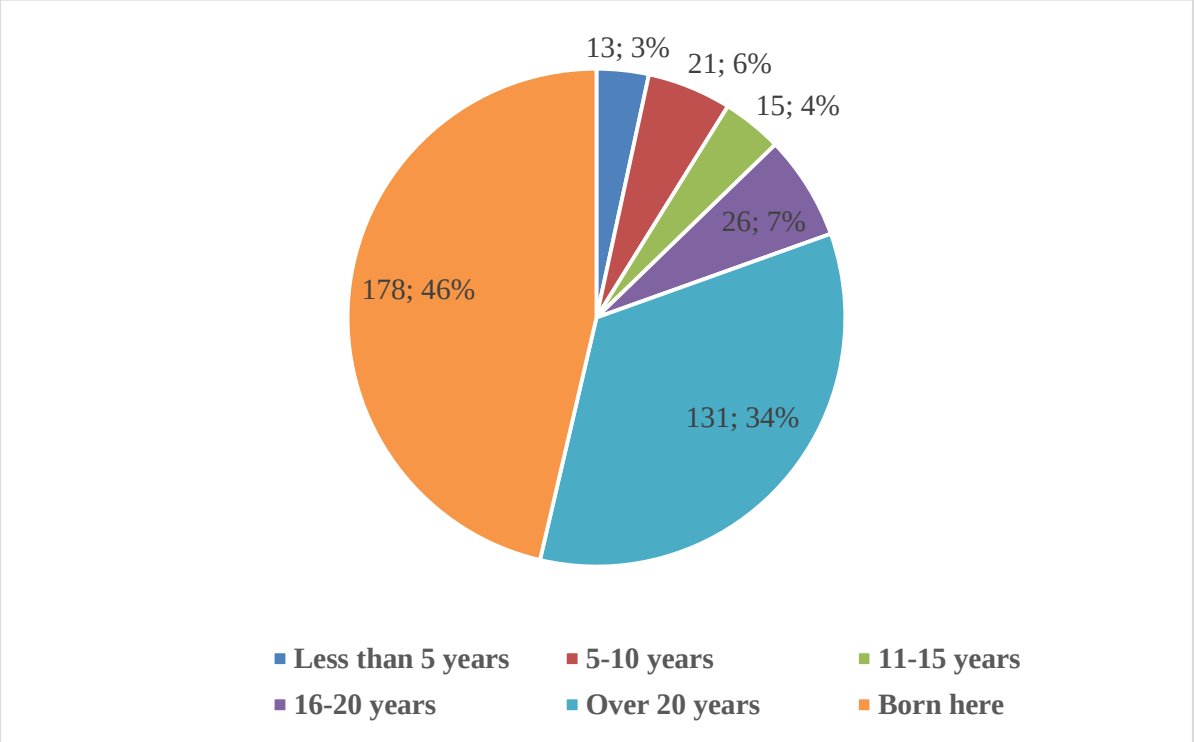


Figure 6.3: Number of years lived in current residence

The above chart shows that pastoralists are transforming into semi- pastoralists 46% are staying where they were born, 34% have lived in the same place for over 20 years and only 13.3% have lived in Katilu and Namoruputh for less than 5 years. Mobility is the key coping strategy for

pastoralists in search of water and greener pasture, conflicts, larger pieces of land, cultural practise and disease outbreak. Ekaya (2005) study concurs with the above findings, the transformation is occurring due to economic, political, demographic and environmental changes. Prolonged droughts, population growth, expanding crop agriculture, political insecurities including civil wars and ethnic conflicts, and conservation policies have all affected the ability of mobile pastoralists to keep their large herds, move freely across the drylands and rely on mobile pastoralism as a livelihood system. As a result, crop agriculture is becoming increasingly common, and sometimes necessary subsistence strategy. This is a real challenge since the drylands that pastoralists occupy are uniquely suited to rearing of livestock.

Table 6.4: Reasons for Migration

	N	Percent
Search for greener pastures	177	27.4%
Conflicts	143	22.1%
Search for water	169	26.2%
Larger pieces of land	39	6.0%
Culture	13	2.0%
Disease Outbreak	105	16.3%
Total	646	100.0%

Men are more likely to migrate with animals at 17.9% than women at 7.1%. Mostly they will go away for some months and then come back home when the climate conditions changes. Sometimes the whole household move and the animals at 27.4%, herds' boy and men at 18.9%, men, children and animals at 13.4%.

Migration at the levels of individuals and households represents an important adaptive strategy. It can potentially contribute to poverty alleviation, by diversifying income sources of at the household's levels, provided that conditions for migrants are improved. Migration improves access to financial and social capital, reduces pressure on natural resources and makes communities less

vulnerable to extreme weather events and other shocks (Birk and Rasmussen, 2014). Nonetheless, so far migration is receiving limited attention in adaptation policy and planning

6.4.4. Self Help Groups

Table 6.5: Gender Respondent and belonging to a Self-help Group

		Belong to a social group		
		Yes	No	Total
Gender of respondent	Male	29	75	104
	Female	50	217	267
Total		79	292	371

Table 6.5 shows that more women belong to self-help groups as compared to men at 50 and 20 respectively. Generally women and men who do not belong to self-help groups are more at 217 and 75 respectively.

Table 6.5: Gender Respondent and belonging to a Self-help Group

Gender of respondent * Do you belong to any community group e.g. Ayuta, self-help group Cross tabulation				
		Belonging to a social group		Total
		Yes	No	
Gender of respondent	Male	29	75	104
	Female	50	217	267
Total		79	292	371
Ch-Square Value= 51.47; df=1; p=0.021<0.05				

Table 6.6 shows that the correlation between gender and belonging to a self-help group is statistically insignificant P<0.05.Women's organizations have proven to be effective vehicles for improving food security and community-based management of natural resources. For example, self-help groups can address and improve women's access to land use and tenure, water rights, livestock production, credit and financial services, markets and transportation, agricultural extension services, participation in decision-making and community development, improved capacity-building that takes gender differences into account (IFAD, 2010).

6.4.5 Access to Information

Table 6.7: Sources of information

	Frequency	Percentage
Television	12	3.8
Radio	7	2.2
Extension officers	74	23.4
NGOs	10	3.2
Elders	23	7.3
Receives from neighbours	190	60.1
Total	316	100.0

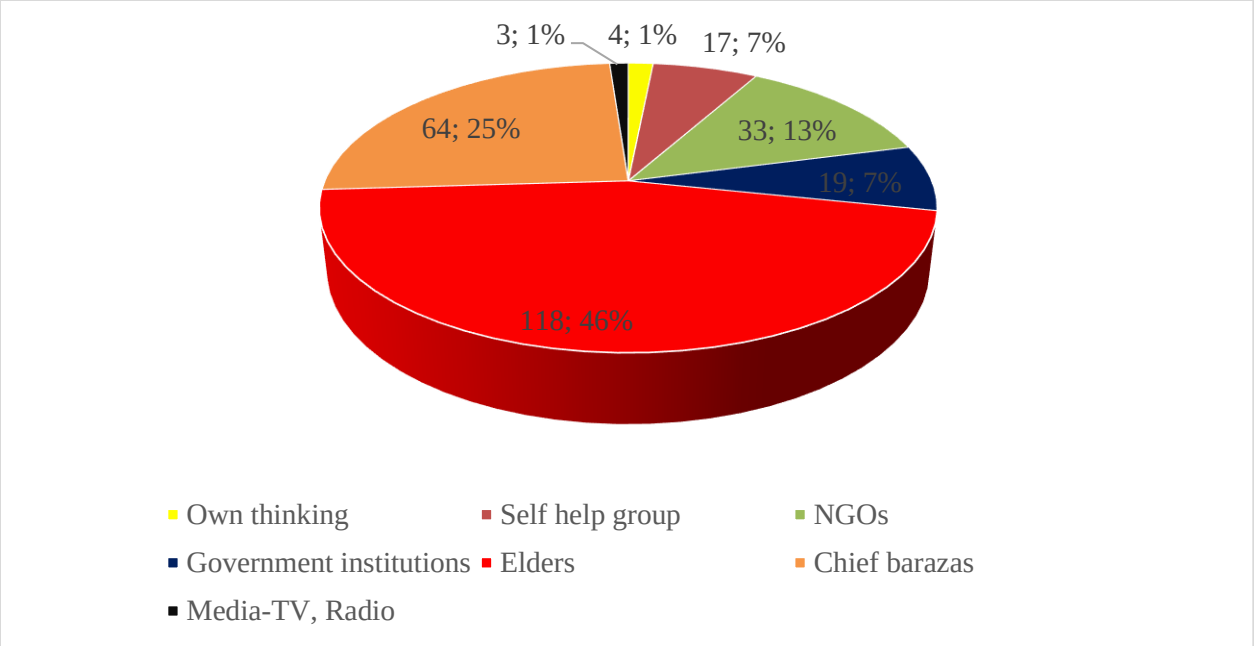


Figure 6.5: Access to Information and Skills necessary for Adapting to Climate Change

The figure 6.5 above shows that majority of communities in Turkana still rely on elders to access information and skills necessary to adapt to climate change at 46%, Chief barazas at 25%, Non-Governmental Organizations (NGOs) at 13%, Government institutions at 7%, and only 4% rely on media (television and radio) to access information.

The changing and unpredictable climatic patterns and extremes poses great challenge to pastoralists livelihoods. Therefore climate information is a valuable resource for communities, county governments and other service providers to make more informed decisions, make effective and timely risk management, develop adapted and diversified livelihoods options that will reduce vulnerability and enhance resilience (Ambani and Fiona 2014).

6.4.6 Institutional support and Capacity Building

Table 6.7: Training and using Information for Adaptive Capacity to Climate Change

		Has any of the information you received helped you to cope with floods/droughts?	
		Yes	No
Have you attended any training?	Yes	51.2%	48.8%
	No	13.2%	86.8%
Ch-Square Value= 53.98; df=1; p=0.000<0.05			

Table 6.7 shows that there is a significant association between attending a training and using the information to cope/adapt to climate change $p<0.001$. Most of the respondents who attend training said that they have used the information to cope/adapt to climate change.

Table 6.8: Difference between Gender and attending Training

		Have you attended any training?	
		Yes	No
Gender of respondent	Male	33.7%	66.3%
	Female	18.2%	81.8%
Chi-Square Value= 10.225; df=1; p=0.001<0.05			

Table 6.8 shows that there is a significant association between gender and attending training $p<0.001$, more women than men are attending the capacity building trainings. Vincent, 2007 states that achieving adaptive capacity means acquiring human and social capital with the right

governance structures in place. Local institutions have the capacity to equip local communities with new knowledge on the impacts of climate change and how to manage likely future uncertainties and risks (Boko et al., 2007).

6.5 Conclusion and Recommendations

6.5.1 Conclusion

This chapter has provided new insights in relation to gender, social capital and adaptive capacity to climate variability among pastoralists in arid and semi-arid regions in Kenya. The research main findings revealed that the state of adaptive capacity is reflected in the main economic activities at household level in Turkana which are livestock keeping/pastoralism and farming. The economic activities are highly influenced more by the geographical location and age. There are more farming activities in Katilu than in Namoruputh. This is because Katilu is located next to a river and there is irrigation taking place by the riverbeds. Both women and men participate in livestock keeping and farming.

One argument is that there is a transition from nomadic pastoralism to semi-permanent settlement in Turkana. The transformation is occurring due to economic, political, demographic and environmental changes. At the same time, there is robust evidence that migration is an important adaptation strategy. It can improve access to financial and social capital, and reduce pressure on natural resources.

The four most common adaptation strategies include: fetching water from rivers, construction boreholes/reservoirs, migration, and digging shallow wells. The pastoralists in Turkana are still largely dependent on indigenous adaptation strategies built on social capital to cope and adapt to drought. Generally, there is a decline in social capital. The pastoralists in Turkana are still largely dependent on indigenous adaptation strategies built on social capital to cope and adapt to drought. However present socio-economic situation combined with climatic risks cannot support the vulnerable households.

Majority of pastoralists communities in Turkana still rely on indigenous/local systems to access information and skills necessary to adapt to climate change. They mainly accessed information through elders, followed by Chief barazas (local government administration at the village level), and then self-help groups. Other sources of climate information were: non-governmental organizations (NGOs) and Government institutions. The use of modern media (television and radio) to access climate information was very limited.

There is a significant correlation between gender and attending trainin, correlation is weak. More women than men are attending the capacity building training on climate change adaptation. There is also significant correlation between attending a training and using the information to adapt to climate change. Most of the respondents who attend training said that they have used the information to adapt to climate change.

6.5.2 Recommendations

The current adaptation strategies in Turkana indicates that climate change is a developmental issue. There is need for the government and development agencies to invest in social institutions in Turkana to minimize the climatic risk. Improved development assistance and enhanced targeting of the truly vulnerable within pastoral societies demands an acceptance that pastoralists' vulnerability to climate change is neither uniform nor universal, and the need to consider differences like gender, age, marital status and varying geographical locations at the local levels.

Policy makers should understand that the pastoralists in the past have used indigenous knowledge to cope and adapt to climate change. The current recurrent and intensity droughts requires investment in modern technology, equipping pastoralists with relevant information and skills to make them resilient to climate change, and implementing existing and relevant policies for northern Kenya.

