ASSESSING THE DROUGHT ADAPTATION STRATEGIES AND INSTITUTIONAL INTERVENTIONS IN THE PASTORAL LIVELIHOOD SYSTEM IN NAROK COUNTY, KENYA

A Thesis submitted in partial fulfilment of the requirements for the Degree of Masters in Arts in Environmental Policy

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DECLARATION
Student Declaration

I, Peter Wangunyu Kaguai do hereby declare that this is my original work, and that it has not been submitted for an award of Degree at University of Nairobi or any other institution of higher learning.

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This thesis has been submitted with our approval as university supervisors.

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DEDICATION

This thesis is especially dedicated to my driver and companion, who accompanied me to Narok for field work. A comrade at the Faculty of Law, University of Nairobi, Reuben Kaguai Wangunyu, continue Resting in Peace, my boy.

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First and foremost, I thank God for the gift of life and good health. Secondly, I am very grateful to my supervisors Dr. Elvin Nyukuri, Prof. Stephen Obiero Anyango, and Prof. Richard Mulwa, for their exceptional guidance and constructive criticism.

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ABSTRACT

Drought has been the leading cause of vulnerability among populations who live in Kenya's arid and semiarid lands. Mosiro ward, whose residents mainly practice pastoralism, is classified as ASAL in Narok County. The pastoralists have, over time, developed drought adaptation strategies. Therefore, this research was carried out to identify and assess the adaptive mechanisms adopted by the pastoral community to cope with drought in Mosiro ward in Narok, Kenya. The study had the following objectives; to identify and assess the adaptation strategies used by pastoralists to cope with recurrent drought; to analyze government responses in mitigating the effects of drought and assist the pastoral community to cope with drought; and to appraise the current drought risk management strategy in addressing drought issues in Kenya. A case study design was used. Both qualitative and quantitative data was collected. Data was collected through household interviews, focus group discussions, and key informant interviews. The iterative approach model was used to analyze qualitative data to extract major themes and concepts to be discussed. Analysis of quantitative data was done using the SPSS software to acquire descriptive statistics and the results presented in tables, bar graphs, and pie charts. To quantify the different degrees of drought intensity, between 1964 and 2015, a standard precipitation index was derived from long-term rainfall data from the Kenya Meteorological Services for Narok station. Results revealed that droughts were increasingly frequent and have impacted negatively on the pastoral livelihoods. The socioeconomic characteristics indicate that most of the respondents are pastoralists with low levels of education. Most of the households are headed by males. Water scarcity is a serious problem. Respondents perceive drought to be as natural phenomenon that is exacerbated by human activities such as deforestation, industrial pollution, and climate change. The pastoral community has traditional methods of weather forecasting. The pastoralists have developed various strategies to adapt to drought. These include herd mobility, herd splitting, herd diversification, livestock sales, and livelihood diversification, among others. The most important strategy is mobility. Livelihood diversification was rated highly but was hampered by lack of funding. Self-help groups and table banking proved useful in providing much needed funds through savings and loans. Adaptation is hampered by a lack of funding, livestock markets, insecurity and inadequate infrastructure. The government assistance primarily included providing of emergency food, animal feed and water. However, these were deemed ineffective by the respondents. The government has put in place policy and institutional frameworks to address the issue of drought emergencies. However, insufficient funding, poor prioritizing and coordination has hampered effective implementation of these policies. Based on the findings, the study recommends policy measures to promote pastoralists' resilience. These include establishing more schools, improving livestock markets and communication infrastructure, developing water resources and providing credit facilities, establishment of more and better equipped weather stations for a more effective early warning system, and enhanced provision of veterinary and medical services. Security should be enhanced to curtail resource-based conflicts, especially along the migratory routes. Policies that promote transition to communal and customary land tenure will further benefit pastoral livelihoods and rangeland conservation. An index-based insurance system should be introduced. This study recommends further research to evaluate the economic impact and benefits of the identified effective stratagems in order to identify the most cost-effective drought adaptation strategies.

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CHAPTER ONE
INTRODUCTION

1.1 Background

People who depend on livestock keeping for their livelihood are referred to as pastoralists. Pastoralists live in drylands unsuitable for crop production resulting from poor precipitation with severe temperatures. The livestock raised by pastoralists varies from one area to another. These animals are domesticated herbivores living in herds and feed on grass or herbaceous vegetation. For instance, pastoralists in Mongolia, and central Asia, prefer rearing horses; those in East Africa prefer cattle, while shoats are the favorites in the hilly regions of Southwest Asia.

The pastoralists in the dry lowlands of Southwest Asia, North and East Africa prefer camels. The pastoralists of northern Scandinavia and north Mongolia herd reindeer (Huho *et al.*, 2009). More than 70 % of the rangelands inhabited by pastoralists are unsuitable for growing crops; therefore, rearing animals is the most practical commercial undertaking in the rangelands. Nomadic livestock keeping presents a feasible scheme of production that allows productive usage of vast arid and semi-arid areas. There are approximately 235,000,000 cattle, 472 000,000 shoats, 21,000,000 swine, and 1.3B chickens in Africa, valued at USD 65B. More than 70 % of the livestock and 90 % of the wildlife populate the rangelands (FAO, 2005, Oluoch, 2007).

Droughts follow rainfall for a prolonged duration affect approximately 60% of the world's population. In the rangelands, droughts are the main hindrance to viable crop growing, especially in the rangelands (Huho and Mugalavai, 2010). For instance, more than sixty-eight percent of India is susceptible to aridity, and thirty-three percent is prone to chronic dry spells. Studies indicate that droughts have increased by fifty-four to fifty-seven percent in the ASALs, and tropical areas. In the drylands, severe droughts have occurred for eight to nine years. Grain production in India decreased by 29,000,000 tons in comparison to 212,000,000 tons in 2002 (2001(Nagaraja *et al.*, no date). There was a 10% reduction in rural industry production that led to a loss of USD 5B to the Australian economy during the 1982/83 drought, and USD 590,000,000 of drought relief donated by the commonwealth countries from September 1992 to December 1995 as a result of 1991/95 drought (Bureau of meteorology,

2010), Zimbabwe's 1990-91 drought occasioned a forty-five percent decrease in farm productivity, a sixty-two percentage drop in the value of stock-markets, nine percent decrease in industrial Production, an eleven percent drop in GDP. In Kenya, the drought in 1999-2000 led to losses of US dollars 2.5 million to the economy, whereas the drought in 2002 caused a ten-twenty percent livestock loss in Eritrea; (UN Economic and Social Council., 2007). Ethiopia's Afar and Somali pastoral zones were affected by the 2002 drought, resulting in an estimated 40% cattle and 15% sheep and goats loss. The livestock prices fell by 50% (Food and Agriculture Organization (FAO), 2003); a 34% drop in crop production following the 2009 drought in Chad led to a lack of surplus food and livestock for sale (Oxfam, 2010). Overall, famine is the new normal due to frequent droughts. There has been an increase in crop failure and livestock deaths, with 15% of The WFP's food aid going to Sub-Saharan Africa (UN Economic and Social Council, 2007).

1.2 Pastoralism in Kenya's ASALs

More than 60% of Kenya's cattle are in the hands of pastoralists, which generates approximately 10% Gross Domestic Product (GDP) and more than half of the agronomic GDP. Pastoralism employs ninety percent of the population then accounts for 95% of total household revenues and security of livelihoods in Kenya's rangelands (Huho *et al.*, 2009; US International Development (USAID), 2010).

In Kenya, pastoralism is practiced by the Turkana, Boran, Rendile, Samburu, Gabra, Maasai, Orma, and Kalenjin communities. Transhumant pastoralism is practiced in this region, whereby the pastoralists migrate with their herds as an adaptive mechanism to cope with seasonal deviation in pasture and water. The most significant cause of livestock mortality in Kenya's rangelands is drought. An estimated US dollars 1.6 million in assets in livestock losses per year to mortality, poor quarantine, illnesses, and lost business prospects, leading to decreased food security in the famine susceptible ASALs (USAID, 2010).

Kenya's, pastoral communities rear various domestic animals: cows, goats, sheep, donkeys, and camels. Nevertheless, the predominant livestock differs from one pastoral area to another depending on the value assigned to different stock types and weather patterns. For instance, amongst the Turkana and Rendile, camels dominate herds, whereas cows are dominant in the Maasai and Samburu herds. Kenya is particularly susceptible to drought as barely twenty percent of the country gets adequate and regular rainfall. The other parts of the country that

constitute eighty percent are classified as ASAL. Rainfall unpredictability coupled with drought is a common climatic feature. More than 10,000,000 people, comprising a quarter of Kenya's population and above 50% of the nation's cattle, are found in the ASALs. These comprise the most vulnerable population to drought and rainfall variability (GOK, 2013).

In Kenya's rangelands, large populations of the pastoral community have been adversely affected by increasing incidences of consecutive years of drought (GoK 2008a). In the previous two decades, drought periods in 91/92, 95/96, and 98/2010 have been declared national disasters. Most recently, the 2014-2017drought has also been declared a national disaster (CDKN, 2017). Parts of the country lost up to 84 percent of cows, 77.8 percent of goats, and 72.8 percent of sheep due to the 2009 drought (Wangai *et al.*, 2013). Over 3.5 million people, including 1.4 million herders, were negatively impacted by the 2010/2011 drought incident, according to the Kenya Food Security Steering Group (KFSSG).

The drought had adverse effects on the pastoral community. It depleted water and pasture, caused decreased animal production, increased animal morbidity and mortality, and compromised food security.

Over two-thirds of Narok County is semi-arid (GoK, 2013). Studies reveal that, between 1989 and 2003, a very severe drought ensued in 1999/2000, serious droughts in 1993 and 1997, mild droughts in 1991 and 1994, and normal years in 1989/90,1992and 1995/96 (GoK, 2010, 2013). Most especially, the 1999/2000 drought was brought about by the wet season rain failure in both years, while the 1993 drought was due to the failure of the dry season rain in Narok (Ogutu *et al.*, 2008). These frequent droughts have increased the communities' vulnerability (Narok County resilience project 2017). Despite these adverse climatic conditions, Narok County hosts large numbers of livestock with pastoralism; a key livelihood system practiced for millennia.

The vulnerability of pastoralists results from natural factors and political, socioeconomic, and institutional constraints (Pavanello, 2009). Inappropriate policies have been implemented due to a lack of political interest in pastoral areas. Policies that encourage the settling of pastoralists, immobility, and alienate shared resources, compromising their ability to cope with the drought hazard (Pavanello, 2009). Additionally, there is little or no appreciation of pastoralism's contribution to the overall economy resulting in poor and inappropriate interventions and investments in the ASALs. There are no long-term investments and

developments to enhance pastoralists' resilience, strengthen pastoral institutions, and develop socio-economic infrastructure (Longley & Wekesa 2008). Finally, institutional drought interventions are emergency relief responses rather than continuing enterprises geared towards developing the pastoral system by enhancing service provision and marketing infrastructure improvement (Longley & Wekesa, 2008).

Pastoralists have dealt with the adverse impacts of drought through various strategies (Fratkin, 2001). A good grasp of these strategies is essential to develop basic support systems to enhance the pastoral communities' resilience to drought (Barton *et al.*, 2001). The pastoral communities' drought adaptive mechanisms were ruined by increased population, frequent drought, and scarcity of land, forcing pastoralists to relocate to urban centers for employment as unskilled laborers. They have also migrated to refugee centers for drought relief (Hogg, 1983; Fratkin, Roth & Nathan, 1999). The devastation of the pastoralists' drought coping and adaptation strategies have made them search for external assistance (Oba & Lusigi, 1987). The aid is via relief assistance and interventions by the government, humanitarian agencies, and NGOs.

1.3 Statement of the Problem

Mosiro ward, where this research was conducted, is situated in the driest part of Narok east Sub County. Sixty-eight percent of Narok County is classified as ASAL. The Standardized Precipitation Index (SPI) results revealed that in Narok County, drought events were becoming increasingly severe and frequent, with adverse impacts on pastoral livelihoods.
The pastoral livelihood system is increasingly threatened despite its demonstrable resilience. Pastoral people are progressively susceptible to malnourishment, and food insecurity as their capacity to adjust and recover from adversities deteriorates in the face of recurring and overlapping shocks.

Institutional responses to drought emergencies in Kenya's ASALs are usually delayed and insufficient, while emergency responses are not linked to long-term development. Sometimes long-term investments disrupt pastoralists' lives and are sectoral, such as water or cattle based, instead of the entire pastoral livelihood structure.

This study sets out to examine the adaptive mechanisms used by the pastoralists to survive

the frequent drought, institutional interventions by the state and donor agencies to assist the pastoral community in coping with drought in Mosiro ward, Narok County, and assess the adequacy of the current drought risk management strategy in addressing the issue of drought in Kenya.

1.4 Research Questions

How effective are the drought adaptation strategies used by the pastoralists in Narok County and the intervention measures employed by the government?

The sub-research questions were:

1. What adaptation strategies are used by the pastoral community to cope with drought in Mosiro ward, Narok County?
2. What has the government done to address the impacts of drought and assist the pastoralists in coping with drought in Mosiro ward, Narok County?
3. To what extent does the government's drought management strategy adequately address the drought issue in Kenya?

1.5 Objectives of the Study

To evaluate the adaptation strategies used by pastoralists in Narok county and institutional interventions in Mosiro Ward, Narok County.

1. To identify and assess the adaptation strategies used by pastoralists to cope with recurrent drought in Mosiro ward of Narok County.
2. To analyze government responses in mitigating the effects of drought and assist the pastoral communities in coping with drought in Mosiro ward, Narok County.
3. To appraise the adequacy of the current drought management strategy in addressing drought issues in Kenya.

1.6 Significance of the study

In the ASALs of Africa, pastoral communities live with imminent drought. During droughts, they persistently suffer cataclysmic losses of livestock. The impacts of drought are especially severe for poor pastoralists with small livestock holdings and weak social support networks.

The livelihoods response to emergencies is more complex than just food aid, so there is no question that it entails enhanced capacity to plan and implement. A robust drought plan will

help the both national and local governments and development partners to respond promptly to early warnings of a disaster and initiate a synchronized response. A comprehensive plan has options and triggers for action, and predetermined roles among the actors. It is expected that the results of this survey will benefit a variety of organizations directly involved in drought mitigation. We hope that the recommendations of this study will enable governments and other stakeholders to put in place appropriate systems to reduce losses resulting from drought disasters. This has the advantage of enabling more resilient pastoral livelihoods and rapid economic growth. The results and recommendations of this survey are expected to raise awareness of drought risk management in Kenya's ASALs and beyond.

The findings of this study will benefit relief organizations by occasioning a reduction in losses from drought risks. This could allow investment in education and related facilities to help achieve the social pillar of Kenya's vision 2030. Policy formulators in the livestock industry can utilize the recommendations to formulate policies to prevent and mitigate losses caused by drought. Different levels of government may get a precise depiction of the status of drought in terms of the strategies needed to limit the occurrence of drought disasters. It is expected that researchers in the future can base further research on the findings of this study. This reduces needless duplication and improves the quality of research locally. This could facilitate the provision of ready-made data that can be referenced by different scientists.