Policy makers need to be aware of the current changes/transformation taking place in the arid and semi-arid regions like the transformation from nomadic pastoralism to semi-permanent

settlements. There is need for the settled pastoralist to have access to basic services. There is also the need to have urban planning systems in place to deal with the increasing urbanization in these regions.

Migration has been identified as a set of policy tools that can help individuals, households and communities to adapt to climate change. New policies should be developed to improve the conditions of internal migration, including addressing rights to access land and resources.

Kenya meteorological department has a key role to ensure that climate information is disseminated at the national level and at the local level. It needs to strengthen its network with the local institutions. There is evidence that capacity building and access to climate information has helped local communities to cope and adapt to climate change.

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CHAPTER 7

GENDER AND RESILIENCE TO CLIMATE VARIABILITY IN PASTORALISTS LIVELIHOODS SYSTEM: TWO CASE STUDIES IN KENYA[3]

ABSTRACT

Recurrent droughts due to climate change has led to vulnerability of the pastoralist communities, leading to loss of assets and food insecurity. Climate change will have different impacts on women and men's livelihoods. Building resilience at individual, household and community level will largely depend on the suitability of interventions to the local context, particularly in relation to the social dynamics and power relations that create differences in vulnerability. Most of the research have focused on national and regional studies. The impact of climate change will not be uniformly distributed in countries within Africa or within the same country. This specific research focuses on two diverse ecological zones at the local level in the same County of Turkana in north western Kenya: agro-pastoral zone and primary pastoral zone. This paper aims to evaluate women and men's adaptive capacity to climate variability in Turkana, north-western Kenya. It is evident that increasing resilience can be realised by reducing vulnerabilities and increasing adaptive capacity. The results revealed that agro-pastoralists are more resilient to climate change than primary

[3] ***Published in:*** **Journal of Sustainable Development; Vol. 10, No. 2; 2017 ISSN 1913-9063 E-ISSN 1913 9071; Online Published: March 30, 2017 doi:10.5539/jsd.v10n2p218**

By **Nancy Omolo**

School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Scottsville, Pietermaritzburg, South Africa

Paramu Mafongoya

School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Scottsville, Pietermaritzburg, South Africa

pastoralists. Male-headed household are more resilient than female-headed households. Access to basic services is contributing more in the resilience score than assets, gender of house hold head and age. Generally, few families in this region have very high resilience score.

Keywords: *gender, pastoralism, vulnerability, adaptive capacity, resilience, climate change*

7.1. Introduction

Climate change predictions for Africa indicate that there will be reduced water availability and expansion of the arid and semi-arid regions in sub-Saharan Africa due to climate change (Intergovernmental Panel on Climate Change [IPCC], 2007). The impact of climate change will not be uniformly distributed in countries within Africa or within the same country (Busby *et al.,* 2011). In Sub-Saharan Africa pastoralists inhabit the arid and semi-arid (ASAL) regions which have diverse climate and receive low rainfall. Galvin *et al.* (2004) state that while East African pastoralists have been able to track climate variability very well in the past, their strategies, based on centuries of exposure to intra- and inter-annual droughts, as well as floods, are not working now due, in part, to an inability to implement them. Moreover, drought affected areas have been estimated to double by the end of the century (from 25% to 50%) and drought periods will likely last longer (Birch and Grahn, 2007).

Most pastoral activities in Kenya are concentrated within the country's vast semi-arid and arid regions. Kenya is vulnerable to climate change, like many other countries in sub-Sahara Africa. Pastoralism which is one of Kenya key economic sector will be affected by the persistent droughts. In the year 2011, Kenya and the Horn of Africa experienced one of the worst droughts which led to starvation, malnutrition, human and livestock deaths mainly in the pastoralists inhabited areas in Northern Kenya (Haro, 2012 and Reuters, 2011). According to the National Climate Change Strategy (NCCRS, 2010) the increased reoccurrence of droughts in Kenya's have reduced famine cycles from twenty years between 1964 and1984, and then to twelve years between 1984-1996. Furthermore, the drought cycles have reduced to two years between 2004 and 2006 and then to yearly basis in the following years of 2007, 2008 and 2009 (GoK, 2010).

Adaptive capacity is influenced by many factors including: gender, ethnicity, religion, literacy

levels, culture, disability and age (Denton, 2002 and Enarson, 2002). Other factors that influence adaptive capacity in the pastoral system include: mobility (i.e. access to natural resources); and access to resources (i.e. financial resources and technology). The adaptation strategies include capital in terms of knowledge and know-how pastoral communities use to respond to climate change and variability (Sonwa et al., 2016).

Adaptability form a core part of resilience. According to Folke et al., 2010, it is evident that increasing resilience can be realised by reducing vulnerabilities and increasing adaptive capacity. Resilience can be achieved for every specific risk by reducing sensitivity, exposure and increasing adaptive capacity. These measures can be achieved by intervening into all different dimensions namely: biophysical, economic and social. IPCC (2014) defines resilience as the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation. Miller et al. (2010) explains that there is a time dimension to the resilience concept: a system is resilient when it is less vulnerable to shocks across time, and can recover from them. Adger (2000) argues that these external stress and disturbances can be due to environmental, political and social change.

Three aspects are critical to resilience thinking: resilience, adaptability and transformability (Folke et al., 2010). Transformability can be defined as the capacity to create a completely new system when ecological, economic, or social structures make the existing system unsustainable (Walker et al., 2004). It is evident that processes of social learning and communication across multiple institutional scales, community reorganization, and adaptive capacity are critical when building general resilience of marginal societies to climate change (Osbahr et al., 2008). The policies developed at national levels can be insensitive to local needs. At times they do not provide the rural poor with access to the assets and services they need to allow them to innovate and adapt to the ways that can increase resilience to climate variability and change. To facilitate climate adaptation actions to deliver resilience, local perspectives and knowledge need to be acknowledged and given due priority in formal planning systems (Sharma et al., 2015). At present, resilience thinking does not give sufficient recognition to the already existing accounts of, for instance, institutional change trajectories, the dynamics of path dependence, the distributional character of

institutions, or the fundamental political determinants and drivers of institutional design and diversity (Sjöstedt, 2015).

Most research undertaken on climate change and livelihoods have not focused on collecting and analysing gender disaggregated data, this has led to the assumption that climate change impacts on the livelihoods of women and men in the same way (Dankelman, 2002 and Food and Agricultural Organisation [FAO], 2003). Furthermore, there has been a slow progress in recognising the social dimension of climate risk despite years of research by social scientists (Fothergill, 1996, Moosa and Tuana, 2014).

Many women remain vulnerable not because of their sex, but because of the gender differentiation between women and men (Aguilar, 2010). Gender differentiation in adapting to climate change is affected by availability of natural resources, access to assets, international and national legal policy frameworks (Djoudi and Brockhaus, 2011). Women pastoralists are vulnerable due to a number of factors: cultural restrictions, poverty, conflicts, unfavourable government policies for the ASALs and national legal frameworks over the years has not promoted women participation in decision making (FAO, 2003 and GoK, 2004).

Understanding gender differentiation in adaptation to climate change is very important. This is because in sub-Saharan Africa women play a significant role in food *security and adapting to climate change at the household level (UNDP, 2009) and (Nellemann* et al., 2011). It is vital for policy makers to consider factors driving women choices of adaptation (Nduma et al., 2001). Prioritizing gender issues therefore involves focusing on the inequalities between women and men, in addition to other factors that cause them, in terms of their positions, needs and gender roles (Meer, 2007). Applying a gender lens contributes to a better understanding of the different experiences of disasters between women and men, and different groups in terms of ethnicity, race and age (Le Masson, 2015).

7.2. Methodology

7.2.1 Study Location

The two study sites are Katilu (agro-pastoralist zone) and Namoruputh (primary pastoral zone) in Turkana County in North Western Kenya. Katilu Location is in Katilu Division in the south of Turkana County. It is an irrigation scheme along the Turkwel River. Namoruputh location is in Loima Division in the Central of Turkana County. Namoruputh is not situated next to any river or lake.

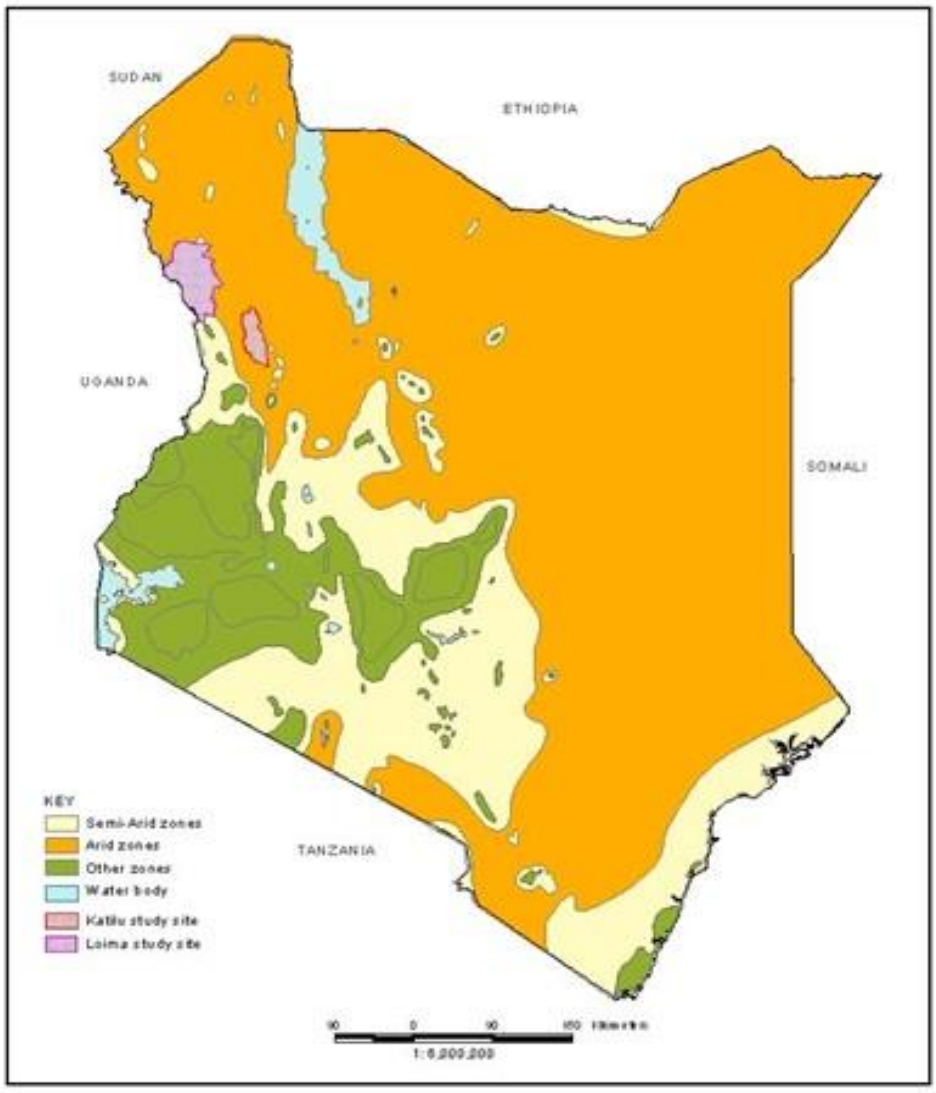

Figure 7.1: Map of Kenya showing Loima and Katilu Divisions in Turkana County.

Source: Author 2016

Turkana County was selected for the study on the basis that it has been subjected to historical and recurrent droughts that have left the regions vulnerable. Turkana County is in arid and semi-arid land (ASAL) area where managing short-term climatic fluctuations as well as adapting to long-term changes is critical to sustaining livelihoods. It experiences several structural challenges characterizing low development and high poverty levels.

Turkana County experiences long rainfall which are usually erratic and unreliable between the months of April and July. While short rains are experienced between the months of October and November. The rainfall ranges 52mm and 480mm annually with mean of 200mm. The temperature ranges between 20ºC and 30.5ºC. Turkana County has a poverty index of 94%, and is one of the poorest regions in Kenya (Turkana County Integrated Development Plan – CIDP, 2013). The two study sites of Katilu and Namoruputh were selected to demonstrate the varied livelihood activities within the ASAL region.

7.2.2 Data Collection

This study used triangulation method which includes: the quantitative household survey data, focus group discussions (FGDs), literature review of secondary data sources and key informant interviews (KIIs).

7.2.3 Data Analysis

Structural equation models (SEM) under SPSS software was used. It represent a current statistical technique that is used to handle multivariate data with and additional component to account for measurement error (Byrne, 2010). Adjusting the survey variables for measurement errors is essential since most variables in social science are not directly measurable and the researcher only relies on proxies that are related to this variable of interest. Measurement error models are used to account for this discrepancy between the true measurement and the observed measurement from the field (Blackwell et al, 2015).

Resilience is not observable but can be infered through several proxy variables. There are several frameworks for estimating relience from these proxy. Food and Agriculture organisation has developed a unified SEM approach called RIMA (resilience index measurement and analysis)

based on eight pillars, namely income and access to food; assets such as land and livestock; social safety nets such as food assistance and social security; access to basic services such as water, health care, electricity, etc.; households' adaptive capacity which is linked to education and diversity of income sources; and the stability of all these factors over time. Availability of data capturing all these components in a survey is a big challenge especially in resource challenged countries, with particular reference to African countries. The resilience framework looks at the root causes of household vulnerability instead of trying to predict how well households will cope with future crises or disasters. In this study variables associated to adaptive capacity, household assets and access to basic services were available to be used in the analysis and estimation of resilience index.

The framework adopted for the current study is given in the figure 7.2 below

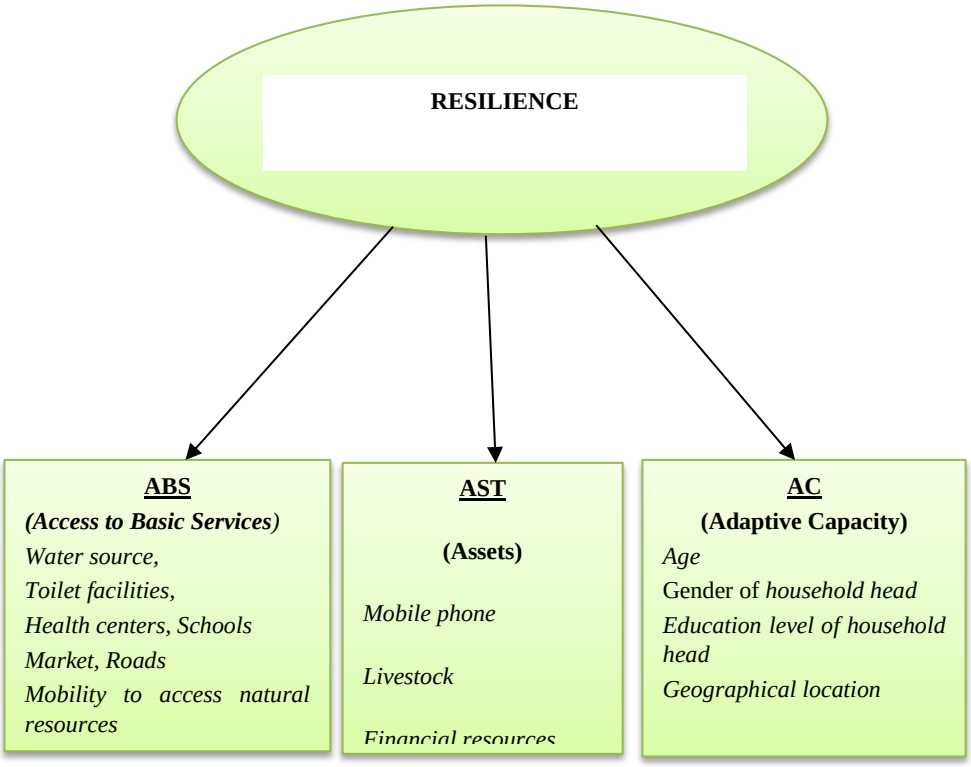

Figure 7.2: Framework Adopted for the Study

Source. Authors

The statistical model (SEM) for this specified framework is as given below

$$ABS_i = \alpha_1 + \lambda_1 \eta_i + \delta_{i1}$$

$$AST_i = \alpha_2 + \lambda_2 \eta_i + \delta_{i2}$$

$$AC_i = \alpha_3 + \lambda_3 \eta_i + \delta_{i3}$$

η_i is a latent variable which represents the resilience score.

δ_i refers to the error term in the model.

α are the intercepts.

7.3. Results and Discussions

The structural model below depics the relationship between resilence and its independent/predictor variables (ABS, AST and AC)

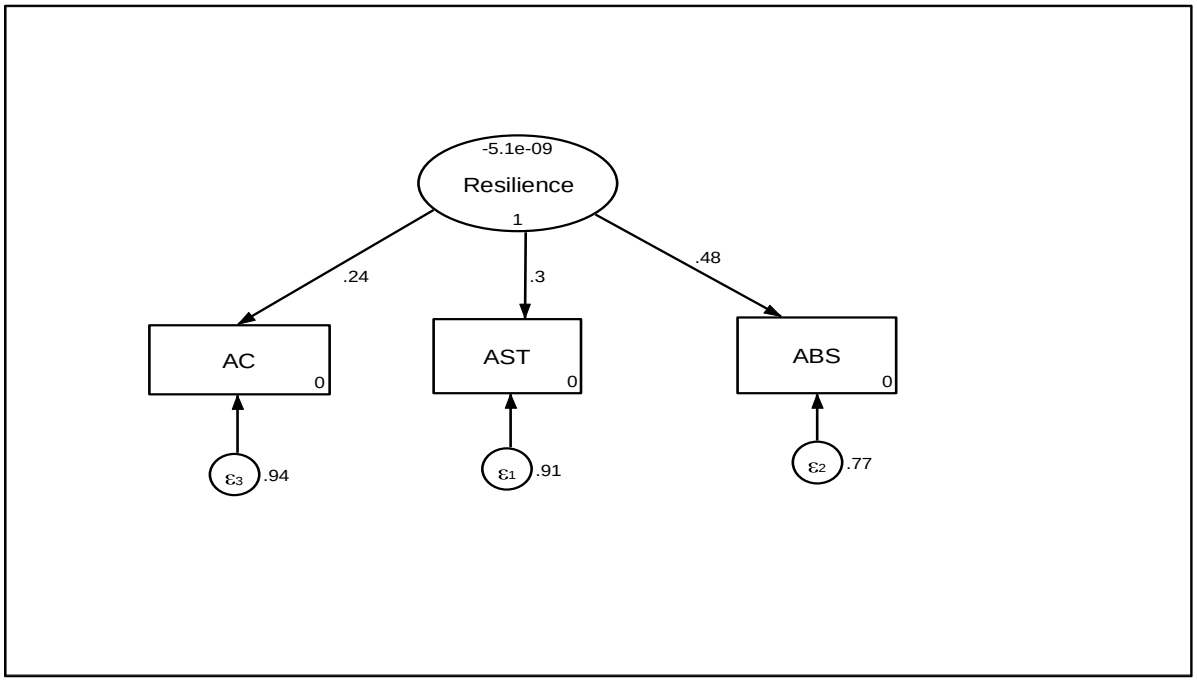

Figure 7.3:Structural equation model diagram depicting the pillars

From figure 7.3 above, it was found that ABS (Access to Basic Services like water source, health services, schools, market, mobility to access natural resources) has the highest loading factor on resilience (r = 0.48) followed by assets - AST (i.e. livestock, mobile phone, access to financial resources and technology) (r = 0.3) and finally adaptive capacity - AC (i.e. age, gender of

household head, education level of household head, culture and ethnicity) (r = 0.24).

7.3.1 Access to Basic Services and Assets

The study finding reveals why Turkana pastoralist are less resilient and vulnerable to climate change. There are inequalities in accessing basic assets in Kenya, for instance, Nairobi's 814, 200 households enjoy the best roads and have numerous schools. A total of 88.3% of Nairobi residence own mobile telephone handsets and 22.3% access to internet connectivity. This is in contrast to Turkana County, where only 15.9 per cent of households own mobile phones. The poverty level in Nairobi is below 30% while the poverty level in Turkana is over 85% (Mwangi 2008).Inequality in Kenya has taken ethno-regional dimensions with some regions and the communities living in those regions being better off than others. This has at times created political tensions between ethnic groups (Wanyande, 2016).

Maddison (2007), argues that there is a positive relationship between the education level of the household head and adaptation to climate. Farmers/pastoralists with higher levels of education are more likely to adapt better to climate change. According to Benor et al (1997) education contributes to creating positive mental attitude towards adoption of modern farming innovations.

7.3.2 Adaptive Capacity

Watson and van Binsbergen (2006) states that pastoralists including Turkana pastoralists have indigenously used risk-spreading strategies over the years that include moving livestock to access the best quality pasture and water available, keeping species-specific herds to take advantage of the heterogeneous nature of their disequilibrium environment, and diversifying economic strategies to include farming, beekeeping and casual labour.

7.3.3 Correlation between Resilience and the Pillars

Table 1 below shows that asset and resilience are positively associated (r=0.539). In addition, the results revealed that that access to basic services and resilience are positively associated (r=0.8537). Lastly, the results showed that asset and resilience are positively associated (r=0.4302).

Table 7.1 Correlation between resilience and the pillars

Component	Resilience	Asset	Access to basic services	Adaptive capacity
Resilience	1.000			
Asset	0.5396	1.000		
Access to basic services	0.8537	0.1464	1.000	
Adaptive capacity	0.4302	0.0738	0.1168	1.000

7.3.4 Descriptive Statistics of Resilience Score

The average resilience among household in this sample was found to be 23.001(17.104). A box plot of resilience shows that a few families in this region have very high resilience resulting to outliers.

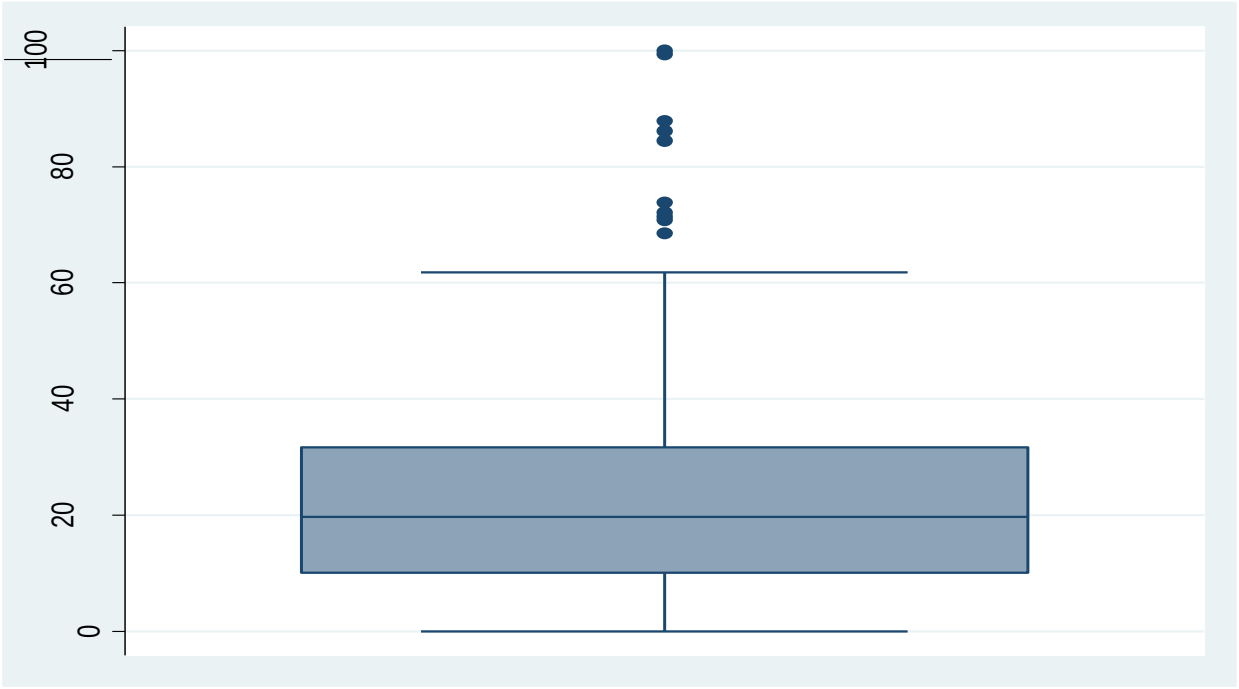

Figure 7.4: A box plot of resilience

Table 2 below shows that the mean score for resilience was 23.001 with a standard deviation of 17.104. It's minimum and maximum was 0.00 and 100 respectively.

Table 7.2 Descriptive statistics of resilience score

Variable	n	Mean	Std. Dev.	Min	Max
Resilience	386	23.001	17.104	0	100

7.3.5 Resilence by Gender of Household Head

Figure 4 below shows resilience by gender of household head. The average resilience for male was 27.6 while that of female 21.2. Household headed by male are more resilient than households headed by female. To check whether this difference in resilience was statistically significant, a two sample independent t-test was carried out. The results are shown in table 3.