This study sets out to examine the adaptation strategies that enable the pastoralists in Mosiro Ward, Narok County, to cope with frequent droughts, the government's responses in mitigating drought impacts, and assess the adequacy of the current drought management policy framework and avail the missing information, which may be similar or different from what is in the existing pool of knowledge.

1.7 Scope of the study

The survey was carried out in Narok County. Its main focus was on the pastoralists. Although the item of investigation impacted different parts of the country, a country-wide survey was impossible because of logistics. The study results can be generalized to other arid lands and pastoralists in Kenya and beyond.

This survey mainly focused on the adaptation strategies that enable the pastoral community of Mosiro Ward, Narok County, to cope with frequent droughts, the government's responses in mitigating drought impacts, and assess the adequacy of the current drought management

policy. The study used the Sustainable Livelihood Approach as the guiding theoretical framework.

1.8 Study Limitations

This survey was hampered by a lack of secondary data due to the unavailability of requisite reports and journals. The issue was resolved by making use of online journals.

Respondents had the tendency of providing information that was not precise and pertinent to the questions posed. Mugenda & Mugenda (2003) states that when asked open-ended questions, respondents are at liberty to give whatever answers they think is correct but does not necessarily answering what had been asked. The issue was resolved through repetition, making the question clear to the respondent.

There were incidences of poor memory recall particularly among focus group discussion participants. This issue was solved by picking forty five to sixty years old participants who could recollect the changing drought patterns in the last two decades.

Data collection took longer than planned due to an unexpected downpour in Mosiro Ward. Therefore, the researcher extended the data collection period by two weeks. The researcher's insufficient financial resources limited the study to one ward. The researcher selected the ward to represent the whole county.

1.7 Definition of Terms

Adaptation Mechanism: the modifications that individuals or organisms enact in order to cope with changes in their environment. These could be behavioral or structural and designed for the organism's or individual's survival in the new environment.

Adaptation Strategies:

Variations to reduce household's vulnerability to severe climate events such as drought (IPCC, 2012).

Adaptive Strategies: sector's responses to livelihood changes through independent or conscious adaptation (IPCC, 2012).

Coping Strategies

The actual response to livelihood system emergencies facing disadvantages and are seen a short-term (IPCC, 2012).

Mitigation Strategies: Measures put in place to mitigate adversative effects (IPCC, 2012).

Effectiveness Refers to how adaptation strategies have been deployed to improve pastoralist's lives of people by moderating the stresses and shocks of drought-related shocks.

Food Security: When a population can access adequate, safe and nutritious food to maintain good health. Food security must include access to affordable food meeting the nutritional needs and preferences of the populace (The World Food Summit, 1996).

Household: The primary unit of investigation and includes people who share a livelihood that is essential to the existence of a household and the wellbeing of its members (Rudies, 1995).

Livelihoods: a dynamic area encompassing opportunities and assets available to households.

Resilience: The capacity of an organism to withstand disruption and reorganize when faced with change to maintain the same structure and identity.

CHAPTER TWO
LITERATURE REVIEW

2.1 Concept Drought

Drought lacks a universal definition. Nevertheless, it is a typical climatic feature affecting all countries (Wilhite, 1996). Drought is an excessive shortfall in precipitation resulting in periods of water shortage Hisdal and Tallaksen (2000). Wilhite *et al.* (2000) explained drought as a normal disaster differentiated from some calamities due to its insidious commencement, which can be widespread and longstanding. Therefore, it becomes difficult to determine its beginning, end, and severity.

It is more challenging to quantify drought impacts than those of other natural hazards for three reasons. One, drought is of insidious onset and gradually accumulates impacts over time and can remain for long after it has ended. Two, Uncertainty of whether drought has occurred is compounded by the lack of a universal delineation of drought, and if it has, how intense is it? Three, drought impacts are not obvious and can be widespread, unlike other hazards, since drought does not damage any structures.

Drought is a most costly hazard to society than other natural disasters (Hisdal and Tallaksen, 2000). It causes more human and livestock mortalities than other disasters combined. Unlike other sudden-onset hazards, drought has long-term consequences and has caused human migration and the loss of civilizations. Drought-induced calamities have increased since the 1960s (Shauri, 2011). This has been attributed to increased vulnerability to long periods of low precipitation rather than frequent meteorological droughts (Wilhite, 1996). More than 50% of the earth is drought-prone since it can practically affect all climatic regions every year (Kogan, 1997; Wilhite, 2000).

Furthermore, most climatic regions can suffer drought. However, it varies from one region to another. Famine is extra pronounced if it happens in above average and average precipitation zones. Nonetheless, the ASALs of Africa are the most vulnerable (Hisdal and Tallaksen, 2000). Hisdal and Tallaksen (2000) further stated that the severity of drought and the resulting environmental degradation are most marked in the third world where social and economic support systems cannot withstand drought impacts, including the delicate ecosystems in the arid areas in which the population has an inadequate adaptive capacity.

2.2 Drought impacts on the Pastoral livelihood system in Kenya

A drought usually develops gradually, and its effects accrue and increase in scale, area, and severity (NRC, 2007). Additionally, the intensification of drought increases with time; the areas affected increase, and its communal consequences build-up (Wilhite & Buchanan- Smith, 2005). There is severe destruction of the socio-economic infrastructure and disruption of social services, with negative impacts, particularly on the poorer pastoralists in the community (Pereira & Cordery, 2009).

One should first appreciate pastoral livelihoods to understand how pastoral communities are affected by drought. Depleting water resources and vegetation degradation directly affect pastoral communities (Sommer, 1998). The resultant shortage of water plus pasture adversely affects livestock body condition, milk production, and ultimately the livelihood security of the pastoral communities. During drought, pastoralists encounter incidences that adversely affect their livelihoods (Orindi, 2007). For one, there's a reduction in livestock productivity resulting from losses occasioned by deaths, reduced calving with a resultant decline in milk output, and a weak physical state with increased vulnerability to illnesses. It renders pastoralists' investments untenable, with families unable to cater for their basic necessities (Orindi *et al.*, 2007). Two, pastoralists butcher the animals or sell them rather than let them die from hunger. Three, pastoralists have to contend with market forces that reduce the demand for livestock (Toulmin, 1995) since drought affects farmers, resulting in decreased availability of grains.

Moreover, there is a decreased demand for livestock due to their poor body conditions. The prices of livestock also tend to fall considerably. On the other hand, the food and grain prices rocket with the resultant erosion of pastoralists' buying capacity (Toulmin 1995).
In Kenya, rangelands constitute over eighty percent of the land mass; pastoralism is the dominant livelihood system. Over eighty-five percent of the inhabitants in these areas occupy themselves with animal husbandry. Nevertheless, the critical livelihood system faces serious impediments resulting from a scarcity of fodder and water, livestock illnesses, lack of market access, and resource-based conflicts.

In Kenya's rangelands, drought is the major, common and widespread natural catastrophe affecting pastoral communities. In the previous two decades, drought has been declared a countrywide catastrophe in five instances (Huho & Mugalavai, 2010). The government declared the 2017 drought a national disaster (NDMA, 2017). In parts of Kenya, more than three million people, among them pastoralists, were adversely affected by the severe droughts of 2006 and 2008/2009. In Kenya, there has been a change in the occurrence of drought in that previously, it used to happen once every ten years, but presently it occurs once every three years and at times every year (Kaitho *et al.*, 2006).

Pastoralists travel searching for water and pasture during deficiency; migration often triggers conflict and a surge in animal diseases. Drought occasions enormous losses of livestock, causing livelihood crises among pastoralists. The 2008/2009 drought episode saw pastoralists lose animals; reports reveal that more than eighty percent of the animals, especially the extra-susceptible sheep and cattle, died (UNDP, 2012).

2.3 Drought Adaptation Strategies for Pastoralists

2.3.1 Adaptation Strategies among Pastoral Communities

Pastoralists have developed drought adaptation strategies to enable drought episodes' survival (Huho, 2011). These adaptations include keeping a variety of livestock, maximization of herds, and variation of living strategies, among other risk management stratagems (Mworia, 2008, Huho, 2011).

Most pastoralist adaptive mechanisms are linked to their culture and generally constitute a series of drought responses (Little, 2001). A crucial adaptive mechanism for reducing vulnerability among pastoral communities is migration (Galvin, 2001). The nomads migrate with their animals to areas with ample water and pasture. This way, the animal's productivity is enhanced and kept at a higher nutritional value than the average range (African Union, 2010). When properly managed, strategic mobility offers high returns and is thus potential and ecologically attuned to the farming activities undertaken in the rangelands (Steinfield, 2006). Poor pastoralist households in East Africa are more susceptible to drought and experience difficulties coping with drought due to their incapability of implementing adaptive stratagems (IPCC, 2001).

Pastoralists inhabiting areas with extreme weather conditions with drought as a common feature have devised counteractive mechanisms to cope with these situations for millennia. Pastoralists in Northern Africa inhabit a vast region of about three million square kilometers experiencing severe and recurrent droughts for numerous millennia (Nyong, 2007). Hulme (2001) further described the intensity and magnitude as increasing with shattering outcomes for millennia.

The application of indigenous knowledge systems by Pastoralists has facilitated the development and implementation of a wide range of strategies to mitigate and adapt and cope with droughts in the past.

The traditional strategies utilized by the Sahelian pastoralists include use of supplementary feeds, diversification of livestock, and slaughter of weak animals for food during drought (International Institute of Rural Reconstruction (IIRR), 2004). Nyong *et al.* (2007), also noted that to cope with drought, the pastoral community in the area shift from cattle and keep more shoats since these need a lesser amount of feed than the former. They also migrate from the dryer north to the wetter south with the aim of relieving pressure on the pastures. This seasonal migration demonstrates a traditional system of range management used by pastoralists to cope with drought.

Pastoralists developed adaptative strategies over time, enabling them to survive droughts (Huho *et al.*, 2011). These adaptations and risk management strategies included livestock migration, animal keeping a variety of livestock, splitting of herds, maximization of cattle numbers, and livelihood diversification (Mworia & Kinyamario, 2008; Huho *et al.*, 2011). Traditionally, pastoral communities survived adversity and risks related to rangelands, such as dry weather conditions, by

migrating with their livestock (Scoones, 1994).

Pastoralists practice mobility to adapt and cope with the arid conditions in the rangelands. Resource mobility and escape mobility are the two major types of migration practiced (Oba, 1997). Migration in search of pasture and water is referred to as resource exploitation mobility and is a response to limited pasture and water availability (Oba, 1997). On the other hand, migration involving long distances to run from severe drought conditions and thus ensuring livestock survival is called escape mobility. To mitigate drought impacts, cattle are moved to dry-season grazing grounds near permanent water bodies within a county or ethnic territory (Barton *et al.*, 2001). For a pastoral community to utilize grazing grounds outside their territory and use underutilized pastures away from human settlement involves translocation, allowing opportunistic use of pasture and water.

For instance, pastoralists in Kajiado county move their cattle to the Chyulu National Reserve and the Kiboko Range Research Station. Others take their livestock either further south to Loitoktok or Makueni in the east, predominantly occupied by the sedentary Akamba community, which indicates that ownership and tribal occupation are broken during times of drought (Mworia and Kinyamario, 2008). The selling of livestock is another way of countering drought. The trade differs from regular sales, where only extra bulls and old cows are sold. During drought, even females usually spared for breeding may be sold (Barton & Morton, 2001). Moreover, low prices and livestock in poor body condition define drought time sales.

Herd splitting spreads risk and maximizes the use of scarce range resources. Those areas with more browse and less grass are set aside for browsers like camels and goats, while those with much grass are set aside for cows and sheep. Additionally, pastoralists borrow and share livestock for survival and breeding purposes among clans and kinship groups. In this manner, low-income families are protected from the adverse effects of drought; on the other hand, wealthy families are enabled to risk spreading drought times (Barton &Morton, 2001).

As a result of decreasing resources in the rangelands and low livestock production, pastoralist families are compelled to look for alternate income-generating activities for subsistence and supplement the little livestock produce available. Therefore, livelihood diversification is becoming

a fairly common practice among pastoralist families. Of late, various income-generating activities have been embraced by pastoral communities to cope with increasingly frequent droughts (Morton & Meadows, 2000).

Some of the actions might involve gathering fuel wood, wood coal making, and collecting Gum-Arabic. For instance, pastoralists of Kajiado County engage in various alternative income-generating activities, including charcoal and firewood sales, sand harvesting, security, and tourism employment, women beadwork and souvenir sales, and motorcycle transport operations (Kemboi *et al.*, 2017).

Herd diversification is an adaptive strategy used by most of Kenya's pastoral communities. This strategy involves keeping different animals like browsers and grazers like cows, dromedaries, donkeys, and small stocks using varying types of forage and having different drought resistance levels (Kashaye *et al.*, 1998). Therefore, grazers like cows and sheep are highly vulnerable to dry spells, while the browsers comprising goats, camels, and donkeys are more drought-resistant (Ouma, 2011). Pastoralists from the Maasai, Samburu, and Pokot communities are incorporating camels into their herds in compensation for the increased mortality rates of cows (GoK, 2011c).

2.4 Drought Management and Intervention Strategies

A drought's onset is insidious and progresses slowly and gradually in time (Roossi, 2003). This important feature can facilitate timely drought impact mitigation measures and interventions where efficient monitoring systems exist (Cancelliere & Mauro, 2007). Besides, sufficient and suitable policies and activities for reducing the socioeconomic impacts of drought, are essential components of effective alleviation activities (Roossi, 2003). According to Carney (1998), drought management is a process of regulatory and decreasing drought effects to not intensify into famine. He recognized some essentials of drought management: preparedness, mitigation, relief, and reconstruction.

2.4.1 Preparedness

Preparedness involves allocating adequate resources for effective drought responses (Carney, 1998). Planning saves lives and minimizes risks through timely and appropriate interventions in the face of a looming drought. It consists of pre-drought activities to manage disaster risk based on

sound risk assessment (ISDR, 2007). It involves developing a comprehensive drought contingency plan, guidelines, institutional structures, forewarning, forecasting capacity, and strategies defining actions aimed at assisting exposed communities to protect incomes by being prepared and acting in case of and looming drought threat.

2.4.2 Mitigation

These are actions that eliminate and minimize the drought impacts. The practice suggests the need for interventions to mitigate drought impacts on the socio-economic and ecological features (Carney, 1998). Measures to mitigate drought impacts can be either structural or non-structural. Structural measures include, for instance, water infrastructure development and suitable trade arrangements. Suitable operating practices, public awareness, policies, and public commitment are essential non-structural measures (ISDR, 2007).

2.4.3 Relief

Relief comprises humanitarian efforts performed during and immediately after a drought event (Carney, 1998). Emergency food and medical supplies proffered to drought victims are examples of relief.

2.4.4 Reconstruction

Reconstruction is the restoration of a disturbed system to its previously functioning status. It may comprise short and longstanding refurbishment of essential life support schemes and comprehensive renewal of famine-stressed regions (Carney, 1998).

Adversity deterrence, preparation, and rescue packages are important as they allow administrations to embark on longstanding development programs to moderate vulnerability to drought (Carney, 1998).