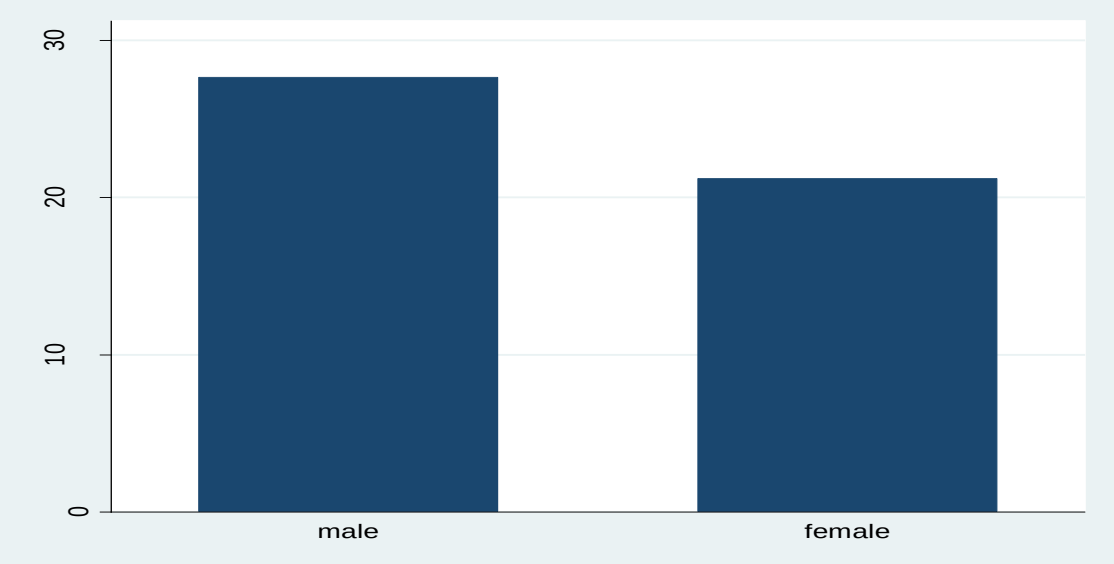

Figure 7.5: Resilence by gender of household head

The test statistics was found to be 3.374 (df = 384), with a p-value of 0.0008. This implies that resilience is statistically different between household headed by female and male.

Empirical research has shown that there is poverty differentiation between female-headed households (FHHs) and male-headed households (MHH). According to Buvinic (1993 cited in Appeleton, 1996:1819) not all FHH household are more vulnerable than the MHH. It is vital to disaggregate data according to different types of FHHs. This is because FHHs by widows are more likely to be vulnerable as compared to FHHs by married women which are likely to be more prosperous. In any of the observed variables, women have lower access to productive assets. This is in line with the current literature which states that women are vulnerable. For example, they have lower access to land, livestock, lower wealth index and participation score. Sonwa et al (2016) states that female-headed households in Turkana are more likely to lack labour for herding and accessing better pastures, which tend to be located in conflict-prone areas.

7.3.6 Resilience by Gender of Administrative Units (Division)

Figure 3 below shows resilience by gender of administrative units. The average resilience for

Katilu was 23.6 while that of Loima 21.4. Households in Katilu division seem to have higher resilience as compared households in Loima division.

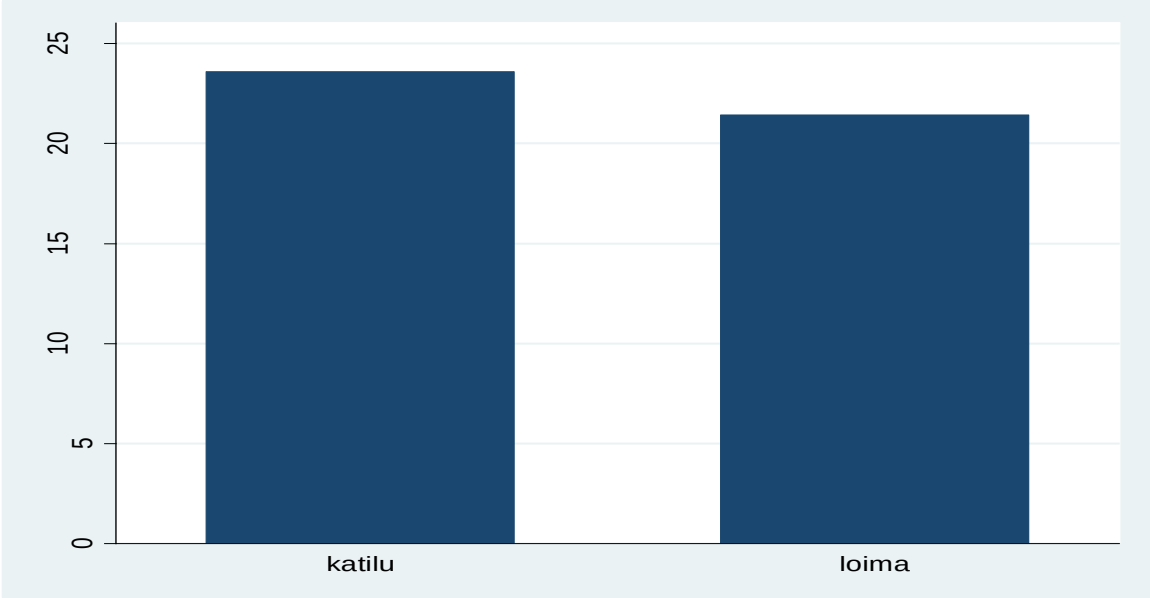

Figure 7.6: Resilience by gender of administrative units (division)

To check whether this difference in resilience is statistically significant, a two sample independent t-test was carried out. The test statistics was found to be 1.094 (df=384), with a p-value of 0.2745. This implies that resilience is *not* statistically different between households in Katilu and Loima divisions of Turkana. The study results shows that women in agro-pastoral zone are more resilient than women in primary pastoral zone. Livelihood diversification varies according to agro-ecological zones.

Omolo (2010) states that livelihood diversification varies according to agro-ecological zones. Katilu is an agro-pastoralist area situated next to river Turkwell. The livelihoods sources in Katilu include selling agricultural produce. There is less farming activities in Namoruputh because the area is very dry.

7.4. Conclusion and Recommendations

From the results and findings above, the study concludes that access to basic services, assets and adaptive capacity are positively and significantly related to resillience. The study further concludes that access to basic services like water, health services, schools, market and mobility to access natural resources has the highest loading factor on resilience , followed by assets like livestock, financial resources and technology, and finally adaptive capacity like age, gender of household head, the education level of the household head, geographical location and culture. The study results shows that women in agro-pastoral zone are more resilient than women in primary pastoral zone. Household headed by male are more resilient than households headed by female.

This study findings helps the government of Kenya and development agencies understand how effective targeting can lead to livelihoods transformation. This study informs policy makers in prioritization of development programmes/projects to ensure inclusivity and address livelihood issues. The focus on analysis of gender and resilience helps policy makers to get a better understanding of the gender dynamics in social-ecological resilience. Further research, however, is needed to determine how gender, participation and decision making contributes to resilience.

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CHAPTER 8

GENDER, DECISION MAKING AND RESILIENCE TO CLIMATE VARIABILITY AMONG PASTORALISTS IN TURKANA KENYA[4]

Abstract

This paper highlights the significance of participation, specifically those of gender, in shaping knowledge production, decision-making, resource distribution, and thus, resilience to climate variability. The gender and development approach has been used to argue that women and men face their social, economic and environmental realities in different ways. How they participate is also different and is closely related to age, sex, socio-economic class, culture and marital status. This research aims to assess whether women and men participation in decision making process can increase their adaptive capacity to climate variability. The research undertook literature review of secondary data sources, conducted focus group discussions and key informant interviews. The statistical package for the social sciences was used to analyse data for the quantitative part of the study. It was found that participation has the highest loading factor on resilience. This is followed by assets, access to basic services and finally adaptive capacity. Generally, the resilience score in Turkana is generally low.

Keywords: *Gender, Decision Making, Pastoralists, Resilience, Climate Variability*

[4] ***Submitted to Journal of Agricultural Science***

By **Nancy Omolo**

School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Scottsville, Pietermaritzburg, South Africa

Paramu Mafongoya

School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Scottsville, Pietermaritzburg, South Africa

8.1. Introduction

Climate change is a global problem with local impacts. Drought occurrence has become increasingly severe during the last decade in the Africa Region, most regions have received rainfall totals of at least 50–75 % below normal, amounts that are not sufficient to support crop and pasture growth for livelihood security (Nicholson 2014). Kenya is vulnerable to the impacts of climate change due to the country's high dependency on climate sensitive sectors like agriculture, tourism, wildlife, tourism, energy, water and health. Kenya's economy remains highly dependent on a number of climate-sensitive sectors, including agriculture, tourism and energy production. This sensitivity is due in large measure from the dependence of these economic sectors on a sufficient supply of water (Parry et al., 2012). Impacts of climate change, such as drought, floods, and extreme weather events have led to reduced food and water security. Climate variability affect women and men differently with the poorest being the most vulnerable. At least 70 per cent of the world's poor are women and they play a crucial role in climate change resilience and mitigation actions (UNDP, 2007).

Eneyew and Mengistu (2013) argues that both women and men have vital roles in the building resilience to climate variability within the pastoral systems. Women play a fundamental role as livestock keepers, natural resource managers, income generators, and service providers, tasks which, in themselves, are influenced by gendered norms, values, and relations. Despite women's contribution they have very limited access to, and control over key resources such as land and livestock. Women's roles in the pastoral system have not been fully recognized. Women are still excluded from decision making process and this weakens their position within the society (Katushabe, 2014). It is increasingly evident that involving women and men in all decision-making processes on climate action is a significant factor in meeting the climate challenges. Thus, it is important to appreciate the women pastoralists' knowledge of and contributions to sustainable land management, and the coping mechanisms they have developed in their struggle to survive. Their indigenous knowledge should be utilized and they should be supported in order to overcome modern challenges (Hannah, 2007).

Furthermore, women are often faced with difficulties when it comes to the general accessibility of financial resources, education, capacity-building activities and technologies. This is usually an

obstacle in the way of women's empowerment in general and their role in relation to climate change adaptation and mitigation in particular (Meinzen-Dick et al., 1997). A study undertaken by Phiri et al (2004) revealed that there is no evidence of an association between either wealth or gender and the planting of improved fallows, while the assumption is that male farmers and high income farmers tend have high rates of adoption for new agricultural practices. Therefore there is an opportunity to introduce new technologies to low income pastoralist's women and men in Turkana.

Sustainable Development Goals (SDGs 5) addresses gender issues. It aims to achieve gender equality and empower all women and girls. Under SDG 5 the targets aims to: Promote women's full and effective participation in all levels of decision making in political, economic and public life; Ensure women equal rights to economic resources, access to financial services, inheritance and natural resources, guarantee women access to and ownership of land and other forms of property in accordance to the national laws; and Encourage the use of enabling technology, especially information and communications technology to promote the empowerment of women (United Nation, 2015).

8.1.1. Gender and Political Representation

Political decision making is evidently gendered policy issue. The area of concern has been the under-representation of women in processes in political decision-making, in terms of the number and type of women holding political positions, elected or nominated ones. Further analysis examines the extent to which processes of political decision-making and their outcomes adequately meet the needs and interests of both sexes wherever they might differ (Meier, 2004). The focus has mainly been on the low number of women participation in the political process. Generally, the issue of the gender balance in political decision making has been the agenda of most countries. The participation of women and men in the political decision making varies from country to country and has been dealt with differently by various countries.

Gender Empowerment Measures (GEM) is a measure of inequalities between men's and women's opportunities in a country. It combines inequalities in three areas: political participation and decision making, economic participation and decision making, and power over economic

resources. It is one of the five indicators used by the United Nations Development Programme in its annual Human Development Report. This index also has four indicators: female members of the Legislature, female participation in selected positions in public and private sector, female participation in academic and technical work, and estimated income (UNDP, n.d) The UNDP does not have a GEM value for Kenya due to non-availability of data and therefore Kenya is not ranked.

The global gender index for Kenya is 0.702 at number 63 out of 144 countries globally. The highest possible score is 1 showing equality and the lowest possible score is 0 showing inequality. Countries such as Rwanda is number 8 with a score of 0.8, Burundi is number 12 with a score of 0.768, Namibia is number 15 with a score of 0.765, South Africa is number 15 with a score of 0.764 and Zimbabwe is number 56 with a score of 0.71, and are all placed above Kenya. But Kenya is ahead of Brazil at number 83 with a score of 0.687, China at number 99 with a score of 0.676 and United Arabs Emirates at number 124 with a score of 0.639. There is wide spread of country performance among the 30 countries covered in the Sub-Saharan Africa region. The diversity of outcomes is frequently driven by different performance on the educational attainment sub-index. In other regions, the largest diversity of outcomes exists across the economic participation and opportunity and political empowerment sub-indexes, whereas performance differences across the educational attainment and health and survival sub-indexes tend to be comparatively minor (World Economic Forum, 2016).

Kenya promulgated a new constitution in the year 2010, which provides a powerful framework for addressing gender equality. It marks a new beginning for women's rights in Kenya; seeking to change the indigenous exclusion of women and promote their full involvement in every aspect of growth and development (USAID, n.d). It provides for one third gender representation recruitment policy in all public offices. The constitution is being implemented for the first time after the general elections in March 2013. This is in line with the Human Development Report (1995), which states that there should be a target of 30 percent of women in all spheres of political and social life for an impact to be felt.

In the year 2013, 16 women and 274 men were elected to the national assembly. Additionally, 47 women were elected to serve as county women's representatives, a new position created under the

new constitution to fulfill the affirmative action principle popularly known as the two thirds gender principle. At least 5 women were nominated out of the total 12 nominated seats for special interest groups. Currently, there are 68 women (19%) in the national assembly. In the senate, part of the bicameral parliament, women did not win any of the 47 elected seats. Nevertheless, 16 women were nominated from party lists in proportion to the number of seats won by each party. Another two were also nominated to represent the youth and people with disabilities. In total there are 18 women (27%) in the senate. In the 47 county assemblies, the second tier of devolved government, women won 82 out of 1450 elected seats, thus 5%, for ward representatives. An extra 680 women were nominated in order to meet the two-thirds rule. Currently, there are 762 women (34%) in county assemblies. (Mzalendo 2015; Thomas Reuters Foundation News, 2013).