The drought management method is reactive and dependent on crisis management throughout the third world. This approach has been faulted for being untimely, uncoordinated, and poorly targeted to drought-ravaged communities (Wilhite, 1997; WMO, 2006). Post-impact humanitarian response increases community susceptibility to drought (Wilhite, 1997). Innovative stratagems emphasize managing drought by objectives rather than management by crisis. Risk management is a drought management strategy that includes the identification, anticipation, alleviation, and contingency planning in the period preceding the drought, together with the execution of relief and rehabilitation

measures immediately after a drought (Wilhite, 1997).

2.5 Drought Management for Pastoral Communities

Among the critical components of drought management in pastoral regions include; the Early Warning System, Contingency plans for drought management, and projects for the reduction ofpastoralists' drought susceptibility (Barton *et al.*, 2001). Moreover, drought emergency plans must facilitate the implementation of the following actions); alleviation to reduce drought effects on the pastoral livelihood system; targeted relief to offer needed respite for the drought-impoverished populations (Barton *et al.*, 2001).

These components are closely linked. Particular guidelines for resilience are interrelated with alleviation and are essential in specific alleviation actions. Therefore, strategies to ensure the right to use pastures in times of drought have to feature prominently in pastoralists' land policy. Poor marketing infrastructure and price fluctuations in final markets hinder the efficiency of emergency marketing interventions (Barton *et al.*, 2001).

Mitigation measures, relief, and rehabilitation are closely interrelated. Relief services should focus on the community's most susceptible sections, for implementing mitigation measures would be difficult. Purchasing livestock as a mitigation measure could make post-drought restocking stress-free.

2.5.1 Drought Early Warning

Early Warning Systems (EWS) collect data for drought monitoring to provide timely alerts when a drought threat looms to elicit prompt drought responses (Davies *et al.*, 1991). In Kenya, the Drought Early Warning System has been initiated at the County level as a component of a general strategic plan to increase food security in arid Counties. The initiative to mitigate the drought impacts has remained through the combined efforts of the Government of Kenya, non-state actors, and donors (Swift, 2001).

Kenya is among the few nations to design and implement Early Warning Systems focused on the livestock sector in the pastoralist communities (Barton, 2001). Kenya's Early Warning Systems have a high-efficiency rate of identifying the different phases that lead to disaster. However, they are expensive to operate, and thus it is imperative finances are readily available for enacting

emergency plans (Barton, 2001; Swift, 2001).

2.5.2 Contingency Planning

A contingency plan can be combined with the Early Warning System for the Government and development partners to take timely and appropriate action to alleviate drought impacts. The information gathered by the EWS will be useless if no action is taken due to a lack of capacity. Early Warning Systems are essential since they facilitate prompt initiation of mitigation measures by the Government and development partners, helping avert impending drought disasters (Barton, 2001). Drought shocks alleviation on pastoralists' livelihood depends on various actions and strategies: government-supported, donor-supported, and most importantly, those supported by the affected communities themselves (Swift, 2001).

2.6 Policy Areas for Drought Resilience Promotion among the Pastoralists

Action on particular sector policies by governments at both country and local levels could reduce the pastoralists' vulnerability to drought, such as those that enable specific mitigation strategies. The sector policies could include building pastoralist institutions and road networks, erecting livestock markets, and boosting security.

2.6.1 Pastoral Institution Building

Among the requirements for alleviating drought impacts are establishing and supporting traditional institutions among pastoral communities. Indigenous establishments are essential in sustaining local strategies to cope with drought.

Pastoralist associations should play the vital role of helping resolve conflict, negotiating the right to use grazing land in the dry seasons, managing shared water resources, protecting grazing rights, accessing and managing natural resources. They should also help establish human and animal health services and assist in revenue collection by levying fees for water resources and grazing land rights and facilitating communal animal markets (Barton et al., 2001). One good example is the Oxfam-funded Wajir Pastoralist Association, which has positively impacted natural resource management e.g., pasture and water, and facilitates conflict resolution (Odhiambo *et al.*, 1998). The pastoral institutions must be legally instituted to mobilize funding and support flexible community-

level natural resource management schemes that encourage mobility (Barton et al., 2001). Moreover, these pastoral institutes could act as the linkage between the state and the pastoralists. They should participate in all activities and decisions that affect pastoral communities.

Cattle markets are essential to protect the livelihoods of pastoralists. Therefore, the governments should establish markets in pastoral areas to boost livestock trade. Marketing efforts should start before drought begins. At this point, a pastoralist can sell his livestock at a good price, increasing his purchasing power (Barton, 2001). Nevertheless, some macroeconomic and sectoral policies, such as livestock products and export policy and the subsidization of animal feeds, constrain pastoralism (Pratt *et al.*, 1997).

2.6.2 Support for Pastoral Markets

Support for Livestock markets is essential for the pastoralist livelihood system to thrive. Therefore, the government must establish markets to facilitate easy livestock trade in the pastoral regions. During drought, marketing interventions are expected to commence before the drought onset; only then can the pastoralists dispose their cattle at better prices and with enhanced purchasing power (Barton *et al.*, 2001). Nevertheless, pastoralism is constrained by some macroeconomic and sectoral policies, such as the livestock products and export policy and the subsidization of animal feeds (Pratt *et al.*, 1997).

2.6.3 Infrastructure

Several communal installations could be necessary to reduce vulnerability to drought among pastoralists (Barton, 2001). Among these are roads and marketing structures for the easy animal trade; Watering centers to ease the translocation of animals and enhance grazing in the dry season; and veterinary and health centers to provide human and animal health services.

2.6.4 Security

Large areas in the ASAL Counties in North-Eastern Kenya are not accessible and cannot be exploited due to the high incidence of resource-use-based conflicts (Barton *et al.*, 2001). Therefore, security must be enhanced to promote the efficient use of grazing land, especially in grazing areas in the dry seasons. The regions with high insecurity are typically utilized as dry-season grazing grounds in far-flung places. Security provision should be an essential consideration in emergency drought planning and the state's strategy for the rangelands (Barton, 2001). To prevent conflict, the government should initiate and enforce directly negotiated local arrangements among pastoral

communities.

2.7 Policy Response to Drought Risk Management in Kenya

In Kenya, the policy response started with the localization of the universal United Nations Convention to Combat Desertification (UNCCD) following its endorsement in 1997. Parties must formulate and effect National Action Plans (NAPs) to tackle desertification, land degradation, and drought. The Country made and implemented its initial NAP in 2002 and has been executing it since then.

At the Conference of Parties, countries were requested to revise and affiliate their NAPs to the UNCCD ten-year strategy (2008-2018). After acknowledging UNEP's technical and financial assistance, the country is at an advanced phase of attuning its NAPS to the said stratagem. There are high expectations that the impacts and mitigation of drought in the country will be addressed following the implementation of this policy document. The Kenya government has demonstrated commitment to develop policy focused on resilience-building. For instance, recent policy papers redefine national priorities for reducing food insecurity and livestock sector reforms in line with Kenya's vision 2030 strategy. The previously marginalized ASALs, which occupy over 80% of the country. Session paper 1 (GoK, 2011) highlights food security, especially in the ASALs, which historically relied relief food. Session paper 2 on livestock (GoK, 2008) was reviewed to include concerns about resilience of the livestock sector, which is estimated to support 90% of the dry land livelihoods.

Kenya has developed the ASALs Policy (Sessional Paper No.8 of 2012) to direct sustainable development in Northern Kenya and other arid lands by intensifying investments in the area. It ensures that resource use resonates with the local peoples' realities. The strategy's requirements are aligned with the African Union Policy framework for pastoralism in Africa of 2011. The National Drought Management Authority was formed through this policy to coordinate all drought-related matters in the country.

2.7.1 Key Policy Developments Addressing Climate Change

To meet international obligations in response to various national and address international challenges and meet international obligations, the Kenya government has approved multiple guidelines, legislation, and strategies. Climate change is among these challenges. Climate change features prominently in the government's priority list; therefore, policies and strategies have been developed to address its challenges.

The United Nations Framework Convention on Climate Change (UNFCC) requires countries to submit progress reports of the national communication (NC) on reducing susceptibility to the impacts of climate change. Many countries have made commendable development in organizing this section of their NC. Kenya's first NC was submitted in 2002. Furthermore, the preparation of national adaptation programs of action (NAPAs) is mandatory for developing countries, giving details of how they are impacted by climate change their plans to mitigate these impacts. The Ministry of Environment and Mining Resources (GoK 2013) asserts that Kenya's national climate change response strategy (NCCRS) and national climate change action plan (NCCAP) have been completed. Despite this, inadequate adaptation preparedness remains a big concern in several African countries, even those that have made NAPAs and NCs (Pandey 2002). Overarching policy frameworks that mainstream climate into national plans are ignored, making implementing NAPAs difficult. This results in African countries implementing adaptation programs as standalone activities, which renders them ineffective (GoK, 2010a).

In Kenya's case, the draft Environment policy contains the existing climate change adaptation guidelines, culminating in the Environmental Management and Coordination Act (EMCA) of 1999 and the newly unveiled NCCAP. The lack of strong provisions on climate change adaptation and mitigation in the EMCA and draft policy can be attributed to the time they were prepared. For example, the draft policy only states that a climate change strategy should be developed.

Even though the NCCRS is a progressive stride towards tackling climate change, Kenya requires robust strategies for addressing moderation and adaptation, leadership on the integration, and mainstreaming these into all national departments and institutions. In spite of this deficiency, fear of the potential impacts of climate variation prompted robust backing for policies, and therefore

leading to the establishing of the premier's office in 2008. The department facilitated provision high-level political underpinning for climate change efforts. The office is now based in the ministry of devolution and planning and face various challenges. There are similar weaknesses in other environmental policies. Particularly, the energy, forest, and ASAL (arid and semi-arid lands) policies lean heavily towards environmental management, although matters of climate change extend further than environmental management.

2.7.2 Emergency Relief and Drought Response

Regarding drought risk management, several tangible stratagems are currently being launched. These include the ten-year Ending Drought Emergencies Strategy (EDE), which was announced at the HOA Summit in September 2011: The Nairobi Strategy on Enhanced Partnership to Eradicate Emergencies endorsed by the heads of state in September 2011; Subsequent Intergovernmental Authority on Development (IGAD) regional program development; A follow-up ministerial level meeting in March 2012; in Kenya's Vision 2030, drought and climate change are largely addressed under the risk management. Strengthening and sustaining the resilience of vulnerable populations is a major goal of disaster management in Kenya. There is need for a paradigm move from short-term to long-term plans and projects. Contingency planning is critical for governments, communities and relevant stakeholders in reducing disaster risk. The establishment and enhancement of national institutions that manage disasters, forging coalitions and networks with other organizations, and mainstreaming reducing disaster risk in development are the main focus of the draft policy. In this manner, the resilience of susceptible populations and coping with potential disasters such as droughts could be enhanced (GoK, 2009).

2.8 Gaps in the Literature Review

There is relatively limited information on indigenous drought adaptation strategies among pastoralists in Narok County. Most studies on this topic have been done in northern Kenya, and none have been conducted in Narok County. There was, therefore, the necessity to study the impact of indigenous drought adaptation strategies on pastoral livelihoods in this county to provide insights to the stakeholders involved in promoting drought resilience and enhancing pastoralists' livelihoods in southern Kenya.

The study therefore makes an attempt to meet this knowledge gap by conducting a detailed analysis

of the adaptation strategies adopted by pastoralists and their effectiveness in helping the pastoral community cope with recurrent droughts. The study also assessed the institutional drought mitigation interventions by state and non-state players and the effectiveness of these efforts. Therefore, this study provides evidence for policy decisions related to drought mitigation strategies that can facilitate recovery from drought related shocks which can promote pastoral communities' resilience in Kenya's ASALs. Furthermore, the research also critically examines the adequacy of the drought risk management strategy in the country highlighting the shortfalls and bottlenecks encountered in its implementation.

It is hoped the state and non-state actors will find the information generated useful in initiating drought control measures. This study provides valuable information that has potential to improve drought risk management and thus can facilitate the successful implementation of drought risk management strategies in Kenya. This research also forms a reference framework for students and policy makers. This study therefore, intended to fill this knowledge gap by assessing the effectiveness of the indigenous drought adaptation strategies in the pastoral livelihood system in Mosiro Ward, Narok County, in Kenya.

2.9 Theoretical Framework

In this study, the Sustainable Livelihood Approach (SLA) was used as a theoretical framework. In the study, it is used to deepen our understanding of the pastoral community's livelihood options in the face of persistent drought. The Sustainable Livelihood Approach was introduced in the 1980s to counteract the "Basic Needs development Approach", a top-down approach. It abandons the top-down model and emphasizes the significance of individuals as important players in development (Chambers, 1983). According to Chambers (1987), the SLA starts with real livelihood strategies by people observing the local environment and conditions, their needs and desires. The SLA also integrates important environmental and social aspects. Although environmental factors reflect the sustainability of the natural resource base, the social aspect refers to the livelihood adaptation, vulnerability, resilience and the capacity of a livelihood to recover from shocks and stresses (Ellis, 2003). Among the factors exacerbating these shocks and stresses are droughts and their effects on the socioeconomic conditions of the pastoralists. The Sustainable livelihood Approach is therefore defined as a 'multi-asset strategy', in which sustainability is measured in terms of existing resources and a valuation of the vulnerability context within which assets exist (DFID, 2004).

According to Hefferman *et al.*, (2001), the Sustainable Livelihood Approach is applicable to pastoral production systems, as it allows for the evaluation of vulnerability and, or sustainability of livestock-based livelihoods. Persons, especially pastoralists are placed at the heart of a network of interrelated impacts that disturb ways of creating livelihoods for themselves and their households. SLF can be applied to assess the adaptive stratagems practiced by persons and groups as a response to exterior shocks such as drought (UNDP, 1999).

Pastoralists depend on a variety of assets such as natural resources, skills, knowledge, credit facilities, education and social networks. The level of vulnerability determines the access to these assets. This vulnerability is influenced by various factors, including events like drought and epidemics, trends such as economic and political changes, and seasonal variations like fluctuation of prices. Additionally, the social, institutional, and policy environment also impacts the ability to access livelihood assets. This in turn affects how they use these assets to achieve their livelihood objectives.