Despite the progress made, Kenyan women have the lowest level of parliamentary representation at 19 percent, compared with at least 30 percent in all its east African neighbours like Rwanda, Uganda and Tanzania. Since 1963 to 2012, Kenyan voters elected 50 women and 1806 men to parliament (Thomas Reuters Foundation News, 2013).

8.1.2. Gender and Education

Over the last decade, Kenya has made significant progress in education, realising gender parity in primary education enrolment and near parity at secondary level. In the year 2007, the government of Kenya introduced free primary school. The Economic Survey (2017) shows that the gross enrolment rate (GER) in Secondary schools rose from 63.3 per cent in 2015 to 66.7 per cent in 2016. Likewise, net enrolment rate (NER) rose from 47.8 per cent in 2015 to 51.3 per cent in 2016. These changes can be attributed to the continued implementation of Free Day Secondary Education (FDSE) and the disbursements of bursaries from the National and County Governments; and the Constituency Development Fund.

However there still exist some challenges to achieving universal literacy levels for both girls and boys, for example: the persistent high level of poverty, particularly in urban slums and rural, inability of most families to cover the cost of their children’s education and opportunity costs for sending children to school are high, and the socio-cultural norms whereby families tend to give priority to boys' education when faced with financial constraints (UNESCO, 2011).

8.1.3 Inheritance Rights

The 2010 constitution provides equal inheritance rights to women and men. Though there are gaps in the implementation as it conflicts with most indigenous cultures and some religions which do not provide inheritance for women. The 2010 CEDAW report states that in some recent inheritance cases, judges have in fact referred to the provisions in CEDAW and other international legal instruments to rule in favour of daughters receiving an equal share of inheritance (OECD, n.d).

8.2. Materials and Methods

8.2.1 Study Area

Turkana County borders Ethiopia, South Sudan to the north and Uganda to the west. It is universally renowned as the cradle of mankind: in Turkana County and the Omo Valley in southern Ethiopia to northeast, archaeologists have found the oldest ancestors to modern humans, dating back more than one million years ago.

The two study sites are Katilu (agro-pastoralist zone) and Namoruputh (primary pastoral zone) in Turkana County in North Western Kenya. Katilu location is in Katilu Division in Turkana South District. It is an irrigation scheme along the Turkwel River. Namoruputh location is in Loima division in Turkana Central District. Namoruputh is not situated next to any river or lake.

Turkana County was selected for the study on the basis that it has been subjected to historical and recurrent droughts that have left the regions vulnerable. Turkana like other pastoralist areas in East African countries tend to have the highest incidence of poverty and the least access to basic services compared with non-pastoralist areas. Due to recurrent droughts the Turkana people have long struggled to access sufficient food and water. Historic marginalization and their livelihood in a fragile ecosystem make them especially vulnerable to the effects of any changes in the environment and climate. Turkana County is in arid and semi-arid land (ASAL) area where managing short-term climatic fluctuations as well as adapting to long-term changes is critical to sustaining livelihoods. Turkana situation illustrates how climate change could aggravate existing

obstacles to the realization of basic human rights and challenge the ability of governments to protect and fulfil those rights enshrined in their constitution.

Turkana County experiences long rainfall which are usually erratic and unreliable between the months of April and July. While short rains are experienced between the months of October and November. The rainfall ranges 52mm and 480mm annually with mean of 200mm. The temperature ranges between 20ºC and 30.5ºC. Turkana County has a poverty index of 94%, and is one of the poorest regions in Kenya (Turkana County Integrated Development Plan – CIDP, 2013). According to Turkana Annual Development Plan (2015) states that despite the high level of poverty in Turkana, the proportion of Kenya's population living below the poverty line declined from 52.6 percent in 1997 to 45.9 percent in 2005/06. The population of the food poor in Turkana County is at 72.7%. The multiple tragedies such as postelection violence, severe droughts and recession during the years 2008, 2009 and 2011 have led to increase the poverty levels. The two study sites of Katilu and Namoruputh were selected to demonstrate the varied livelihood activities within the ASAL region.

Turkana County is experiencing rapid population growth. Turkana County government states that the current population growth rate is 6.4% per annum, with an estimated 1,256,152 people in 2015 (Human Rights Watch, 2015). Turkana County is administratively divided into 6 sub-counties, 17 divisions, 56 locations that are further sub-divided into 156 sub-locations.

8.2.3 Sample size

Stratified random sampling was adopted for this study. The determination of the sample size was based on the demographic data and the clustering of households in the settlement areas using statistics from the Kenya Bureau of Statistics (KBS), Turkana County Government and Arid Lands Resource Management Project (ALRMP) in Turkana and from the public administration officers (Chiefs).

The unit of analysis was the individual household, with every third household being selected for data collection. The target respondents of the closed/structured survey questionnaires were based

on gender (either a woman or a man household head) in an alternating way. The total populations of the study sites were as follows: Namoruputh – 2 075; Katilu – 5 509. The numbers of households in the two study areas were: Namoruputh – 346 and Katilu – 918 respectively. To enhance statistical accuracy during data analysis, 30% of the households were sampled, giving the following sample sizes: Namoruputh – 104 households; Katilu – 275 households. Thus a total of 379 households were interviewed.

8.2.4 Data Collection

This study used triangulation method which includes: the quantitative household survey data, focus group discussions (FGDs), literature review of secondary data sources and key informant interviews (KIIs). The data was collected between the years 2009 – 2015.

8.2.5 The Gender and Development Approach

Women and men face their social, economic and environmental realities in different ways. How they participate is also different and is closely related to age, socio-economic class and culture. It is therefore important to incorporate a gender approach in the analyses of climate change to help understand how the identities of women and men determine different vulnerabilities and capacities to deal with climate change. Furthermore, a gender approach can also be helpful in designing and implementing policies, programmes and projects that lead to greater equity and equality. Especially, it may contribute to building more capacity to adapt to and mitigate against climate change impacts, because it gives a clearer and more complete view of the relations people have built with ecosystems (United Nations Development Programme, (UNDP, 2009).

8.2.6 Data Analysis

In evaluating whether participation in community decision making process affects resilience of a household, this study has used the multiple indicator multiple outcomes (MIMIC) model.

Structural equation models (SEM) is a powerful multivariate tool used to estimate latent variables which cannot be measured in the field (Kaplan, 2000). MIMIC model is an extension of the

structural equation modeling framework that allows the latent variables to be used as dependent and independent variables at the same time (Chung et al., 2005). MIMIC model involves using latent variables that are predicted by observed variables in other regression models that are desired by the user.

MIMIC models provide a better understanding into the correlations between observed dependent variables, latent variables and observed independent variables. MIMICS has two advantages (Brailean et al 2015). Firstly, it allows for simultaneous detection of associations between the observed and unobserved variables. Secondly, it allows for the quantification and detection of direct relationships between observed dependent and observed independent variables, after controlling for the presence of unobserved variables.

The framework for the model proposed in this study is shown in the figure 8.1 below

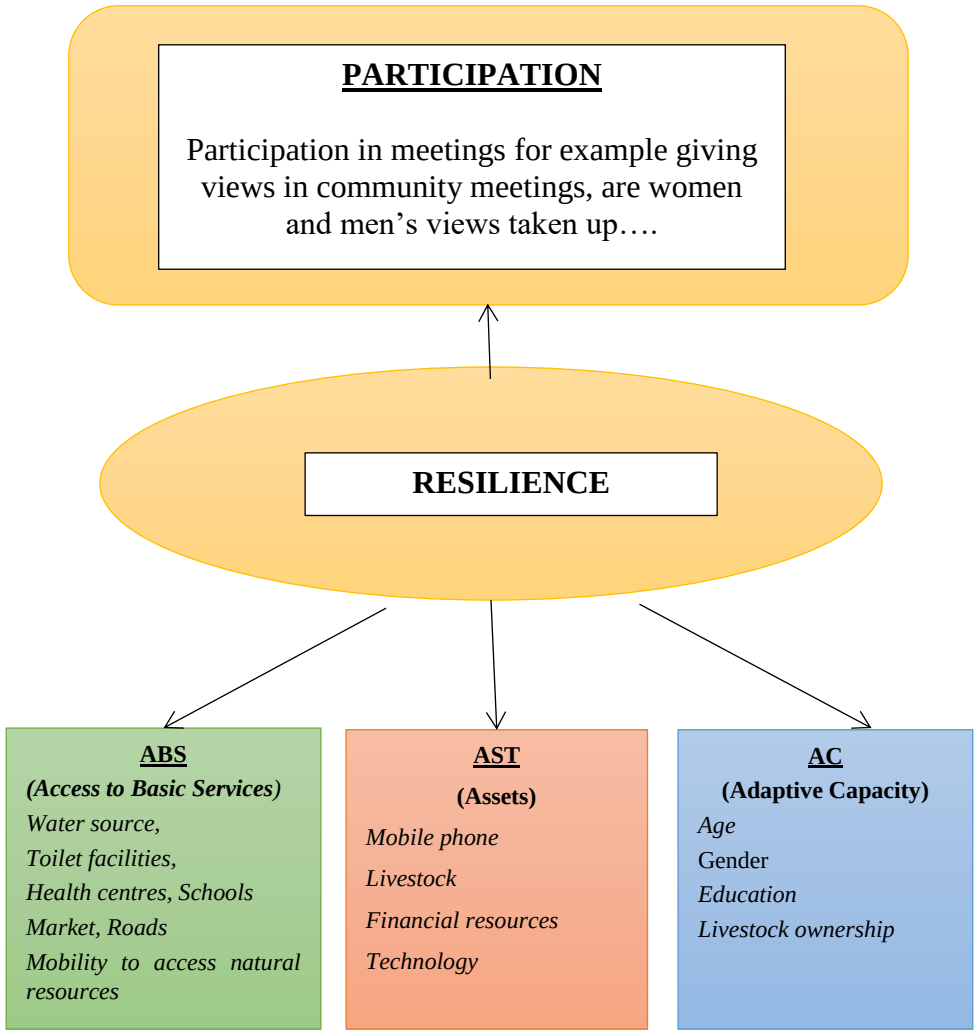

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Figure 8.1: The framework adopted for the current study

Source. Authors

The statistical model (MIMIC) for this specified framework is as given below:

$$ABS_i = \alpha_1 + \lambda_1 \eta_i + \delta_{i1}$$

$$AST_i = \alpha_2 + \lambda_2 \eta_i + \delta_{i2}$$

$$AC_i = \alpha_3 + \lambda_3 \eta_i + \delta_{i3}$$

$$\eta_i = \omega + \psi Partc_i + \xi_i$$

η_i is a latent variable which represents the resilience score.

λ_j are the factor loadings.

δ_{ij} refers to the error term in the model.

α_j are the intercepts.

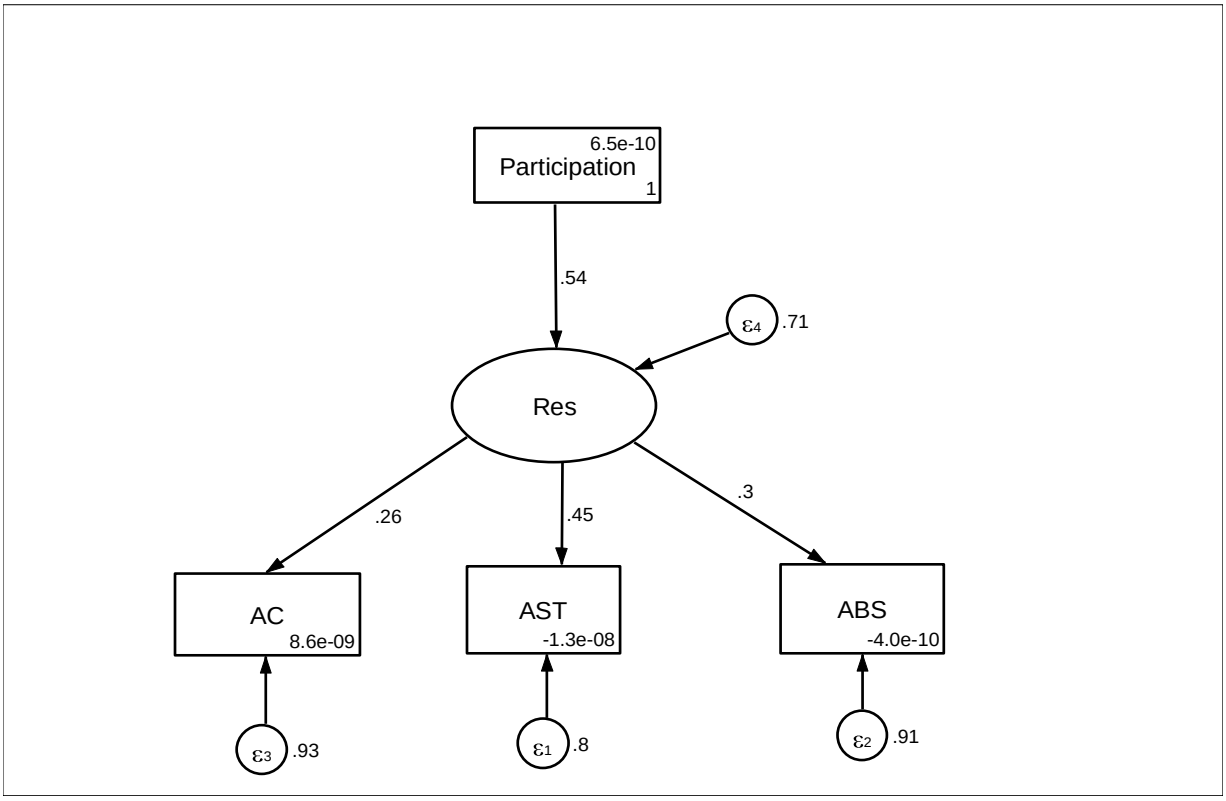
ξ_i is the Berkson measurement error.

ψ is the slope.

ω is the intercept.

8.3. Results and Discussions

The structural model below illustrates the relationship between resilience and its independent/predictor variables (Participation, ABS, AST and AC).



8.3.1 Gender and Participation in Kenya

Kenya is making major strides politically in opening a space for women to be heard in the Cabinet, Senate and the national and county assemblies. Worldwide, women have been side-lined in politics and Kenya is no exception. Kenya is still a patriarchal society and which is reflected through the election of political leaders where, men have dominated by numbers in the National Assembly over the years (The Daily Nation, 2014).

There is limited participation of women in national politics in Turkana. Before the enactment of the new constitution of 2010, the proportion of seats held by women in national assembly

parliament from the Turkana was zero by 2012 compared to 22 nationally (Turkana Annual Development Plan, 2015). In the period 2013 – 2017 there is only one women representative member of parliament from Turkana County.

8.3.2 Age and attendance of meetings

Table 8.1: Age and attendance of meetings

No significant difference between age and attendance of meetings.

Age of respondent	I always attend the meetings
21 years & below	50.0%
21-30	71.9%
31-40	76.7%
41-50	77.6%
> 50 years	80.4%
Chi-Square Value= 6.33; df=4; p=0.176> 0.05	

8.3.3 Gender and Decision Making

Table 8.2: Gender and Decisions Making on Cultural Issues

Table 8.2 shows that there is a significant difference between gender of respondent and decision making on cultural issues (p= 0.012< 0.05).

Who makes decisions on cultural issues affecting the family?			
Gender of respondent	Women	Men	Both men and women
Male	6.1%	29.3%	30.9%
Female	93.9%	70.7%	69.1%
Chi-Square =8.81; df= 2 p=0.012< 0.05			

In some circumstance elderly women within the pastoral communities have ensured that these indigenous practises which are sometime harmful to girls and younger women like early marriage are adhered to. There are still the stereotypes that women are an inferior sex and their roles should be limited to reproductive roles within the household.

8.3.4 Level of Education and Decision Making

Table 8.3: Level of Education and Decision Making

There is no significant difference between who make who makes decisions on Resource use affecting the family and the level education since majority of the respondents 78% did not attend formal schooling.

	Who makes decisions on Resource use affecting the family?		
Level of education	Women	Men	Both men and women
Did not attend school	83.9%	82.9%	72.7%
Lower Primary (1-4)	6.5%	4.5%	9.1%
Upper Primary (5-8)	6.5%	5.4%	10.6%
Adult Education	3.2%	6.3%	3.0%

Secondary	0.0%	0.0%	1.0%
College	0.0%	0.9%	2.5%
University	0.0%	0.0%	1.0%
Chi-Square =13.94; df= 12 p=.305>0.05			

The national adult literacy rate in Kenya is 61.5% and a numeracy rate of 64.5%. Urban areas have higher literacy rates than rural areas. For example, Nairobi, the capital city, has an adult literacy rate of 87.1 per cent while North Eastern Province has an adult literacy of 9.1 per cent. The regional disparities confirm the trend where areas those from economically well off families or regions have a head start in terms of academic achievements compared to those poor families or regions (softkenya, n.a). The literacy level in Turkana County is low and is estimated to be at 46%. There has been efforts by the government and non-state actors to bring the illiteracy levels down in the county down through increasing enrolments in Adult Education Programme and increasing access to basic primary education as well (Turkana County Investment Development Plan, 2013). The education system should be designed in a way to eliminate barriers such as gender, age, socio-economic, geographical and policy.

8.4 Livestock Ownership

Livestock is an important source of livelihood in pastoral system. This section looks at the relationships between gender and livestock ownership for example: chicken, cows, and camel. Livestock ownership vary amongst different pastoralist communities in Africa. There is variations in gender dynamics amongst pastoralists and agro-pastoralists in their control of resources, division of labour and decision making process, and which has not been very well understood by policy makers. Njuki and Sanginga (2013) states that women's role in livestock production and marketing varies from one production system to another, from region to region and from country to country.

8.4.1 Gender and Livestock Ownership (Chicken)

Pastoralists rarely keep chicken, however because of the recurrent droughts and increase in cattle rustling pastoralists have begun to diversify their livelihoods. Thus chicken is mostly reared by

women for food security and for sale. Gender roles differ in the management of cattle, goats, chicken and other animals.

Table 8.4. Gender and Livestock ownership (Chicken)

There is no significance difference between gender of respondence and livestock ownership (Chicken).

	Which type of ownership do you have on chicken if you own one?		
Gender of respondent	I don't own	I own by myself	I own with someone else
Male	42.1%	51.4%	6.5%
Female	56.6%	36.1%	6.2%
Chi-Square =8.71; df= 3; p=0.087>0.05			

8.4.3 Gender and Livestock Ownership (Cows)

Table 8.5 Gender and Livestock ownership (Cows)

There is a significance difference between gender of respondence and livestock ownership (cows) (p=0.001<0.05).

	Which type of ownership do you have on cows if you own one?		
Gender of respondent	I don't own	I own by myself	I own with someone else
Male	58.9%	33.6%	7.5%
Female	79.8%	15.1%	4.0%
Chi-Square =20.56; df= 5; p=0.001<0.05			

A study done in Tanzania by Nguvava et al (2009), shows that for example in indigenous pastoral societies, almost all cattle belong to men, and women only control cattle allocated to them by men. Household management and decisions on animals are made by older men, while young men are involved in herding animals and women are responsible for milking cows and care of young animals. The difference with agro-pastoral system is that men own most of the cattle while women owns crops and poultry. In certain instances women can own cattle through inheritance and they

can also purchase animals with income from other activities, but through consultation with the men.

8.4.4. Gender and Livestock ownership (Camel)

Table 8.6 indicates that there is a significant association between gender and Camel ownership at 5% two tail test (p= 0.012), the correlation is weak (r=-.129). Camel is regarded as the most luxurious desert animal within the pastoralist's communities in Kenya. Camels are mostly owned by men.

Table 8.6: Gender and Livestock Ownership (Camel)

Table 8.6 shows that there is a significance association between gender of respondence and livestock ownership (camels) (p=.0.001<0.05).

	Which type of ownership do you have on camels if you own one?		
Gender of respondent	I don't own	I own by myself	I own with someone else
Male	65.1%	32.1%	2.8%
Female	82.8%	13.6%	3.7%

Chi-Square =17.83; df= 4; p=.0.001<0.05

Quisumbing et al 2014 argues that there is a common perception that women are more likely own small livestock like chicken, goats and sheep as opposed to other larger livestock like camel and cattle, and therefore would benefit from the sale of small animals. This is supported by a study by Njuki and Sanginga (2013) which shows that women managed more income from the sale of small livestock than from sale of large livestock in Tanzania. While in Kenya there was no difference in income from the management of small or large livestock by women or men. Water-Bayers (1988) study which was done in Nigeria revealed that although women did not own cattle they were in control and managed income from the sale of the milk.

8.5 Conclusion and Recommendations

It was found that participation has the highest loading factor on resilience. This is followed by assets(i.e. livestock, mobile phone, access to financial resources and technology). ABS (access to basic services like water source, health services, schools, market, mobility to access natural resources) and finally adaptive capacity - (i.e. age, gender of household head, education level of household head, culture and ethnicity). Generally, the resilience score in Turkana is generally low. The study showed that there is a significant association between gender of respondent and decision making on cultural issues. There is a significance association between gender of respondence and livestock ownership namely camels and cows.

Recommendations

Generally, the literacy level of women and men in Turkana is low. The literacy level of women is lower than that of men. The education system should be designed in a way that eliminates barriers such as gender, age, socio-economic, geographical location and policy. The free primary education in public schools should be made compulsory for all girls and boys of school age. Narrowing gender gaps in education and learning should be a top priority for the government of Kenya. Moreover, there is the need to promote basic literacy programs for adults. The government and development partners need to prioritise capacity building, and promote women access to productive assets and participation in policy making. The government should ensure the one third gender rule enshrined in the Kenya Constitution of 2010 is adhered to both in the political and

public offices. Strengthening women's access to resources and opportunities will allow them to share more broadly in the benefits of economic growth.

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CHAPTER 9

CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

This specific study examined the relationships between gender and adaptive capacity to climate variability among pastoral communities in Turkana in north-western Kenya. The study used triangulation method which includes: the quantitative household survey data, focus group discussions (FGDs), a literature review of secondary data sources and key informant interviews (KIIs). Data was then analyzed using the Statistical Package for the Social Sciences (SPSS). Focus group discussions and key informant interviews were carried out to obtain qualitative data.

9.1.1 Gender Differences in Perceptions of Vulnerability to Climate Variability in Pastoral Rangelands of Kenya

All participants surveyed have witnessed a change in weather in the last 10 years. The respondents in Katilu and Loima felt that drought is one of the factors which has contributed to changes in vegetation in the last 10 years. The respondents also perceived floods to have led to changes in the livestock over the last 10 years. At the same time, diseases have led to changes in the livestock stock over the last 10 years. There is increased frequency in drought occurrences than in the past, and which is in agreement with the meteorological climate data. Besides climate variability and change pastoralists are experiencing political marginalization and decreased pastureland. Vulnerability is influenced by age and gender. Elderly women are considered to be the most vulnerable to climate variability and change because they are the poorest in the community, followed by elderly men, the disabled, female-headed households, married women, men and lastly the youth. Less than 30% of women and men in both Katilu and Loima are able to read and write. There is a significant association between gender and estimate income per month. It is evident that

issues related to climate change are managed at the household level rather than at the individual level.

9.1.2 Gender, Social Capital and Adaptive Capacity to Climate Variability: A Case of Pastoralists in Arid And Semi-Arid Regions in Kenya

The research main findings revealed that the state of adaptive capacity is reflected in the main economic activities at household level in Turkana which are livestock keeping/pastoralism and farming. The economic activities are highly influenced more by the geographical location and age. There are more farming activities in Katilu than in Namoruputh. This is because Katilu is located next to a river and there is irrigation taking place by the riverbeds. Both women and men participate in livestock keeping and farming.

One argument is that there is a transition from nomadic pastoralism to semi-permanent settlement in Turkana. The transformation is occurring due to economic, political, demographic and environmental changes. At the same time, there is robust evidence that migration is an important adaptation strategy. It can improve access to financial and social capital, and reduce pressure on natural resources.

The most common adaptation strategies include: construction boreholes/reservoirs, migration, and digging shallow wells. The pastoralists in Turkana are still largely dependent on indigenous adaptation strategies built on social capital to cope and adapt to drought. Generally, there is a decline in social capital. The pastoralists in Turkana are still largely dependent on indigenous adaptation strategies built on social capital to cope and adapt to drought. However present socio-economic situation combined with climatic risks cannot support the vulnerable households. There is also significant association between attending a training and using the information to adapt to climate change.

9.1.3 Gender and Resilience to Climate Variability in Pastoralists Livelihoods System: Two Case Studies in Kenya

The study concludes that access to basic services, assets and adaptive capacity are positively and significantly related to resillience. The study further concludes that access to basic services like water, health services, schools, market and mobility to access natural resources has the highest loading factor on resilience , followed by assets like livestock, financial resources and technology, and finally adaptive capacity like age, gender of household head, the education level of the household head, geographical location and culture. The study results shows that women in agro-pastoral zone are more resilient than women in primary pastoral zone. Household headed by male are more resilient than households headed by female.

9.1.4 Gender, Decision Making and Resilience to Climate Variability among Pastoralists in Turkana Kenya

It was found that participation has the highest loading factor on resilience. This is followed by assets(i.e. livestock, mobile phone, access to financial resources and technology). ABS (access to basic services like water source, health services, schools, market, mobility to access natural resources) and finally adaptive capacity - (i.e. age, gender of household head, education level of household head, culture and ethnicity). Generally, the resilience score in Turkana is generally low. The study showed that there is a significant association between gender of respondent and decision making on cultural issues. There is a significance association between gender of respondence and livestock ownership namely camels and cows.