2.10 Conceptual framework

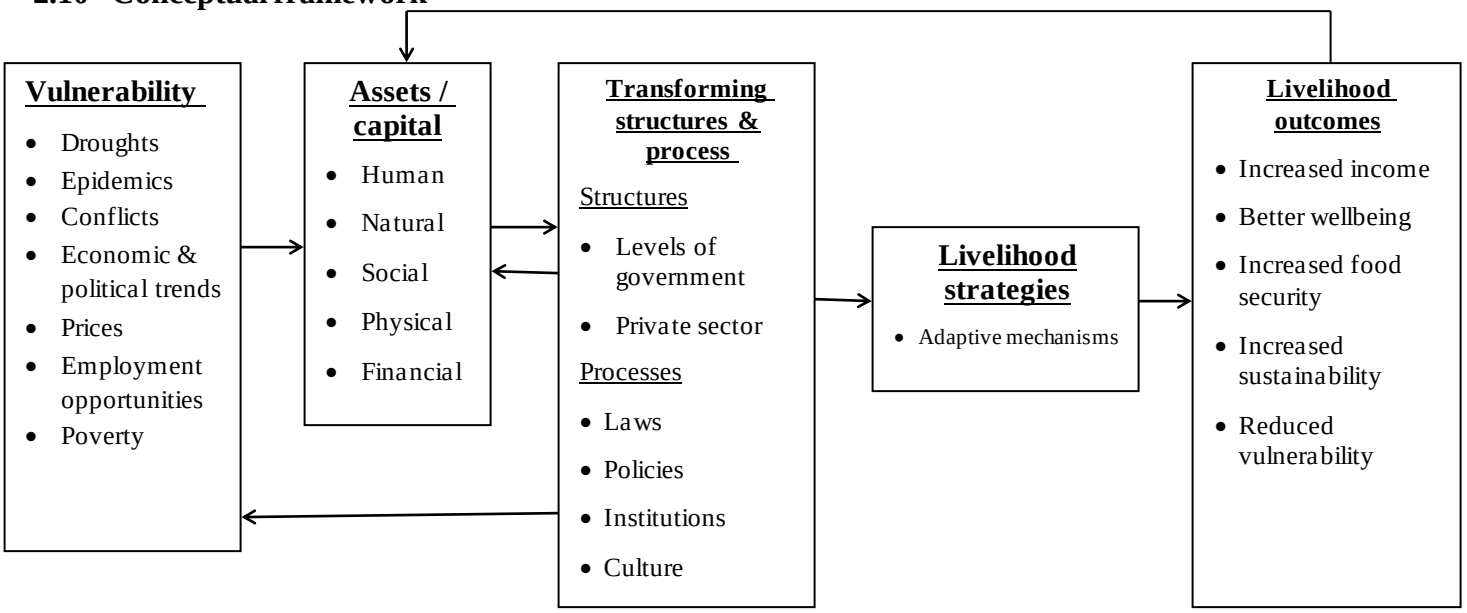

Figure 1: The Sustainable Livelihoods Framework (SLF) (Adopted from Ashley & Carney, 1999)

Explanation:

1. Vulnerability Context

The fundamental subject of analysis is drought vulnerability. In decades past, Kenya's pastoral communities have experienced numerous drought incidences which have become more frequent and intense. Droughts have exacerbated the pastoralists' vulnerability by triggering epidemics, conflicts and the weakening terms of livestock trade. Changes in economic and political conditions also accounts for pastoral vulnerability.

2. Assets

Pastoralists rely on five types of assets or capital: Human, physical, social, financial and natural capital. For the achievement of a sustainable livelihood, these five types of capital are essential. In addition, the capacity to practice livelihood stratagems depends on fundamental matter, economic, material and immaterial assets that they have or can get (Heferman *et al.*, 2001). They comprise:

a) Human capital:

These include competences, experience, healthiness, and the capability to travail in order to achieve various livelihood goals. With respect to animal husbandry, customary expertise of land and various environmental assets, accessibility of labor, and physical wellbeing enables pastoralists to undertake stratagems like migration.

b) Physical Capital

These include dispensaries, livestock clinics, road and rail network, marketplaces and telecommunication infrastructure. In addition, human housing, cattle sheds and equipment are material resources.

c) Social capital

These are social assets that include social networks, trust, and access to larger social structures on which pastoralists rely to earn their livelihood.

d) Financial capital

Comprise pecuniary or fiscal assets accessible to families providing various living necessities. Cattle are used as a means of monetary income by people in various modes, e.g., as investments, as stocks, or ways of making money in emergencies or security for loans.

e) Natural capital

Consist of environmental reserves such as land, air, water, wildlife, and biodiversity, grazing land and water essential assets of great importance for sustainable pastoral livelihood systems.

3. Livelihood strategies

The SLF likewise alludes to the livelihood strategies adopted by families to attain desired livelihood objectives. The pastoral community's livelihoods strategies comprise of various actions aimed at always accessing these essential assets, even during periods of drought. These include the coping and adaptation stratagems adopted in times of drought.

4. Policies and Institutions

Transformation structures and processes also influence the access to the five livelihood assets. Regulation by the different levels of government (national and county), laws, culture, and institutions impact on how pastoralists adopt the various livelihood stratagems to attain desired

livelihood objectives.

5. Livelihood Outcomes

The SLF also outlines the final objectives desired by the pastoralists, labelled 'livelihood outcomes.' These comprise increased income, improved wellbeing, increased resilience, reduced food insecurity and sustainable of use natural resources. Enhanced welfare and reduced food insecurity have implications for good nutrition and better health.

In general, the SL framework conceptualizes pastoral livelihoods in relation to susceptibility, accessible resources, living stratagems, and the prevailing political and institutional processes.

The framework was well suited for this study in evaluating the adaptation strategies adopted by pastoralists to cope with recurrent droughts and the institutional interventions by the state and non-state actors to assist the pastoralist community mitigate drought impacts in Mosiro ward.

CHAPTER THREE
METHODOLOGY

3.0 Introduction

This segment provides an overview of how the research project was carried out to address the precise questions. It contains details about the survey locations, where the data was sourced from, the reasons behind choosing those sources, the types of data that were compiled, the methods used for sampling, the techniques employed for data collection and the subsequent analysis of the data.

3.1 The study area

Narok County

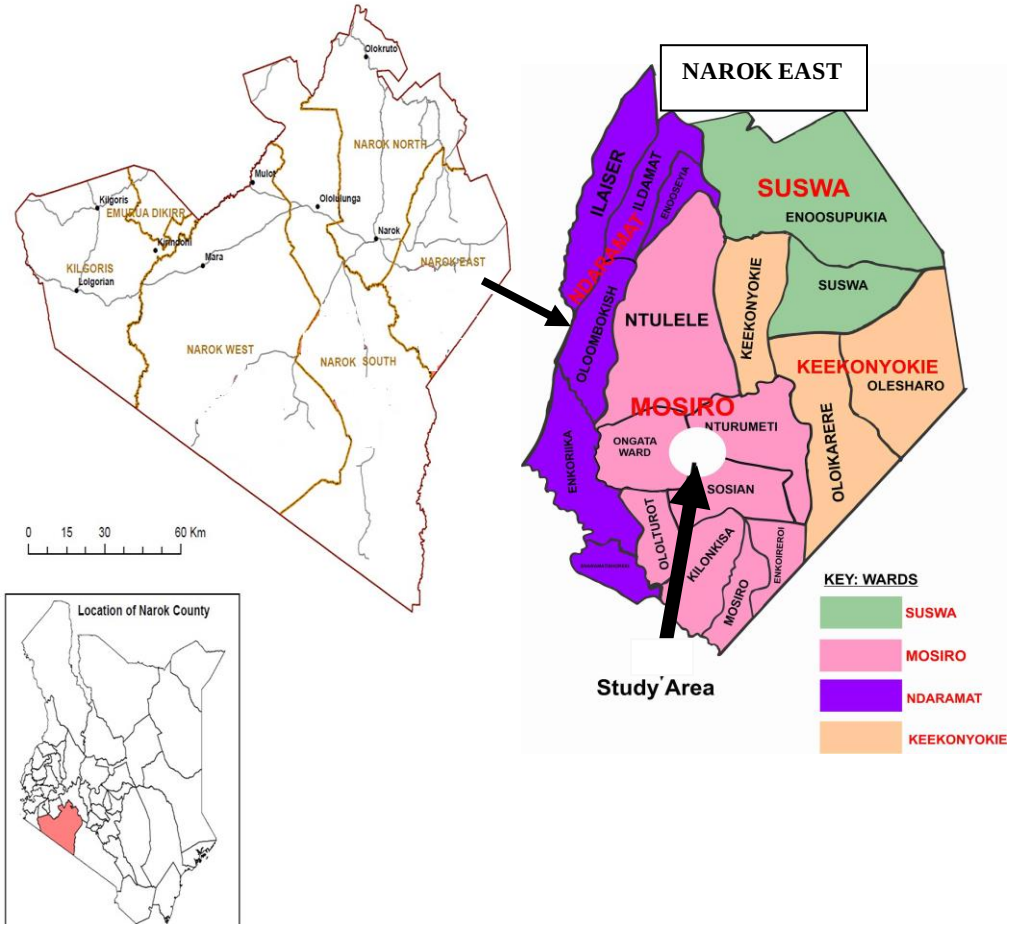

Figure 2 Map of the study area (Adapted from: IEBC 2022)

The study was carried out in Mosiro ward, Narok East Sub-County.

The selection of Narok East Sub-County was based on its topographical location. As well as its sources of livelihoods and vulnerability to extreme climatic events, particularly drought and dry spells. Narok is one of the 21 counties categorized as arid and semiarid lands (ASALs). It is situated in the Great Rift Valley and has some major rivers, parched and rocky sceneries, and active volcanoes. The county extends over 17,933.1Km^2, with a population of 1,157,873 (KNBS, 2019).

Narok County has an assorted natural resource base and a rich Maasai culture. The County's main livelihood systems are pastoralism, crop farming, conservation and tourism and trade, and traversing three expansive ecological regions. Mau highlands, Mara grasslands, and the Trans Mara Midlands. The county is situated on the Southwestern part of Kenya, at latitudes 0° 50" and 1° 50" South and longitudes 35° 28" and 36° 25" East.

Narok County is bordered by several Counties: on the Eastern side is Kajiado, Migori to the West, to the North Nakuru and Bomet, Nyamira, and Kisii to the North-West.
The county's features include a highland in the west, which is covered by the Mau Forest and reaches an altitude of 460 meters.
The Highlands are rich in volcanic soils, making them suitable for intensive agricultural production. Pastoralists inhabit the lowlands, which have inadequate soils and unpredictable rainfall. The main soils in this area are relatively shallow and can be easily eroded if not properly managed. Temperatures fluctuate between 8^0C and 28^0C, and precipitation ranges from 500 mm to 800 m per year.

In the arid zones, of Narok County, the flat low fertility soils of the plains are overgrown with grass, dispersed herbaceous plants and shrubs (GoK, 2009)
Vachellia tortillis and various shrubs are the main types of vegetation. Due to the high temperatures, physiological properties have evolved that prevent water loss. As a result, the area is prone to episodic droughts most of the year and the County suffers from water scarcity challenges as most rivers dry up during drought. The Narok County Integrated Plan 2018 (GoK, 2018) indicates that current domestic and livestock water sources include streams, shallow wells, water pans, boreholes and springs. Nevertheless, most of these water sources are polluted with various microbes and organic compounds that cause diseases such as enteric fever, diarrheal illnesses, cholera and bilharzia. Thus, the pastoralists are forced to rely on

rainwater harvesting and water vendors.

3.2 Study Design

The case study model was employed since the current survey's emphasis is the assessment pastoralists' adaptation mechanisms to recurrent drought in a particular locality. The case study model is vital in gathering data by carefully perceiving community actions and circumstances and observing people's attitudes, choices, as well as behavior. In case study research, it is crucial to ask exploratory questions such as "what" and "how" in order to gather in-depth and useful perceptions and knowledge about the subject matter. These types of questions go beyond what a survey can achieve and help uncover detailed information (Bryman, 2008).

The objectives of the survey were: - Evaluate the adaptative stratagems embraced by the pastoral community to cope with drought in Narok County, examine institutional interventions in dealing with drought in Narok County, and assess the country's current drought risk management strategy.

Objectives 1 was answered via primary data, Focused interviews (FGDs), key informants interviews, and household surveys to gather individual opinions as pertains to the efficacy of adaptative mechanisms adopted by pastoralists to cope with drought.

The researcher solved objective 2 by using both primary and secondary data. To gain insights into the pastoralist's perceptions on institutional interventions, primary data collection tools were used. Policy papers were perused to acquire information about the government's response to famine in Mosiro ward.

Objective 3 was resolved by reviewing current drought risk reduction management strategies. Finally, key informants from related administration sectors such as government, medical and agriculture, among others were questioned to acquire information on institutional interventions in Mosiro ward.

A questionnaire was formulated in order to answer the research questions derived from the study objectives. The questions addressed the main themes of the research objectives. Each item in the questionnaire addressed a specific objective.

3.3 Data needs and sources

The primary data source was informed by stakeholder mapping for the study area, which enabled public and private stakeholders' recognitions, e.g., the state, private sector, and drought-ravaged community living in the study area. On the other hand, secondary data (published material) pertinent to the study was sourced from relevant books, scholarly articles, journals, periodicals, internet resources, and relevant maps to inform the research problem.

3.4 Sampling

3.4.1 Determination Sample Size and Data Collection Procedure

Out of the 915 Households in the three selected villages (Kenya National Bureau of Statistics, 2019 Census), after general observations were done via a cut across inspection (North-South, East-West) before the start of the field study, 100 homesteads were picked at random in the chosen pastoral community in Mosiro ward.

To objectively derive the required sample size, a formula used by Nasuirma (2000) was employed

n= {NCv} / {Cv + (N-1) e}

Where;

N = is the Target Population

Cv= is the coefficient of variation

e= is tolerance at the desired level of confidence for this study: N=915

Cv= 0.5

e = 0.05

Therefore: n= {NCV} / {Cv + (N-1) e} n= 915 (0.5)2/0.52+ (1459-1)0.052 n=228.75/2.585 n=90.2366863905

The sample size (n), therefore, was 90. To cater to the households opting out of the study, a sample size of 100 households was proposed.

Participating households were selected using a multi-stage random procedure. Mosiro ward was specifically selected due to its geographical location, primary livelihood activity, and susceptibility to drought. After listing the sub-locations in the ward, three study villages were randomly selected.

From the Kenya National Bureau of Statistics records, the number of households was obtained. Then followed the distribution of questionnaires in the villages (Ongata Naado 58, Nturumenti 25, and Sosian 17) based on the total population. Then followed the random selection of the participating households; this technique ensured that every head of household had an even chance of participating in the study.

3.3 Key Informants and Focus Group Discussions

A sampling frame for the participants in key informer interviews and focus group discussions participants was not prepared.

3.4.2 Data Collection

A pilot study was done to pre-test the questionnaire in randomly selected households in the study area. According to Mugenda & Mugenda (2003), pilot studies aim to test the instrument's validity and reliability so that items that do not meet this threshold can be rectified or discarded.

3.4.1 Household Surveys

During fieldwork, there are various methods of data collection. Interviews have been defined by Cloke (2004) as "conversations with a purpose." Even if the discussions can be structured, semi-structured, or non-structured, they offer real insights into a community's understanding. Face-to-face interviews were conducted with male and female heads of households in the homesteads. A standard questionnaire was used to conduct a forma study.

The questionnaire directed to the household heads was calculated to prompt demographic statuses, such as level of education, marriage, size of family, age, sex) and other factors like traditional information, local insights on drought, coping, and adaptation stratagems, etc. One hundred respondents were interviewed using a structured and non-structured questionnaire. In order to acquire statistics to facilitate the analysis of data in an explicit manner, structured questions were used. Conversely, for an in-depth response, the un-structured question was useful. A questionnaire that guarantees uniformity is economical and time-saving (Mugenda and Mugenda, 2003).

3.4.2 Key Informants

The researcher begins data collection with these individuals because they have a wealth of information, are accessible, and provide further information (Creswell *et al.*, 2007). Similarly, Kumar (1989) stated that "key informant interviews involve questioning a selected group of individuals likely to provide needed information, ideas, and insights on a particular subject." These interviews focused on pastoralists' drought adaptation strategies, the government's policy interventions, and the current drought risk management strategy. While conducting key informant interviews, I requested the participants suggest other individuals with vast knowledge on the issue. Also, local administrators nominated capable individuals for interviews.