9.2 Recommendations

9.2.1 Gender Differences in Perceptions of Vulnerability to Climate Variability in Pastoral Rangelands of Kenya

It is oblivious that the people in Turkana have lived with drought for many years, and understand the occurrences and impacts. Perceptions of communities to climate change should be considered by policy makers in advancing strategies to mitigate impacts of climate change. Vulnerability of pastoralists to climate change could be reduced by investing in early warning systems, providing pastoralists with information on climate change, promoting livestock insurance index, introducing livestock breeds adaptable to the semi-arid regions, promoting diversified livelihoods, promoting fodder farming and water harvesting. Household specific interventions should be considered in mitigating climate change. Age, gender, and income should be considered in all interventions as vulnerability is linked to age, gender and income. There exists a gap between the technical-scientific approaches and the community information and knowledge status. It is important to know which institutions, policies, knowledge and information gaps to get to, this will contribute to addressing the current drought induced problems.

9.2.2 Gender, Social Capital and Adaptive Capacity to Climate Variability: A Case Of Pastoralists in Arid And Semi-Arid Regions in Kenya

The current adaptation strategies in Turkana indicates that climate change is a developmental issue. There is need for the government and development agencies to invest in social institutions in Turkana to minimize the climatic risk. Improved development assistance and enhanced targeting of the truly vulnerable within pastoral societies demands an acceptance that pastoralists' vulnerability to climate change is neither uniform nor universal, and the need to consider differences like gender, age, marital status and varying geographical locations at the local levels.

Policy makers should understand that the pastoralists in the past have used indigenous knowledge to cope and adapt to climate change. The current recurrent and intensity droughts requires

investment in modern technology, equipping pastoralists with relevant information and skills to make them resilient to climate change, and implementing existing and relevant policies for northern Kenya. Policy makers need to be aware of the current changes/transformation taking place in the arid and semi-arid regions like the transformation from nomadic pastoralism to semi-permanent settlements. There is need for the settled pastoralist to have access to basic services. There is also the need to have urban planning systems in place to deal with the increasing urbanization in these regions.

Migration has been identified as a set of policy tools that can help individuals, households and communities to adapt to climate change. New policies should be developed to improve the conditions of internal migration, including addressing rights to access land and resources. Kenya meteorological department has a key role to ensure that climate information is disseminated at the national level and at the local level. It needs to strengthen its network with the local institutions. There is evidence that capacity building and access to climate information has helped local communities to cope and adapt to climate change.

9.2.3 Gender and Resilience to Climate Variability in Pastoralists Livelihoods System: Two Case Studies in Kenya

This study findings helps the government of Kenya and development agencies understand how effective targeting can lead to livelihoods transformation. This study informs policy makers on prioritization of development programmes/projects to ensure inclusivity and address livelihood issues. The focus on analysis of gender and resilience helps policy makers to get a better understanding of the gender dynamics in social-ecological resilience. Further research, however, is needed to determine how gender, participation and decision making contributes to resilience.

9.2.4 Gender, Decision Making and Resilience to Climate Variability among Pastoralists in Turkana Kenya

Generally, the literacy level of women and men in Turkana is low. The literacy level of women is lower than that of men. The education system should be designed in a way that eliminates barriers such as gender, age, socio-economic, geographical location and policy. The free primary education in public schools should be made compulsory for all girls and boys of school age. Narrowing gender gaps in education and learning should be a top priority for the government of Kenya. Moreover, there is the need to promote basic literacy programs for adults. The government and development partners need to prioritise capacity building, and promote women access to productive assets and participation in policy making. The government should ensure the one third gender rule enshrined in the Kenya Constitution of 2010 is adhered to both in the political and public offices. Strengthening women's access to resources and opportunities will allow them to share more broadly in the benefits of economic growth.

LIST OF APPENDICES

GENDER ADAPTIVE CAPACITY TO CLIMATE VARIABILITY AND CHANGE IN PASTORAL COMMUNITIES: CASE STUDY OF TURKANA IN NORTH-WESTERN KENYA

RESEARCHER: Nancy Akinyi Omolo (PhD Food Security student), University of KwaZulu-Natal (UKZN)

SUPERVISOR: Prof. Paramu Mafongoya, College of Agriculture, Engineering and Science, UKZN; SARCHi Research Chair: Agronomy, Food Security and Rural Development

Appendix 1 - Survey Questionnaire

Introduction

Good morning/afternoon: My name is ……. from the University of KwaZulu-Natal (UKZN). We are conducting a study on: "enhancing adaptive capacity of pastoralists to climate change-induced vulnerability in northern Kenya." We would like to ask you a few questions in relation to the study. The information you provide us will be kept strictly anonymous and confidential and will be used solely for research on finding solutions to common problems.

General Information

Fill Section A, before the interview

Region / Province ……	District ……	Sampling Point (GPS Location) (*optional)* Manyatta
Sub-location	Location	Division

Interviewer Code / Name	Supervisor name: _____ Checked by supervisor : Sign_____ Date_____	Date ---/----/----- Interview time Start:_____ End:_____

Interviewee (Respondent) Information

1. Respondent's Physical Address_____ Tel. No. _____
   a. Village/enumeration areas _____
   b. Name of the Manyatta _____

Gender of Respondent	Age	Occupation	Level of education
a. Male b. Female	a. 18 – 24 b. 25 – 30 c. 31 – 40 d. 41 – 50 e. 51 – 60 f. 61 +	a. Formal Employment b. Pastoralists c. Herdsmen d. Business (Specify) _____ e. Farming f. Fishing g. House wife/Home maker h. Other (specify)	a. Did not attend school b. Lower Primary (1 – 4) c. Upper Primary (5 – 8) d. Adult Education e. Secondary f. College g. University h. Post graduate i. Madrassa j. Other
Religion	Marital status	Type of household	Sources of information
a. Catholic b. Protestant c. Muslim d. African indigenous e. Other f. None g. Declined	a. Single b. Married c. Divorced/ d. Separated e. Widowed	a. Female-headed b. Male-headed c. Child headed	a. Newspapers b. Television c. Radio d. Extension Officers e. NGOs f. Elders g. Other_____
Literacy Level	Place of birth		
Are you able to read and write? a. YES b. NO If YES, in which language? a. English b. Kiswahili c. Local language	Were you born in this location a. Yes b. No If no, Where? _____		

Pastoral Household Information

2. How many people live in the household? _____

3. How many people in this household fall in these age categories?
    a. 0-5 _____
    b. 6-11 _____
    c. 12-17 _____
    d. 18 and above _____

4. How many people in this household fall in the following level of education categories?
    a. No formal education/did not attend school _____
    b. Primary _____
    c. Secondary _____
    d. Tertiary level/colleges/Universities_____
    e. Madrassa_____

5. How long have you lived here?
    a. Less than 5 years
    b. 5-10 years.
    c. 11-15 years
    d. 16-20 years
    e. Over 20 years
    f. Born here

6. a) Do you stay here permanently?
    a. YES
    b. NO

    b) If no, how is your stay?
    a. Semi-permanent (House hold stays, animals and herdsmen move)
    b. Nomadic (Animals and whole house hold move)

    c) Who moves?

    a. Households
    b. Households and animals
    c. Men and animals
    d. Children and animals
    e. Men, children and animals
    f. Women
    g. Herd boys and men
    h. Others_____

    d) Why do you move?

a. Search for greener pastures
b. Conflicts
c. Search for water
d. Larger pieces of land
e. Culture
f. Disease outbreak
g. Others (specify)_____

Access to Structural Infrastructure

7. How far is your nearest livestock market (walking hours)?
   _____
   _____

8. How far is your nearest market for agricultural commodities (walking hours)?
   _____
   _____

9. How far is your nearest health center (walking hours)?
   _____
   _____

10. How far is your nearest road –used by vehicles (walking hours)?
    _____
    _____

11. How far is your nearest primary school (walking hours)?
    _____
    _____

12. How far is your nearest secondary school (walking hours)?

_____

_____

13. Does any member of you family living here have a mobile telephone?
    a. YES
    b. No

Livelihood Activities and Socio-economic Status

14. Which economic/income generating activities are you involved in?
    Activities

    a. Livestock keeping
    b. Crop farming
    c. Honey production
    d. Masonry
    e. Carpentry
    f. Shop
    g. Grocery
    h. Others specify _____

15. What are your sources of income?

_____

_____

16. Please estimate how much you earn in a month (in Ksh)?
    a. Nil
    b. Less than 100
    c. 100 - 500
    d. 501 – 1000
    e. 1001- 5000
    f. 5001-10000
    g. Over 10000

    (Enumerator to show how you arrived at the amount)

17. How is wealth accumulated by your family?
    a. Goats
    b. Cattle
    c. Camels
    d. Self Help Group
    e. Cash
    f. Others (specify)

18. In this community, whom do you consider to be rich? Explain
    _____

    _____

19. In this community, whom do you consider to be poor? Explain
    _____

    _____

20. In this community, whom do you consider to be neither rich nor poor person? Explain
    _____

    _____

21. In this community which groups of people are most likely to be poor?
    a. Married women
    b. Women headed households
    c. Men
    d. Elderly women
    e. Elderly men
    f. Disabled
    g. Youth groups (18-35 years)
    h. Others _____ (specify)

22. Please explain why the above group/s are most likely to be poor?

_____

_____

Roles by Gender

23. What are the sources of water for this family?

_____

_____

24. How long does it take you to walk to the water point during the wet season (walking hours)?

_____

_____

25. How long does it take you to walk to the water point during the dry season (walking hours)?

_____

_____

26. Who in this household fetches water during the wet season?
    a. Men
    b. Women
    c. Girls
    d. Boys

27. Who in this household fetches water during the dry season?
    a. Men
    b. Women
    c. Girls
    d. Boys

28. What are the most common sources of cooking fuel?

_____

_____

29. How long does it take to fetch firewood during the wet season?

_____

_____

30. How long does it take to fetch firewood during the dry season?

_____

_____

31. Who collects firewood during the wet season?

_____

_____

32. How long does it take to prepare your common meal for the family?

_____

_____

33. Has the type/quality of firewood used changed over the years?
    a. YES
    b. NO

    If yes, explain how?

_____

_____

34. Who takes care of the sick in this household?

_____

_____

35. Who takes care of the sick animals in this household?

_____

Participation in Decision Making by Gender

36. Respond to the following questions with respect to your participation in decision making in terms of water/vegetation (pastures) and livestock management?

SN	Issues	Highly agree	Agree	Neither agree nor disagree	Disagree	Highly disagree
1	Community meetings are convened on water/pasture/livestock					
2	You always attend the meetings					
3	You always give your views during the meetings					
4	Your views are always listened to and accepted					
5	Your views have guided action at community level					
6	Your clans and customary institutions decide how the community uses the resources					
7	You participate by giving your views through your son					
8	You participate by giving your views through your wife					
9	You participate by giving your views through your husband					
10	You participate by giving your views through your daughter					

37. Who makes decisions on resource allocation, cultural issues, and investments affecting the family?

	The decision	Women	Men	Both Men and Women	Others (specify)

1	Investment				
2	Resource Allocation				
3	Cultural Issues				
4	Investments				
5	Resource Use				
6	Others specify:				

38. Who ensures that these cultural practices such as marriage and dowry payments are adhered to?
    a. Married women
    b. Women headed households
    c. Men
    d. Elderly women
    e. Elderly men
    f. Disabled
    g. Youth groups (18-35 years)
    h. Others (specify) _____

39. Have you ever influenced your spouse on issues relating to droughts and floods?
    _____
    _____

40. Who decides where your family should settle or move to?
    _____
    _____

41. Are women consulted on land issues (i.e. where to settle or when move to new land)?
    a. YES
    b. NO
    c.

    If NO why?

    _____
    _____

Ownership of Assets by Gender

42. Who owns this homestead?

_____

_____

43. Do you own any of the following items? If yes indicate type of ownership. Please tick in the relevant box

	I don't own	**I own by myself**	**I own with someone else**	**Declined**	**Don't know**
Land					
Camels					
Donkeys					
Goats					
Chicken					
Sheep					
Cows					
Business					
Bicycle					
Motorcycle					
Car					
House					
Produce for sale (Aloe, crops, Vegetables, gum Arabica…)					
Other investment (bank, post office, securities, bonds….)					
Other **(Specify)**					

Impact of Climate Variability and Change

44. In which years did you experience severe droughts?

_____

_____

45. In which years did you experience extreme flooding?

_____

_____

46. How are you affected by droughts? (Circle correct answer/s)
    a. Not affected
    b. Moderately affected
    c. Severely affected
    d. Don't know

47. How are you affected by floods? (Circle correct answer/s)
    a. Not affected
    b. Moderately affected
    c. Severely affected
    d. Don't know

48. What is the level of severity of drought and flood on the following: Indicate 1, 2 or 3 in the table provided

Sector/areas/issues	**Drought**	**Flood**
1. Livestock		
2. Crops		
3. Food Security		
4. Population health and well being		
5. Water resources (its quality and availability for use)		
6. Social & Institutional (governance, labor, gender)		
7. Infrastructure – boreholes. roads, technological developments (uses) applicable to project		

Key: 1.Very severe 2. Severe 3. Not severe

49. What exposes you to the risks of droughts? (Circle correct answer/s)
    a. Cutting of trees
    b. Lack of income
    c. Overgrazing
    d. Flat land
    e. Eroded and bareland
    f. Others (specify)

50. What exposes you to the risks of floods? (Circle correct answer/s)
    a. Cutting of trees
    b. Overgrazing
    c. Poor housing
    d. Flat land/eroded
    e. Lack of gabions
    f. Lack of environmental conservation
    g. Others (specify)

Coping Strategies

51. How does your family cope with drought?

    _____

    _____

52. How does your family cope with the floods?

    _____

    _____

53. Where do you get knowledge, information and skills necessary to pursue different coping strategies during drought or flood?
    a. Own thinking
    b. A friend
    c. Self Help Groups
    d. NGOs
    e. Government institutions
    f. Elders
    g. Chief barazas
    h. Media-TV, Radio
    i. Others specify _____

54. Which are the most common foods consumed in this family?

_____

_____

55. How many meals do you take in a day?
    a. One
    b. Two
    c. Three
    d. Other_____
56. During droughts how many times do you eat in a day?

_____

_____

57. What kinds of foods are eaten during drought?

_____

_____

58. During the wet season how many times do you eat in a day?

_____

_____

59. What kinds of foods do you eat during floods?

_____

_____

60. Have the types of foods eaten by your family changed over the last 10 years?
    a. YES
    b. NO

    b. If yes please explain

61. Do you belong to any community group (e.g. Ayuta, self help group etc)
    a. YES
    b. NO

62. Please give the name (s) of the self-help group/ community group you are involved in (e.g. women's group, youth group, Ayuta, men's group etc)

b. If YES, Explain the benefits and the activities of the group

_____

_____

c. If NO, Explain why?

_____

_____

63. What activities is the group you have mentioned above involved in?

_____

_____

64. What are the benefits of being a member?

_____

_____

65. In the face of a drought and floods which assets do you choose to remain with or dispose? (Indicate 1 or 2 in the table provided)

Asset	**Drought**	**Flood**
Camels		
Goats		
Houses		
Land		
Cash		
Jewelry		
Others. Specify		

Key: 1. Sell off/dispose 2. Invest/Save

66. What safeguards do you and your family put in place against droughts?
    a. Buy more livestock

b. Sale of livestock
c. Social safety nets
d. Seeking Food relief
e. Asking for Remittances from family
f. Increased charcoal burning
g. Loaning of animals
h. Setting aside grazing areas
i. Buying of fodder (hay)
j. Others (specify) _____

67. What safeguards do you and your family put in place against floods?
    a. Buy more livestock
    b. Sale of livestock
    c. Social safety nets
    d. Food relief
    e. Remittances from family
    f. Loaning of animals
    g. Construction of gabions
    h. Others (specify) _____

68. Do you think your activities to cope with drought and floods affect the natural resources?

    a. YES
    b. NO

    b. Explain

    _____

    _____

Future Climate Risks and Vulnerability

69. What would happen to your family source of livelihood if droughts became twice as frequent?

    _____

    _____

70. How would you and your family be able to cope with increased drought frequency?

    _____

    _____

71. In your opinion, between women and men who is more at risk to droughts and floods?

a. Men
b. Women

b. Please explain your answer above

_____

_____

THANK YOU FOR YOUR TIME.

Appendix 2 - FGD Interview Guide

Community: _____

Date: _____

Name of Moderator: _____

Name of Note Taker: _____

Gender of Group (circle one): All Female All Male

Start time: _____ End time: _____

 # PERSONS IN GROUP AT START _____

 # PERSONS IN GROUP AT END _____

I certify that I have read and discussed the consent procedures on the following page with the group and continued only on consent by all members.

Signed: _____ Date: _____

INTRODUCTION

The PhD student conducting this research will welcome the respondents, introduce herself and the purpose of the research:

Welcome and thank you for coming to this focus group discussion. My name is Ms. Nancy A. Omolo and I am from the University of KwaZulu-Natal. Assisting me is_____ who will be taking notes on the discussions, and who is from_____. I am conducting this research as part of my PhD study to gather information that will lead to a better understanding of women's adaptive capacity (in comparison to men) to climate variability and change (droughts and floods) in this community. This information will help to inform policymakers and key persons about the reality of women's vulnerability and how they can adapt to climate variability and change.

The PhD student will tell the participants approximately how long the session will last (and the research tools to be used, if there is any).

The student will explain to the participants that the FGD guide will take approximately 3 hours 30 minutes. Introduction will take 15 minutes. The FGD guide is divided into two sections. Section 1: will take 1 hour 30 minutes. It involve asking question on perceptions and concerns related to climate variability and change (droughts and floods), coping and adaptation strategies, barriers to coping and adaptation strategies, and lastly gender needs assessments. Section 2 will involve administering 2 tools on gender analysis and vulnerability assessment, which will take approximately 2 hours.

INSTRUCTIONS

The PhD student will explain the following instructions to the participants

- Ask one of the participants to lead in prayers (optional).
- Encourage the respondents to decide on the language to be used.
- Explain that this is a free discussion, and there are no right or wrong answers.
- Explain that all information shared here is confidential.
- The researcher/moderator should not take a specific position, but should be neutral.
- Encourage only one person to speak at a time and to speak loud enough to be heard, leaving enough time for the other group members to also share their thoughts when responding to questions.
- Explain that participation is voluntary and there is no penalty for refusing to take part.
- Explain the use of a recorder Ask if anyone have any questions
- Make sure that everyone knows the location of rest rooms (toilets).
- Ask the participants to switch off their mobile phones.
- Pass contact sheets to all group members (should contain for example, their names, age, gender, occupation, residence, household head/not..)

SECTION I

This section is divided into sub-sections (A-F) and should take approximately 1 hour. The sub-section numbered D only applies to women, while the subsection numbered E only apply to men.

A. Perceptions and concerns related to climate risks (15 Minutes)

- What are some of the major events that you have experienced in this community in relation to droughts and floods since 1960's
- What have been the impacts of droughts and floods on your livelihood?
- What impacts would droughts and floods have on your livelihood if they became twice as frequent?
- How effectively would you and your community be able to cope with doubled frequency of droughts and floods?

B. Vulnerability (15 Minutes)

- Which groups are more vulnerable (women and or men) to climate variability and change (droughts and floods) in this community and why**?**
- Are there any cultural traditions/beliefs that have contributed to women's and men's vulnerability in this community?

C. Coping and adaptation strategies (15 Minutes)

- What are some of the existing coping and adaptation strategies to droughts and floods in this community?
- Which coping and adaptation strategies you have mentioned are specific to women?
- Which coping and adaptation strategies you have mentioned are specific to men?
- Why are people engaged in these specific of coping and adaptation strategies?
- What has made certain coping and adaptation strategies successful?
- Which institutions (Government, NGOs, CBO, religious organisations...) are supporting this community to cope/adapt to climate variability and change?

D. Barriers to adaptation to climate change (15 Minutes)

- What are some of the constraints and opportunities in adapting to climate variability and change in this community (for example: culture, education, infrastructure, technology, indigenous and Government laws for example in relation to land ownership, movement of animals,...)?
- Do women and men face the same constraints?

E. Women's needs assessments (15 Minute) – (This section applies to women only)

- What needs and opportunities exist for increasing women's productivity and/or production?
- What needs and opportunities exist for increasing women's access to and control of resources?
- What needs and opportunities exist for increasing women access to and control of benefits?
- What are needs and opportunities exist for increasing women participation at community level (for example, leadership skills to participate in community meeting/projects, proposal writing skills to fundraise for community projects role models, right to speak, equal gender representation)?
- Have women been directly consulted in identifying such needs and opportunities?

F. Men's needs assessments (15 Minute) – (This Section applies to Men only)

- What needs and opportunities exist for increasing men's productivity and/or production?
- What are needs and opportunities exist for enhancing men's participation at community level (for example, leadership skills to participate in community meeting/projects, proposal writing skills to fundraise for community projects, role models, right to speak, equal gender representation)?
- Have men been directly consulted in identifying such needs and opportunities?

SECTION II

Each tool will take approximately 1 hour. Therefore, section 2 will take a total of 2 hours. This section involves administering gender and vulnerability tools named below. Gender analysis tool 1: Activity, Access and Control Profile (general household profile). Vulnerability analysis tools will include: tool 2 - Livelihood matrix analysis framework. These tools will involve using flip charts and felt pens. The FGDs will take place in a school classroom/ a room so that the flip charts can be pinned on the boards or walls. The tool are explained below:

- Tool 1: Activity, Access and Control Profile (general household profile) below helps to identify what activities individuals do, with what, and also provides analysis of individuals' access to and control over resources. The table is based on, Harvard Framework Analysis (HFA), the People-Oriented Planning Activity Profile and the Intrahousehold Disadvantages Framework for analysis of intra-household dimensions of disadvantages. Furthermore, it addresses Moser Framework tools-1 (gender roles) and tool-3 (control of resources and decision making), (see Appendix – 3).

- Tool 2: Livelihood matrix analysis framework.
  The livelihood sensitivity matrix provides a starting point for determining which livelihoods are most vulnerable to different types of climatic hazards and the degree to which different livelihood activities are impacted by different climate hazards (see Appendix – 4)

Appendix 3: Gender Activity Profile

(Example of Activity, Access and Control Profile [general household profile])

Activities	**Who is responsible for carrying out the activity?**	**Where**	**When/ how long?**	**Resources used**	**Who controls resources/ Who do you need to negotiate with?**	**Benefits produced?**	**Who controls the benefits**
Productive Activities							
Livestock herding	1. Husband 2. Son 3. Herds-boy	1. Communal land	Daily	1. Time 2.Pasture 3. Water	1. Husband 2 & 3. Community elders, sometimes determined by climatic risks	- Improved household well-being	Husband
Selling animal products							
Casual labour (herding ...)							
Other activities							
Reproductive Activities							
Childcare including provision of food	1. Wife 2.Grandmother 3.Daughter	Household	Daily	1.Time 2. Cooking utensils. 3. Food ingredients. 4. Firewood & water. 5. Physical energy	1. Mother 2 &3.Bought by husband 4. Collected by girls, wife 5. Wife	- Protected children. - Improved human capital. - Frees-up husband time for other (productive) activities	Various Various Husband
Socialising	1. Wife	1. Household/ Village	When time is available/when	Social capital (and sometimes surplus	Dependent on sufficient time. (and sometimes	Maintaining social capital	Various

			tasks can overlap	food and beverages).	surplus food and beverages).		
Other activities							
Community Activities							
Community meetings							
Custodianship of cultural norms and traditions	1. Older woman	Village and household	On-going	1.Knowledge 2. Social capital	1.Older woman	- Maintenance of tradition. - Maintenance of individual's social status.	Older woman
Other activities							

Appendix 4: Livelihood Sensitivity Matrix

(Example Table)

	CLIMATIC RISKS						EXPOSURE INDICES	
	Drought	**Dry spell**	**Intense rain**	**Floods**	**Warm spells**	**Other**	***Exposure***	***Weighted exposure index***
Frequency								
Resources and livelihoods								
Availability of quality and quantity water								
Availability of pasture								
Livestock diseases								
Human diseases								
Wood fuel								
Aloe								
Wild fruits								
Others								
Livelihood activities								
Livestock production								
Farming								
Poultry keeping								
Charcoal/wood fuel use								
Fishing (Lake Turkana)								

Crafts sale (i.e. baskets, mats..)								
Harvesting and selling aloe products								
Others								

KEY: 1 = Not Severe, 2 = Severe, 3 =Very Severe

THANK YOU FOR YOUR TIME.

Appendix 5: Key Informant Interviews (KIIs) Schedule

BACKGROUND OF THE RESEARCH

It is widely acknowledged that the negative effects of climate change are likely to hit the poorest people in the poorest countries hardest, in other words: that the poor are most vulnerable to climate change. Given that, women form a disproportionate share of the poor in developing countries and communities that are highly dependent on local natural resources, women are likely to be disproportionately vulnerable to the effects of climate change. It is agreed that vulnerability and adaptation are largely social issues (as opposed to purely biophysical or technological). The issue of adaptation is emerging as an important and extremely urgent aspect of climate change policy and projects. However, gender issues are not yet playing a more explicit role in projects and policy. As a result of the feminization of poverty, there exist gender inequalities. There are gender differences in climate variability and change impacts and in adaptive capacities due to women and men's gendered roles in society in the division of labour, decision-making and in access to resources. Therefore, there is need to acknowledged the differences in the adaptation process to avoid further increases in gender inequality and to ensure the successfulness of adaptation policies and measures.

Questions

1. What are your perceptions and concerns in relation to climate risks inherent in this region?
2. Who is more vulnerable to climate variability and change? Women and or men, why are they vulnerable? Are there differences in women and men vulnerability?
3. Do you think that women have the capital in terms of knowledge and know-how to adapt to climate variability and change (for example droughts and floods)? Are women adaptive strategies different from men?
4. To what extent have programmes aimed at adaptation to environmental impacts or at improving resource management included women? What are the current levels of female participation in decision-making on climate change at local and national levels-both in terms of the numbers of women participating as well as the quality of that participation?
5. What are the barriers to participation or, for those involved in consultations, the barriers to being heard and taken seriously? Are the barriers experienced by women the same as those of men?
6. What are some of the discriminative cultural and social attitudes and negative stereotypes preventing women from accessing resources needed for adaption to climate variability and change? How can women, including poor women, have an equal say in how resources for adaptation are allocated at the local levels. What are the existing indigenous and government laws that protect women's property rights?

THANK YOU FOR YOUR TIME.