A total of nine key informant interviews were conducted in this study. They came from the Narok department of livestock, Narok agricultural Development Sector (ASDP), National Drought management Authority (NDMA), County meteorological department, Regional Pastoral Livelihood Resilience Project (RPRLP), and the Kenya Bureau of Statistics (KNBS) office. Key informants from administration, health and education departments were also interviewed.

To delve into the local knowledge regarding strategies for adapting to drought and the responses of the government, focus group discussions with various leaders in the community and elders were held using guided checklist questions. A total of three focused group interviews were held in Ongata Naado, Nturumeti, and Sosian villages. The information obtained from key informer interviews was complemented by the focused group interviews.

The selection of focused group discussants was based on their status, approval, and familiarity with the cultural practices and societal arrangement of the community.

Focus group discussions allow the researcher to understand peoples' feelings and the participants to seek explanations as to why they held particular views. The validation and triangulation of the responses elicited from the household survey is facilitated by the focused group interviews (Byrman *et al.*, 2004).

Secondary data were collected using desktop studies which included an analysis of the research problem grounded on available texts. Sources of secondary data included periodicals, papers, books, also various journals. Additionally, associated development materials, such as reports and policy papers, were studied and analyzed to comprehend pastoralism, policies, their

execution, and influence in Narok County.

3.5 Data Analysis

The iterative approach model was used to analyze qualitative data to extract major themes and concepts to be discussed. Miles and Huberman (1994) describe qualitative data analysis as a continuous process. This approach allows the researcher to interact freely with the collected data and make sense of it throughout the analysis process, as demonstrated below.]

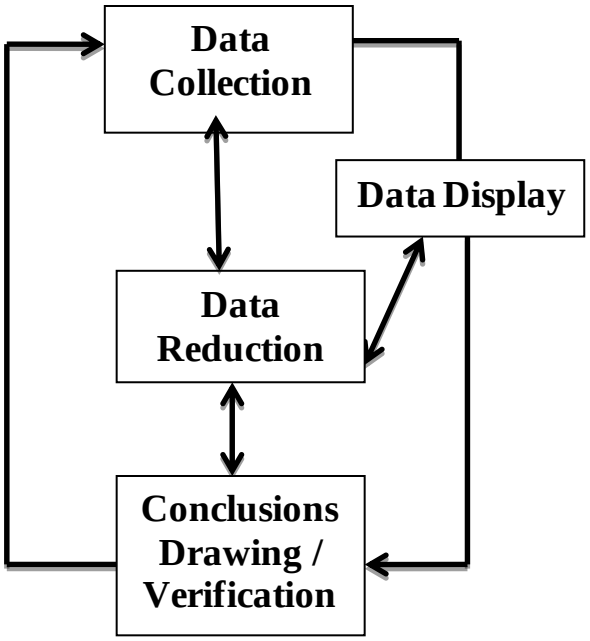

Figure 3: The Iterative Model Approach

The Statistical Package for Social Sciences was used for the analysis of quantitative data (SPSS). The institutional support by the state and non-state players was summarized and presented in graphs, charts and frequency tables in order to facilitate the description of the study.

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Introduction

The section below explains the analysis and results of this survey. The study had the following objectives: Evaluate the adaptation strategies adopted by the pastoral community to cope with drought in Narok County, examine institutional interventions in dealing with drought in Narok County, and assess the country's current drought risk management strategy. Therefore, the following section presents the findings.

4.2 Results- Demographic Characteristics

Obtaining the information on the participant's background knowledge and experiences is essential since the demographic data helps determine their relevance to the enquiry. Demographic data is important for determining if the entities in a survey are a representative sample of the target population for the purpose of generalization. In research, demographic variables are defined as independent variables since they cannot be manipulated.

The results revealed that the majority of the people surveyed were aged between 31 and 50 years. The average age of the household heads was 36 years. The majority of the people interviewed as heads of households (75%) were men, while 25% were women. Almost all of the house hold heads (90$) were married, Out of the total, 7of the individuals were not married, while 3% had gone through a divorce. Among the heads of households, 21% had not received any formal education, wheras44% had a secondary level of education, and 14 had achieved tertiary education. These percentages are illustrated in the tale below.

Demographic Characteristics	
Age of the Respondents	
21-30 Years	30
31-50 Years	60
Above 50 Years	10
Total	**100**
Marital Status	
Single	7
Married	90

Divorced	3
Total	100
Gender	**Percentage**
Male	75
Female	25
Total	100
Level of Education	
None	21
Primary	44
Secondary	21
Tertiary	14
Total	**100**

Table 1: Demographic Characteristics of the respondents

4.3 Income Sources

Respondents stated their primary source of income. Most respondents (41%) derive their income from pastoralism, while 21% derive their livelihood from crop farming. On the other hand, 19% engaged in livestock trading, 12% engaged in petty trading and services, 5% were civil servants, and only 2% worked in tourism. Livestock keeping was a source of income for most respondents (figure 4.2 below).

Respondent's Primary Sources of Income

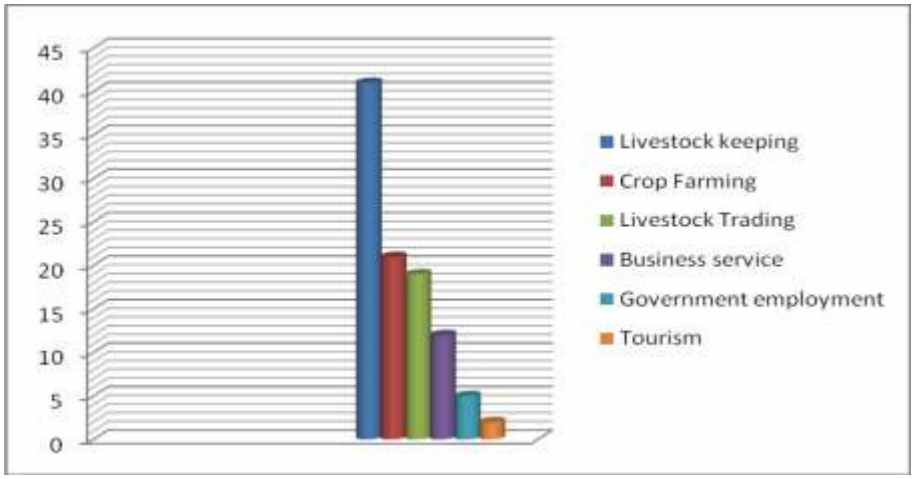

Figure 4: shows the respondents' primary sources of income.

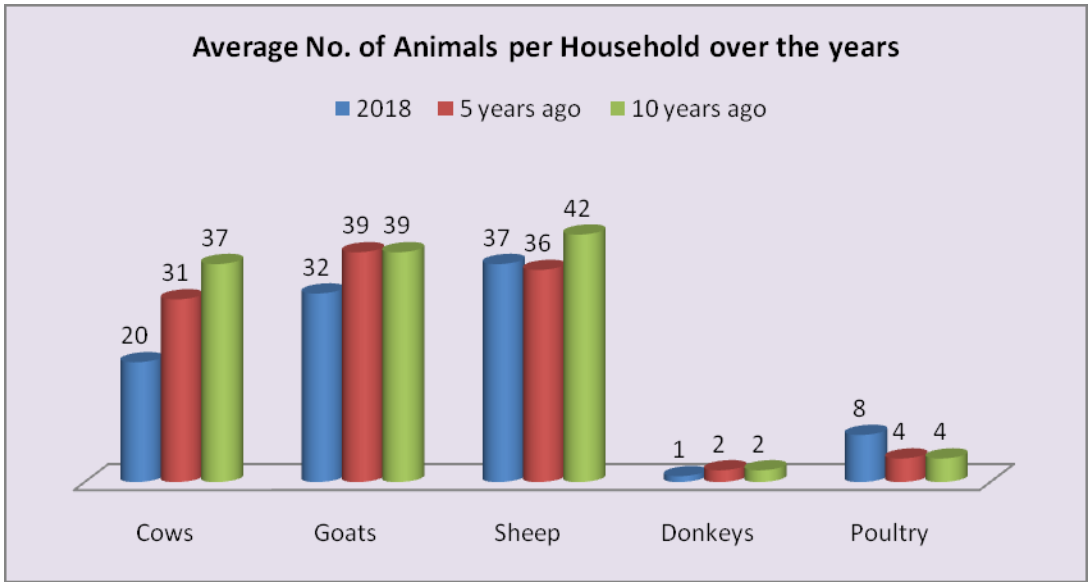

Figure 5: Average Number of Livestock Holdings

Figure 5 above illustrates the average number of cattle holdings per family over the last ten years. According to the study, the number of livestock has per household has gone down, which is a decrease of 45.94%. Similarly, the number of goats has also decreased from 39 to 32, which is a reduction of 17.94%. The number of sheep decreased from 42 to 37, which represents a decease of of 11.90. The pastoralists provided different explanations for the changes in livestock numbers as depicted in figure 4.4 below. The decease in the number of donkeys and chicken was not considerable.

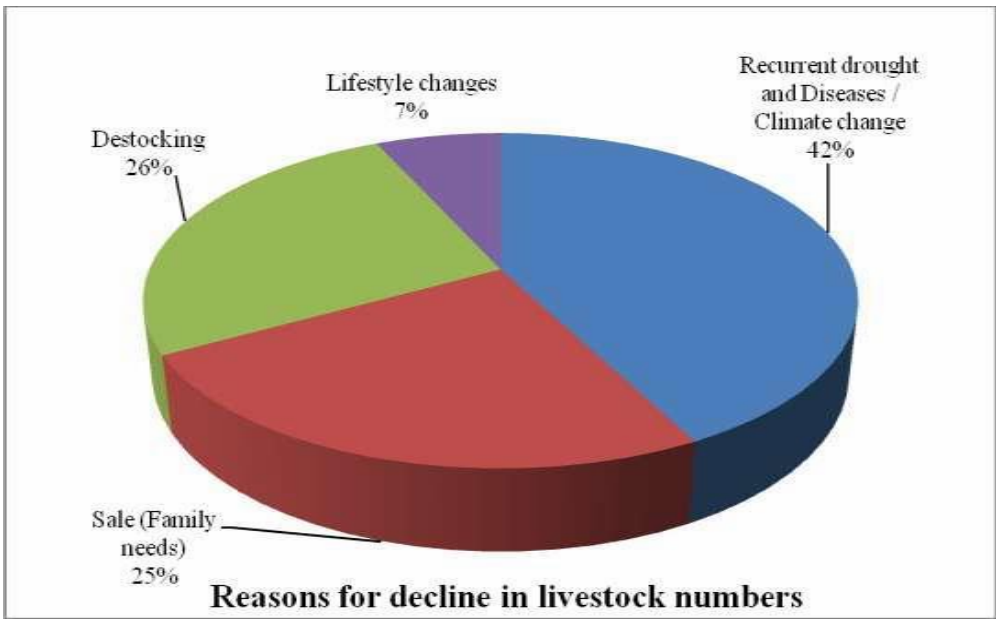

Figure 6: Reasons for decreasing number of livestock

According to the majority of the respondents (42%), the decrease in the average number of livestock holdings per household is mainly caused by recurring droughts and diseases. On the other hand, 25% of the respondents attributed the decreased livestock numbers to sales to finance household needs like paying school fees. Another 26% cited destocking as the main contributing factor to the decline, while 7% attributed it to lifestyle changes like the diversification of livelihoods, which diminished the importance of cattle keeping. Focus group discussions indicated that, unlike in the past, pastoralists were selling cattle rather than waiting for them to die of starvation during times of drought. In the past, when the drought was not as frequent as presently, pastoralists kept up to 3000 head of cattle, but this is no longer sustainable in the prevailing circumstances.

4.4 Water Sources for Livestock and Humans

Most families get water from dams, 22% from boreholes, 18% from water pans, 10% from dry river beds, and only 10% access water taps. Other sources of water included water harvesting. During the dry season, when the water pans and dams become dry, households rely on water vendors who transport water in trucks called water-bowsers.

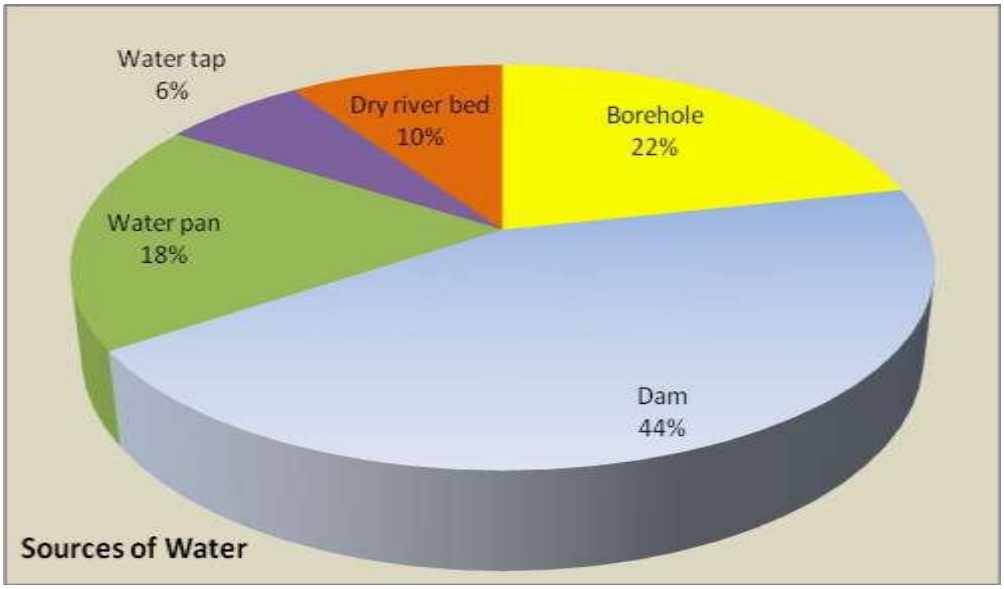

Figure 7 sources of water

During the focused group interviews participants expressed that Mosiro ward faced a significant issue of water scarcity. Young women and girls moved long distances, searching for water during the dry season. Usually, the distance traveled to the water sources is

approximately 3km, but this distance increases by up to 10 Kilometers during the dry season. The county drought information officer corroborated this.

4.5 Pastoral Community's Drought Perception

To corroborate the pastoral community's perception of drought, the researcher got rainfall data for Narok Station from *Drought in Kenya* from 1964 to 2015.

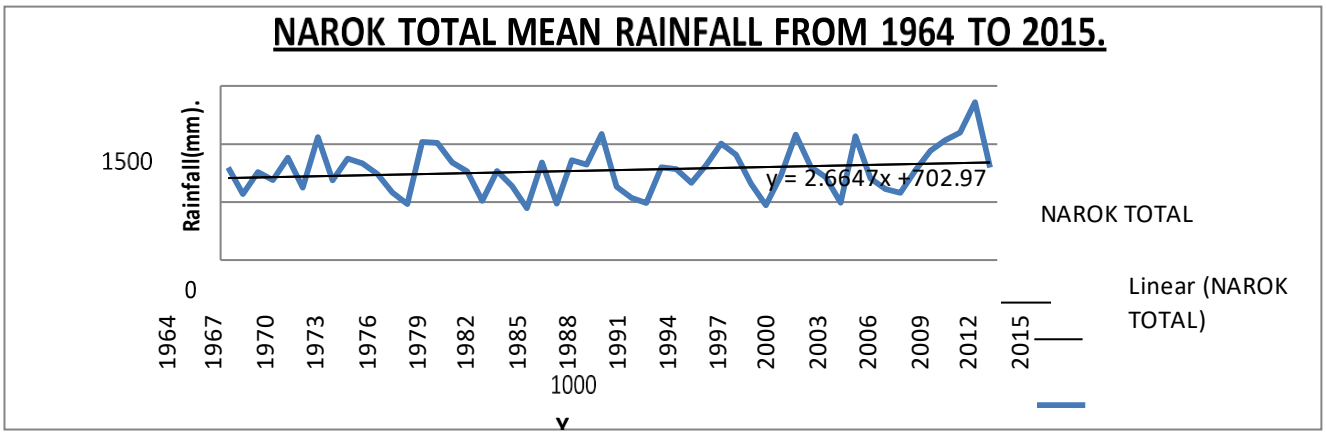

Figure 8: Graph showing mean rainfall totals variation for Narok (adapted from drought in Kenya, Mulama *et al.*, 2016)

The survey used the Standardized Precipitation Index (SPI) how severe the drought was over a span of 12 months (M12) from January 1964 to December 2015. In the analysis. Negative values of the SPI indicate dry periods, while positive values indicate wet periods. To calculate the SPI, we divide the difference between the normalized seasonal precipitation and its long-term seasonal average by the standard deviation. This is done by using the following formula:

$$SPI = \frac{Xij - Xim}{r}$$

Where *r* represents the standard deviation, *Xij* refers to the seasonal precipitation at the *ith* synoptic station, and *Xim* represents the long-term seasonal mean precipitation. Negative SPI values denote the beginning of a meteorological drought, while positive values indicate its end. Mild droughts occur when the SPI values range between 0 to - 0.99. Droughts are moderate when the SPI values range from -10 to -1.49 and are severe when the values are between -

15 to -1.99. Droughts are classified as extreme when the SPI values of -2 and below. An SPI

of zero (0.00) denotes average precipitation.

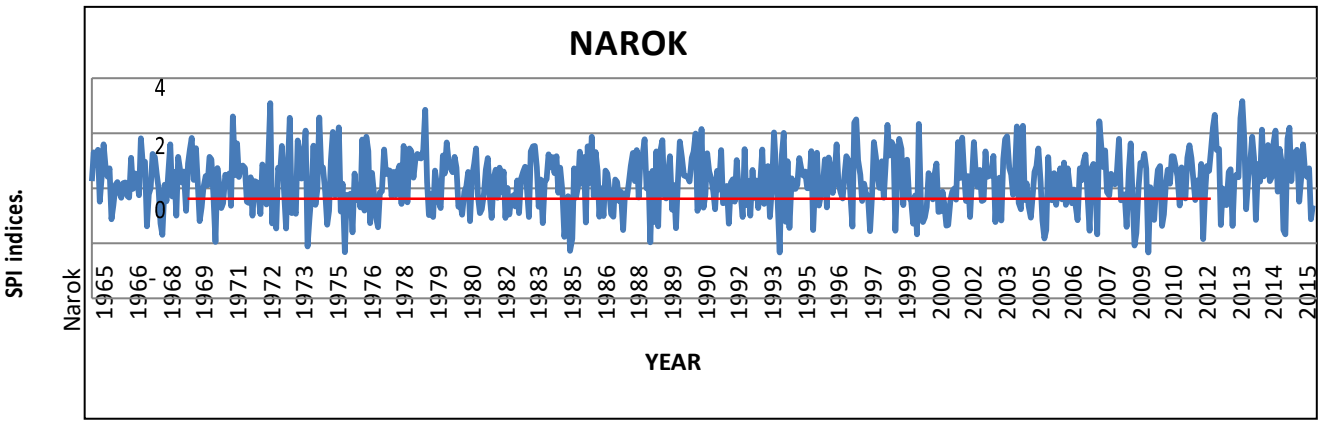

Figure 9: Graph showing SPI analysis for Narok station (adapted from Drought in Kenya, (Mulama *et al.*, 2016).

Narok recorded a slightly decreasing trend in rainfall. Extremely dry 1969, 1972, 1974, 1983, 1988, 1993, 2008, and 2010 periods. Dry periods were in 1965, 1971/72, 1973, 1975, 1979, 1980, 1982, 1990, 1996, 1997, 2007, 2009, 2012, and 2013. Moderately dry periods occurred in 1978, 1989, and 2009-10.

Responding to whether they had experienced drought in the last twenty years, 97% responded in the affirmative, while 3% responded negatively.

The respondents had different opinions about drought. Most (34%) believed that drought was a deficiency rainfall for one or two seasons. Another 20% thought of drought as a timed when livestock die. 26 saw it as part of the climate, while 20% saw it as a natural disaster or phenomenon.

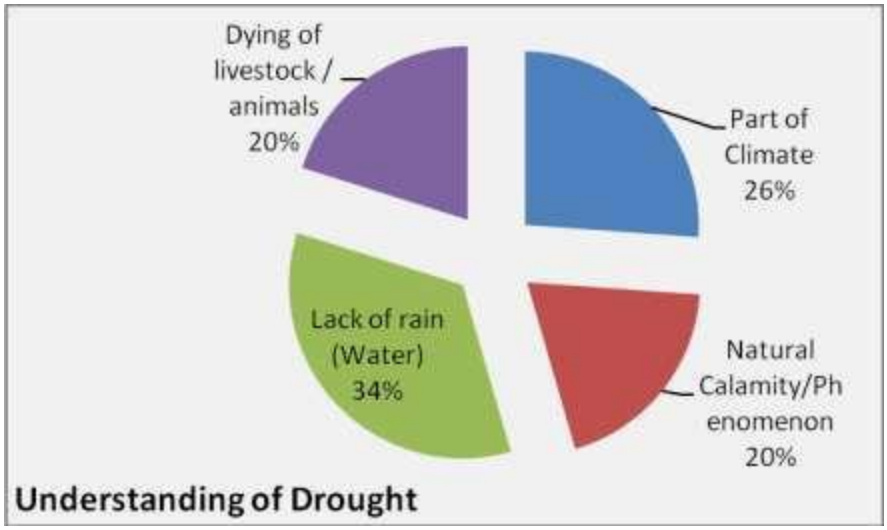

Figure 10: Respondents' perception of drought

The survey wanted to determine what the pastoral community considered drought indicators. Focus group discussants and key informants identified animals, plants, topsoil, wind, water bodies, and people's behavior as drought pointers.

As regards the animals, deteriorating body conditions indicate drought, i.e., Cattle, shoats, and donkeys become emaciated, characterized by protrusion of ribs and hair loss. Furthermore, livestock cannot move long distances due to accompanying lethargy and lack of stamina. This keeps animals, particularly sheep and young and old cows, in the shade and cannot feed on the little pasture available. Another livestock indicator is the decrease in milk production among lactating animals. For instance, a lactating goat can barely fill a 200ml glass of milk daily. The young calves hardly get enough milk from their mothers and, ultimately, die of starvation. Cattle deaths indicate drought. In the event of severe and extended droughts, livestock deaths occur. Initially, the young and old sheep die, followed by the kids, mature sheep, and goats.

The condition of the plants is a sign of drought. Participants stated that there is a color change in plants from green to brownish, and with more grazing, the ground is left bare, with the tufts of grass and shrubs indicating drought. Then trees shed leaves and fail to bloom or bear fruits, indicating drought. Wind and soil can indicate drought. During drought episodes, the dust bowls resulting from wind erosion and soil dryness are drought indicators.

The water sources also indicated drought; drying seasonal streams and rivers signal drought.

Pastoralists move their animals to permanent water sources. Most relocate near the Uaso Nyiro River, where they source water for human and livestock consumption. Some pastoralists temporarily settle at the river until the end of the dry spell.

Kit was c lear from the FGDs that drought was more common presently than in the past. They indicated that rainy seasons had become short and unpredictable in the previous few decades. They were so erratic that pastoralists could not predict the rainy season. There has been an increase in mid-season dry spells, exacerbating pastures and water scarcity.

Some focus group participants would recall past droughts experiences. Others would remember stories narrated by their elders. There was consensus among the elderly and middle-aged members that severe droughts occurred in 1964, 1974, and 1984. A drought occurred in 1992, 1994, 2000, 2009-2011and, 2014-2017. The 1984 episode was particularly severe because it was the first time they got food aid in the form of yellow maize.

During focus group discussions, there was agreement that the area was rich in different vegetation in past decades, particularly in the 1950s, 60s, and 70s. There were no food shortages, water and pasture were aplenty, and the pastoralists were wealthier and healthier. They considered these as the good old times.

According to the key informants, severe drought events occurred only once in ten years in the past. Some minor drought episodes would occur between the ten-year duration. Compared to the severe droughts, these had no significant effects on the pastoral livelihood system.

4.5.1 Opinion on Causes of Drought

Regarding what causes drought, most respondents (45%) cited deforestation, charcoal burning, inadequate plant cover, and pollution from industries (20%) as causes of recurrent drought. Others (30%) attributed it to climate change and global warming, while 5% believed that recurrent droughts were due to mystical powers like God, Satan, etc.

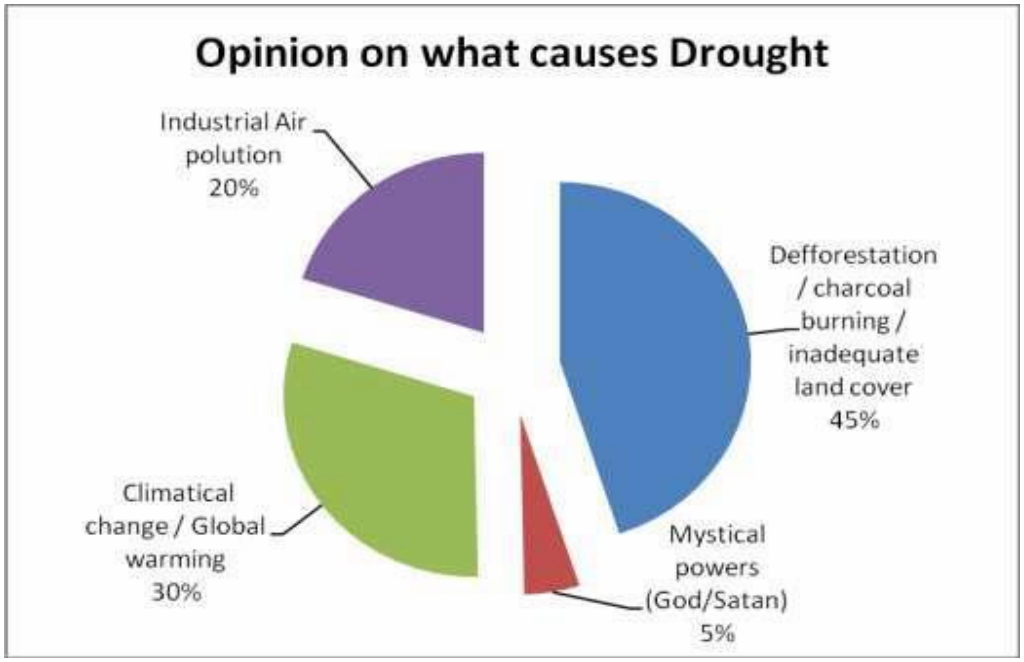

Figure 11: Opinion on Causes of Drought

Key informant discussions pointed out that deforestation was a primary concern. They were incredibly disappointed with the local administration since charcoal burning is a major cause of deforestation and under their noses. They pointed out this would stop if the local administration and police were not compromised. They blamed the continued felling of trees for charcoal burning on corruption on the part of the local administrators and police, who looked the other way as trucks and even motorcycles sped along with the Narok–Mai-Mahiu road ferrying sacks full of charcoal.

4.6 Drought adaptation strategies and their effectiveness, as perceived by pastoralists in Mosiro ward, Narok County

Over the years, the pastoral community in Narok County has developed adaptive stratagems to deal with drought impacts. The research reveals that pastoralists have embraced several stratagems to deal with frequent droughts. The respondents identified mobility in search of pasture, livestock sales, supplementary feeding, livelihood diversification, table banking, and self-help groups as drought adaptation mechanisms embraced by the pastoral community in Mosiro ward. The households identified other stratagems, including wild fruits and vegetable harvesting, slaughtering weak animals, herd diversification, taking children to school, and harvesting rainwater.

Adaptation strategy	Number
Mobility /Migration	78
Herd splitting	67
Livestock diversification	61
Supplementary feeding	56
Livelihood diversification	59
Cooperatives/SHGs	54
Food consumption adjustments	33
Rainwater harvesting	61
Sending children to school	27
Slaughter of weak animals	59
Harvesting of wild fruits & vegetables	54
Livestock donations	58

Table 2 shows the adaption strategies and the number of households using them.

Table 3 summarizes the adaptation strategies and the number of households using them in Mosiro Ward. Mobility (78), Destocking (67), hay purchases (56), diversification of livelihoods (59), and cooperatives/ SHGs (54) are the strategies identified by respondents. Households also acknowledged other stratagems, including wild fruits and vegetable harvesting, slaughtering weak animals, herd diversifying, children's education, and rainwater harvesting. The respondents were requested to rate the identified stratagems on the merit of their effectiveness. They evaluated strategies that significantly reduced vulnerability to drought. To evaluate the effectiveness of pastoralist's household adaptive stratagems in Narok County a five-point ordinal scale was used. It comprised of: very effective = 5, moderately effective = 4, effective = 3, less effective -2 not effective =1.

Table 3 below summarizes the respondent's responses.

Adaptation strategies	Very effective	Effective	Moderately effective	Less effective	Not effective	Total
Mobility /Migration	52	21	18	6	3	**100**
Herd splitting	36	27	21	11	5	**100**
Livestock diversification	24	51	15	10	1	**100**
Supplementary feeds	24	45	17	7	7	**100**

Livelihood diversification	32	28	15	12	13	**100**
Table banking /SHG	38	11	12	12	27	**100**
Food consumption adjustments	9	13	7	10	61	**100**
Rain harvesting	36	25	17	7	5	**100**
Sending children to school	45	25	19	6	5	**100**
Animal health training	29	5	9	7	50	**100**
Livestock sales	27	10	6	10	47	**100**
Harvesting wild fruits & vegetables	11	18	16	15	40	**100**
Livestock donations	**19**	**13**	**23**	**19**	**26**	**100**

Adaptation Strategies	**Percentage of respondents**					
	Very Effective	**Effective**	**Moderately Effective**	**Just effective**	**Not effective**	Mean
Mobility /Migration	52	21	18	6	3	**4.13**
Sending children to school	45	25	19	6	5	**3.95**
Livestock diversification	24	51	15	10	1	**3.9**
Herd Splitting	36	27	21	11	5	**3.78**
Table banking /SHG	38	11	12	12	27	**3.54**
Livelihood diversification	32	28	15	12	13	**3.54**
Rain Harvesting	36	25	17	7	5	**3.50**
Supplementary feeds	24	45	17	7	7	**3.27**

Table 4: Level of the effectiveness of adaptation strategies

4.6.1 Mobility

This survey established that all the participants considered mobility a key adaptation strategy of pastoralists in the study area. While most respondents (52%) rated mobility as very effective, 28% rated it moderately effective, and 16 % said it was just effective. On the other hand, only 6% indicated that it was less effective, and 3% said it was ineffective.

In focused group interviews, participants mentioned that they practiced herd mobility. Respondents indicated that they moved their animals as far as Tanzania, Nairobi, Machakos, and Nakuru in search of water and pasture to mitigate drought effects. One focus group discussant reported that migration was a vital strategy in times of drought to ensure livestock survival. It helped save a core breeding stock for the post-drought replenishing of herds. Key informants complained that herd migration posed a disease control challenge because of the difficulty in tracking livestock and vaccinating them against new disease outbreaks.

4.6.2 Taking Children to School

Educating children has been perceived as an essential adaptive stratagem among the pastoral community of Mosiro ward. The respondents suggested that educating children could be a suitable long-term adaptation strategy to recurring drought. Respondents saw schooling as a feasible adjustment stratagem in an unpredictable environment of uncertainty about the future of pastoralism and the sustainability of livestock keeping. Table2 shows that 45% of the participants stated that educating children is a very effective adaptation strategy, and 23% considered it effective. 19% thought it was moderately effective, 6% said it was less effective, and 5%said it was not effective at all.

For decades, the pastoral communities in Mosiro ward perceived education as an exit strategy from pastoralism and thus were reluctant to take their children to school. Nevertheless, with the increasing urbanization, land use changes, plus increasing climatical dissipations, such as drought, education of children was perceived as good preparation of children faced with uncertainty.

4.6.3 Livestock diversification

Participants rated the effectiveness of the livestock diversification coping strategy the highest. Most of the respondents (51%) rated this strategy as effective. In comparison, 18% indicated it was very effective, 25% stated it was moderately effective, 10 % rated this

strategy as less effective, with 15% saying it was ineffective.

Focus group discussion participants indicated that they were keeping more goats and sheep. They mentioned that sheep are more economical to keep because ten could feed on what one cow eats daily. The goats are browsers and can feed on shrubs, making them more resistant to drought.

The small ruminants were also more productive since they have a shorter gestation period and can multiply rapidly during the rainy season. They indicated that goats and sheep were being reared mainly for meat and income provision for household needs. Most respondents said they kept small stocks because they are easier to sell during a drought crisis for livelihood sustenance.

The veterinary officer indicated that the small ruminants suffered fewer diseases as they were more resistant to infections.

4.6.4 Herd Splitting

Splitting of herds was a stratagem in which livestock are divided into smaller groups and distributed among family or kinsmen for separate grazing. This survey disclosed that 36 % of the participants rated it very effective, 27% effective, 21% moderately effective, and 11% less effective. However, 5% stated that it was not effective at all. The reason was that there was very little or no vegetation to feed the stock that would be left behind in severe droughts.

Key informants affirmed that the splitting of herds is done by families with big herds. Livestock was divided and grazed in different regions by warriors and middle-aged men, while others remained behind with the old members, young girls, and boys in settled areas.

4.6.5 Table Banking and Self-Help Groups

Table banking is a cluster finance scheme in which members meet regularly and save money, receive and repay loans at minimal interest rates. Table 2 shows that 38% of the participants described table banking as an exceptionally effective adaptative stratagem, 11% thought it was effective, 12% believed it was moderately effective, 12% said it was less effective, and 27%said it was not effective at all. Table banking and self-help groups offer a simple system of securing funds with no security and minimum interest rates in the pastoral community. The women and youth in Mosiro Ward use table banking to secure livelihood diversification loans

and pay for children's school fees. Some youths indicated using these loans to buy motorcycles and offer transport services to the local population.

4.6.6 Livelihood diversification

In the pursuit for subsistence and improvement of living standards, families work hard to build a broad portfolio of activities and social skills. This is referred here as livelihood diversification (Ellis, 2000).

As regards the effectiveness of diversification of livelihood as a drought adaptation mechanism, 32% indicated it was very effective. In comparison, 28% stated that it was effective. A further 15% said it was moderately effective, with 12% rating it as less effective and 13% stating it was ineffective.

Livelihood diversification was practiced by 59% of the respondents (figure 4). The respondents preferred to engage in crop farming, 20%, livestock trading, 18%, business/services, 12%, government employment, 7%, and tourism, 2%.

4.6.7 Rainwater Harvesting

Water shortage is a significant problem facing Mosiro ward. Most respondents (36%) indicated that water harvesting is an effective adaptation strategy during the dry season. Another 25% rated this strategy as effective, while 17% rated it as moderately effective. A further seven indicated that it was less effective, with 5% saying it was ineffective.

Focus group discussion participants mentioned that water shortage is a significant problem in Mosiro ward. This inadequacy is exacerbated by recurrent droughts that dry up water pans, wells, and rivers. The pastoralists' adaptation strategies are harvesting rainwater, walking extensive distances to draw water, plus purchasing it from vendors.

4.7 Institutional Interventions

4.7.1 Interventions by the Government

Regarding whether the government proffered any assistance to mitigate the drought impacts, 59% said they received no government assistance, while 41% indicated they had received some form of government help.

	Frequency	Percentage
YES	41	41%
NO	59	59%

Table 5: Assistance from the government

Regarding the type of assistance gotten from the government, 53% indicated that the government provided relief food, nutritional supplements, animal feed, and water. 14% said they received training in animal health care and animal health services, while 14% indicated that they received water tanks. Another 14% said that the government helped construct dams, boreholes, and water pans.

Assistance	Frequency	Percentage
Relief food (supplements/animal feed &water for livestock etc.)	53	53%
Water infrastructure (boreholes /dams etc.)	19	19%
Animal health training	14	14%
Water harvesting equipment, e.g., water tanks	14	14%

Table 6: Types of assistance by the government

The area chief confirmed that the government supplies water for domestic consumption using water trucks, and they have been constructing dams and water pans. The Chief stated that the government had provided some residents with water harvesting equipment like water tanks to help them cope with drought. The chief pointed out that families in need are identified and provided with relief food and nutritional supplements during drought. The local administration has been working with the agriculture ministry to implement a water

conservation method that involves digging a hole lined with polythene paper for water storage.

The Kenya Medical Supplies Authority (KEMSA), the United Nations Children's Fund, and the government supplied highly nutritious, ready-to-use therapeutic feeding (RUTF) to severely malnourished children and ready-to-use supplementary feeding (RUSF) to moderately malnourished children and adults. Fortified blended flour (FBF) was given to malnourished adults, including pregnant and lactating mothers and children. Corned soya blended flour (CSBF) was given to lactating mothers and children for preparing porridge.
The National Drought Management Authority (NDMA) indicated that other institutional mitigation measures to alleviate the effects of drought in Narok included the rehabilitation of strategic boreholes and water pans and providing plastic water tanks to schools and selected households.

The regional pastoral livelihood resilience project (RPLRP) undertakes some drought response interventions, including livestock restocking and animal food supplementation through range cubes and mineral blocks. The government undertakes livestock disease surveillance and vaccination for various diseases in the county.

The government carries out some food Interventions, including malnutrition screening done by the NDMA in conjunction with the health ministry (MOH) supported by the European Union. They then distribute relief food in all the sub-counties.

The government has initiated the Mosiro irrigation project in collaboration with the African Development Bank. The scheme occupies over 750 acres where pastoralists grow vegetables, with more than 500 listed memberships benefiting from food and income generation. Government-owned Ewaso Nyiro tannery adds value to hides through tanning.

The NARIGP (National Agricultural and Rural Inclusive Growth Project) undertakes community training using participatory rural appraisal (PRA) in various agricultural produce value addition through the World Bank's support. The United Nations Development Program has sponsored a five-year project that trains pastoralists on improved pasture protection, cultivation of drought-tolerant crops as part of the sustainable land management project, from

2011.

Faith-based organizations like the Anglican Church of Kenya (ACK) have been undertaking livelihood diversification training projects in the county's drought-stricken areas.

What can be done to improve government assistance?

In response to the question, "what can be done to improve this assistance? A majority (63%) felt that the government should upscale the provision of water infrastructure, e.g., by sinking more boreholes; 25% stated that provision of livestock health training and livestock insurance. In comparison, 11% wanted the provision of loans for restocking. A further 9% said that an irrigation scheme should be initiated. 21% indicated that animal health services, including extension services, should be expanded.

4.7.2 Assistance by NGOs

Assistance from Non-Governmental Organizations (NGOs)

Do You Get Any Help from NGOs during a drought?

	Frequency	Percentages
Yes	23	23
No	77	77
Total	**100**	**100**

Table 7: Assistance from NGOs

On being asked to state the assistance offered by NGOs, the majority, 44%, cited the provision of relief food and 15% animal health training. In comparison, 41% mentioned the provision of water through the sinking of boreholes.

If yes, what type of assistance?

	Frequency	**Percentage**
Relief food	44	44%
Provision of water	41	41%
Animal health training	15	15%
Total	100	100%

Table 8: Is NGO assistance effective?

If this assistance was adequate or effective, 58% rated it ineffective, while 42% said it was effective.

Is this assistance adequate/effective?

Type	Frequency	Percentage
YES	42	**42%**
NO	58	**58%**
TOTAL	**100**	**100%**

Table 9: Effectiveness of assistance

4.7.3 Suggestions on what could be done better?

The majority suggested that the NGOs should assist in constructing more boreholes and water pans, enhance the providing of relief sustenance and water for the people plus their cattle, and improve the provision of education in Mosiro ward. It was also suggested that the irrigation project in Mosiro should be expanded to accommodate more pastoralists.

4.7.4 Was any credit received during a drought?

In response to whether they had received any financial support or credit for support during the drought, most respondents (81%) had not received any. In comparison, only 19% indicated they had received some loan assistance to mitigate the drought effects.

	Frequency	**Percentages**
Yes	19	**19**
No	81	**81**

Total	**100**	**100**

Table 10: Financial support or credit

Focus group participants indicated that such facilities were unavailable to the common pastoralist. They suggested that the government facilitate the provision of loans to purchase livestock and restock. They also felt they should be provided insurance for their animals to help them restock during the drought recovery phase.

4.8 Challenges in Drought Adaptation

On being requested to mention the challenges they faced in drought, 58%, indicated a lack of resources, e.g., money, and poor infrastructure, e.g., roads. In comparison, 25% mentioned resource-based conflicts with settled communities and other pastoralists. 17% cited restrictions from protected areas like conservatories, forest reserves, game parks, and private farms.

In FGDs, it was stated that there was a need for more water pans to be constructed in the Mosiro ward, as the ones available are few and not well distributed. Supplements were distributed to their livestock at long intervals, sometimes after two years. They also cited poor animal health services with a lack of skilled personnel.

4.9 Constraints to Livestock development in Narok County

When questioned on the challenges of livestock development in Narok County, Key informants and focus group discussants raised the following issues; Livestock keeping is the primary livelihood source for the study area's pastoral community. There are numerous challenges impeding livestock development in the County. First, the department is understaffed. This leads to poor delivery of veterinary services. Low budgetary allocation leads to a lack of equipment and the various components for treating animals, such as medicines and vaccines. There is also a tendency for herders to treat their livestock instead of seeking professional veterinary services. Mobility compromises disease control as vaccination coverage is very low, particularly during the dry season when the pastoralists migrate with their livestock. Mobility also makes disease surveillance and vector control impossible as the migrating herds pick parasites and infections along the migratory routes.

Secondly, the lack of infrastructures such as livestock markets and value-addition facilities such as tanneries for skins and hides hampers livestock development. There are no modern slaughterhouses despite livestock keeping being a major economic activity. A poor road network, hinders cattle trading and marketing, worsening drought's effects. The poor condition of roads has resulted in a high transport cost, thereby affecting the performance of various economic activities. The poor road network has hindered market accessibility and hampers access to social amenities.

Thirdly, weak policies coupled with an improper policy framework and poor prioritization and planning lead to poor animal health interventions in the study area. Presently, pastoralists are experiencing more adverse impacts of drought on their livelihoods compared to the past. Due to a lack of water, forage, and morbidity, livestock losses have resulted in declining numbers, food insecurity, and famine.

4.10 Assessment of the current drought management policy framework in addressing drought emergencies in Kenya

4.10.1 Kenya's National Policy Framework for Drought Management

The current policy framework for supporting resilience in the Arid and semiarid lands in Kenya has been propelled by two main factors. The first factor is the devolution of government to the counties, which was introduced in the 2010 constitution. This move in government started in the year 2012 has significantly impacted the rangelands. For many years, these areas have experienced marginalization.

The second factor that gave impetus to the policy framework was the 2011 drought in the Horn of Africa. The region experienced successive failed rains, leading to a humanitarian crisis. This drought coincided with rising food prices, affecting nearly thirteen million individuals, with around 3.75 million located in the northern Kenya. The magnitude of this crisis prompted a change in approach from emergency response to resilience building among the government, donors and humanitarian agencies. In this light, the IGAD member states and development partners came together to address the long-term move towards the reduction

of drought susceptibility in the rangelands.

Kenya adopted the Ending Drought Emergencies Strategy (EDE) to end drought emergencies by 2022 (Abdi, 2012). In 2012, Kenya approved Session No.8 in 2012 to address the developmental imbalance between the pastoral areas and other parts of the country. This is also called lands the ASALs Policy. Some institutional transformations have reinforced these critical reforms such as the founding of the NDMA as a permanent and expert organization in the ministry of devolution tasked with managing drought and climate risk, and the most notable being the decentralization of power to the counties (GoK, 2015).

4.10.2 The Ending Drought Emergencies Strategy (EDE)

Kenya's approach to drought management changed following the 2010/2011 adversity in the Horn of Africa. The management of drought was reframed in the debate on vulnerability and resilience by the EDE strategy of 2012. The contention is that susceptibility can only be reduced by investing in development foundations. The EDE generated commitment from the government and development partners to improve drought management and address challenges of increasing vulnerability. Therefore, six pillars are identified by the EDE as essential entry points in effectively combating drought emergencies. These are peace and security; climate-proofed infrastructure; human capital; sustainable livelihoods; drought risk management; intuitional development, and knowledge management. The following is a summary of the content of each pillar (G0K, 2015).

4.10.2.1 Insecurity

Among the important components of development are peace and security. The resilience of vulnerable pastoralists cannot be enhanced as long as violence and insecurity persist. Inter-communal clashes persist despite considerable peace-building experience in Kenya from the early 1990s. To bring this to an end, an intensive effort is desired. These measures should be broad and all inclusive, emphasizing important universal approach as a base upon which key players could harmonize these endeavors. For effective peace-building and conflict resolution, the engagement must be broad to incorporate the main actors including the government, political leaders, local communities, plus neighboring countries.

4.10.2.2 Climate-proofed Infrastructure

Adequate infrastructure is a vital component of drought and climate change resilience. There is a huge shortfall of infrastructure in Kenya's rangelands, the road networks are poor, lack electricity, and water resources are under developed and have poor mobile phone connectivity.

The counties cannot address this shortfall on their own and therefore, a multi-sectoral approach is needed. Consequently, a framework for harmonized resource mobilization from the national government, development partners, and the private sector has provided by this pillar. Its main focus is on vital infrastructure that can bear the impacts of climate change. The progressive transfer of technical capacity to the county governments is also facilitated by this framework. Other investments funded comprise water harvesting equipment and rural roads.

Direct investment in transport and water has been prioritized under this framework since there is considerable contribution in the energy and ICT sectors by the private sector.

The existing infrastructure development in the ASALs planned by the sectors and contained in the contained in the sector plans and the EDE MTP II, will be augmented by these investments.

4.10.2.3 Human Capital

People who are educated and healthy are more likely to withstand stressful situations like those occasioned by drought. Unfortunately, the public services in the Arid and semiarid lands areas are not as good as those in the other parts of Kenya. The access to these services is uneven and the services themselves are not well-funded and are of poor quality. Because of this, these counties have the lowest human development index in Kenya.

A program framework is crucial as the ASALs counties face similar challenges in their heath, nutrition and education sectors. It is important to note that health, nutrition and education outcomes are interconnected. By having a single framework, counties provide integrated services and share evidence-based solutions to tackle these challenges. Additionally, innovative ways to enhance service delivery during drought, as well as utilize technology to improve access to service and ensure equal opportunities for all.

4.10.2.4 Sustainable Livelihoods

The enhancement of livelihood resilience to the effects of drought and climate change in the ASALs counties is the main objective of this pillar. The undertaking is made more difficult by the profound disparities and susceptibilities of the area, the collective unpredictability of dry surroundings and markets, and institutional flaws at all levels.

Decentralization offers distinctive chances of undoing past prejudices in communal strategy and investing and encourage various livelihood options that are that suitable to the peculiar actualities of the ASALs. Although livelihood diversification is being pursued, particularly y those living in or near towns, the region has a relative advantage in livestock production. A common for all stakeholders to complement their interventions supporting sustainable livelihoods in the ASALs is provided by this framework.

The reinforcement of these pillars was to be via fast-tracking investing in development basics, which included human resource base and infrastructure such as schools and health centers.

Additionally, enhancing the institutions and fiscal frameworks in drought management is an essential strategy that ensures effective institutional frameworks that promote drought management in the ASALs. The EDE stratagem recognizes the need for intergovernmental cooperation considering the cross-border nature of drought (GoK, 2015).

The EDE strategic plan aligns with the Country's regional and global resolve of ending drought crises in a devolved state policy, becoming a distinctive, complete, optimistic, and progressive step (Abdi, 2012). Against the preceding, it is hoped that devolution will present meaningful opportunities for achieving the EDE aims that include streamlined allocation of resources to the counties previously underserved by the central government. Devolution will provide room for actions that align with grassroots priorities and realities. Therefore, the implementation of the EDE becomes a joint responsibility of both state and local governments in three categories based on roles specific to actors at the two levels of government. Included are those intercessions by the central and county governments via their sector strategies and County Integrated Development Plans (CIDPs), also included are

interventions by the NDMA and associates cutting across sectors. The Ending Drought Emergency stratagem is an addendum to the country's long-lasting strategic plan of vision 2030 that envisions the state as a rapidly industrializing middle-income nation that offers a high-quality life to the citizenry (G.O.K 2007).

The EDE is recognized as one of the foundations for national transformation in the second short-term plan for 2013. In its regional aspect, the EDE initiative represents the country's contribution to the IGAD Drought Resilience and Sustainability Initiative (IDDRSI) (GoK,2015).

4.10.2.5 Drought Risk Management

Symbiotic relationships exist amid drought risk management and almost every other sector. Failing to deal with drought threats can have widespread adverse impacts on the environment, food security, education, security and the economy. An essential foundation of drought risk management comprises of effectual activities by the above departments, especially the ability to up-scale or down-scale services as the need arises.

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As concerns drought risk management, there is an ongoing paradigm shift, that incorporates systems that ensure prompt responses, the scalability of existent assistances,

Even though it's not fully integrated into every day practice yet, there is shift happening in how drought risks are managed in the country. The shift includes the incorporation of systems that guarantee a quick response, making existing services adaptable, using market-based approaches, and improving coordination across different areas like drought risk reduction, climate change adaptation, and social protection. This pilar closely aligns with the Sendai Framework for Disaster Risk Reduction as it emphasizes integrating drought risk reduction into policy, planning and implementation. It also focuses on strengthening institutional capacity,

4.10.2.6 Institutional Development and Knowledge Management

The main objectives of this pillar are to guarantee enabling settings for the Ending Drought Emergencies strategy and hence enhance its delivery and outcome. The pillar will facilitate the provision of evidence-based decision making, enable quality and synchronized responses.

Prop up an interface between the pillars of the Ending Drought Emergencies Strategy, monitoring and evaluation of the progress regarding the achievement of objective of ending drought emergencies by the year 2022. It will also guarantee accountability to related civic organizations and play a supervisory role to the EDE in its entirety. The integration of the EDE commitments within the third Medium Term Plan for Kenya Vision 2030 for the period 2018-2020 is a specific outcome from the effort of this pillar.

4.11 The National Policy for the Sustainable development of Northern Kenya and other Arid Lands (ASAL Policy)

Kenya has formulated the ASAL Policy to acknowledge the development gap, distinct environmental, socioeconomic, and political realities, and the developmental differences between the ASALs and the rest of Kenya. Providing frameworks for disaster management and ending drought emergencies are among the objectives of the ASALs policy. It proposes strategies for reducing the effects of drought and climate change on susceptible populations living in arid lands (GOK, 2015).

These include providing a framework to synchronize the execution of the EDE program in the country, establishing the National Drought Contingency Fund to facilitate the protection of livelihoods for the vulnerable households during droughts by timely sharing information on drought and climate changehence enabling timely and concerted efforts by different stakeholders; The gazettement and emergency management of reserve grazing grounds and the encouragement of the development of buffer zones for growing forage, crops, and reseeding as emergency preparation; The exploration of opportunities and development of appropriate mechanisms beneficial to the communities from bio-carbon enterprises, solar and wind power; Exploration of electricity access using the existing power grid through the rural electrification program; the support of institutional framework for drought risk management targeting the poor and food insecure.

The necessity of effective planning and coordination of development is acknowledged in the ASALs policy. For consultations and collaboration between the government and the counties, the ASALs policy has provisions for these and other actors to address the arid lands' development gap. The ASALs policy also has strategies that facilitate coordination and harmonization of development in the ASALs by establishing transformational structures (GoK, 2015).

4.12 Drought Risk Management and Devolution

After the ravaging effects of the 2010/11 drought, the Republic of Kenya undertook steps politically toward ending drought emergencies by 2022. The initiation of the EDE initiative and the Common Programming Framework (CPF) were critical measures. The CPF was a guiding strategy document that operationalized the EDE commitment by providing a sound framework that acknowledged the structural vulnerability of the people in the ASALs and enhanced cooperation and collaboration, traversing departments, donors, and local governments. A county programming paper was incorporated in the formulation of this strategy. It also is the country's contribution to the region of the IDDRSI.

After the promulgation 2010 constitution, power was decentralized from the central government to the counties. Drought management-related functions like agriculture and disaster risk management devolved per EDE's guiding principles. It emphasized tackling the causes of drought vulnerability and lack of power and equity in the country. These can only be achieved through capacity building of the devolved units by enhancing cooperation between governments through a structured mechanism.

In this light, the following section analyzes the developments regarding managing drought risks as proposed in the Ending Drought Emergencies stratagem. Also captured is the government's role and that of non-governmental organizations in four support sectors and cooperation with the devolved units. These include mainstreaming disaster management in their CIDPs; Empowerment of counties and drought vulnerable groups; Coordination of stakeholders, and the utilization of information from the EWS.

4.13 Incorporating drought management into CIDPs

Since the advent of devolution, the Kenya government's priority has been to mainstream disaster risk management into the counties' CIDPs; with most functions related to EDE pillars like agriculture and disaster risk management devolved, the government worked aggressively on this decentralization. In these areas, investments are increasingly being integrated into the CIDPs. There has been cooperation between the minister and the county coordinators to ensure that county development plans adopt elements of disaster risk management. To get finances for implementing projects, counties must meet this condition.

There is community involvement and consultation to prioritize the most pressing disaster that requires interventions.

Moreover, county governors are encouraged to make drought risk management laws and climate change adaptation. Even though some counties are ahead, there is hope that most counties will mainstream drought resilience in their CIDPs. Nevertheless, this requires cooperation and political will at the national and county level and among counties.

4.14 Empowering Counties and the Vulnerable Populations

Notwithstanding the provisions of Kenya's 2010 constitutional charter handing the managing of natural capitals to the local communities, Duguma (2017) indicated that government plans often ignored local contributions. Complete comprehension of how various communities function, including local regulations, is necessary to operationalize the provisions granted in the constitution. Therefore, sound mechanisms for supporting communities to enforce these regulations must be effected. Concerted efforts are being executed to empower both counties and local communities. For example, to guarantee the sustainable resource use and adequate investment, the ministry of livestock and fisheries has tried to influence investment decisions based on local conditions. Presently, pastoralists are being empowered by the Ministry by incorporating their traditional expertise in pasture management is being incorporated into both national and county strategies.

Duguma (2017) further pointed out the important role of the counties in facilitating sustainable management of the land resource in the rangelands and that there are ongoing consultations with county governments aimed at the creation of Sustainable Land Management (SLM) platforms for assisting counties to deal with environmental degradation, financing, awareness creation, poor cooperation among governments and capacity gaps at the county level that delays the process. Also, civil society was involved in sensitizing the counties to be at the forefront of implementing international conventions to which Kenya had committed. These organizations also helped create awareness among county governors on various environmental issues.

A positive effect of the enhanced partnership between environmental partners and county governments is to increase awareness of environmental issues from county-level agricultural experts to grassroots communities.

4.15 Harmonization between Stakeholders

The EDE Common Programming Framework (CPF) highlights the need for linkages between synchronization structures to harmonize technological support from the state and donors with local administrations. This is a significant move for creating a conducive atmosphere for implementing the EDE strategy. The government and NGOs should conduct their activities in a sound and coordinated manner.

In Kenya, the leadership and coordination of all drought-related matters are mandated to the NDMA in the ministry of devolution and regional planning. The focal point for the Ending Drought Emergency initiative is the EDE secretariat which the NDMA hosts. The national EDE committee, on EDE matters, and the intergovernmental forum are serviced by the secretariat.

The President chairs the intergovernmental forum, with county governors in attendance. This body provides political guidance to the EDE within the configuration of the intergovernmental Act of 2012. The cabinet secretary in charge of drought management in Kenya chairs the intergovernmental committee, county governors covered by the EDE, and cabinet secretaries from the national government attend these meetings. The intergovernmental committee and the intergovernmental forum facilitate the provision of political leadership and harmonization between national and county governments. Also chaired by the NDMA is the EDE steering committee. Participants of this working group are drawn from the government chairpersons. The EDE pillars are co-chaired by the development partners and nominated memberships. The government chairpersons facilitate linkages to the pertinent departments.

The committees hold quarterly meetings to provide operational oversight of EDE and guarantee movement toward the ten-year objective. Technological harmonization at the national and county levels, where the various pillars, including government and non-governmental actors, are represented, is supplied by the EDE steering committee. In the counties, the central committee is replicated in purpose and membership. Moreover, the NDMA is the secretariat for the national and county steering committees. Its effective engagement with the IDDRSI forum elucidates the country's regional position in championing Ending Drought Emergencies, contributes to local goals, and profits from opportunities for learning in the

region and mobilization of resources.

Duguma (2017) indicated that some non-state agencies had initiated complementary efforts to boost a collaborative stakeholder environment. Civil Society Organizations (CSOs) were interested in coordinating mediation activities to ensure harmonization between the government and non-governmental actors, thus addressing the communication barrier between the government, county governors, and other stakeholders.

Additionally, the NDMA links county governments to sources of information about international processes. It fills the information gaps at the county level about the various government-led drought resilience programs. In this aspect, it was stated that the NDMA would be getting funds for operation under the SLM framework in the MENR. Furthermore, the initiatives to link stakeholders are costly and require adequate funding (GoK, 2015).

4.16 Utilization of information from the EWS

In Kenya, the EWS is hosted in the meteorological department. IGAD Climate Prediction & Applications Center (ICPAC), headquartered in Nairobi, supports the meteorological department. ICPAC releases regular bulletins of primary climate information on a ten-day, monthly and seasonal basis. Sectoral ministries use this to plan jointly. These weather predictions (Normal, Alert, Alarm, Emergency, or recovery) guide mitigation measures by pertinent departments.

As the responsibility for mitigating drought impacts lies with the county governments, there are efforts to accelerate and enable prompt communication. When threats are identified by a steering committee chaired by a governor, a request is sent through the early warning bulletins, and a response is expected from the central government within twenty-four hours. This way, the time between request and response is reduced GoK (2015).

Nonetheless, Duguma (2017) reported inadequate preparedness and delayed responses resulting from poor uptake and utilization of early warning information at the national and county levels.

4.17 Linkage of Humanitarian Aid with Development

The linkage of relief and development led to broad interventions to mitigate various

vulnerabilities in drought-prone communities after realizing that pastoralists face numerous interrelated vulnerabilities in their daily lives. The integration of crisis modifiers by donors integrates humanitarian funding mechanisms in their development funding for prompt and sensible use of resources during drought.

Duguma (2017) alluded that several donors were moving in this direction. For instance, the World Food Program supports cash-for-assets programs, conservation, and irrigation schemes, land rehabilitation, soil and water by community mobilization, where pastoralists get payment for their labor. There is also the collaboration between the European Union and the GoK in a pilot crisis modifier approach for timely response to drought in the ASALs. Furthermore, the UNDP and the German Agency for Technical Cooperation (GTZ) have been funding and giving technical support for long-term development interventions that contribute to drought resilience building.

4.18 Challenges

The country is in the initial phase of an important change in its approach to drought management. However, devolution has made it difficult. Consequently, establishing mechanisms for prompt response is a policy priority for the government. This is shared with donors who support Kenya's dream of ending drought-related emergencies by 2022.

Although Kenya is in the initial stages of putting up foundations to realize these reforms, significant measures have already been implemented nationally and locally. These measures aim to improve the organizational, institutional and human resource base. Consequently, the founding of the NDMA gave impetus to the overall efforts with its devolved functions in the counties. There is a consensus that drought management follows a reactive approach. Furthermore, there has been no shift from the past management by crisis approach. Mitigation measures are short-term projects; instead, a preventive and anticipative drought risk management approach should be implemented. An analysis of the country's efforts concerning the move from stop-gap measures to a preemptive drought risk management approach and considering the progress from the 2010/2011 drought. Next is a presentation of the hindrances impeding the progress of drought risk management in Kenya.

4.18.1 Lack of funds

The Early Warning System is meant to warn and activate assistance for the susceptible populations at set points before the beginning of a drought. Nevertheless, inadequate funding persists even though the national drought and disaster contingency fund has been operationalized for support facilitation. This undercuts timely interventions and compels actors to seek funds through budgetary reallocations, a slow and tedious process that diverts funds from long-term investments in drought resilience. There is a deficiency of famine exigency funds. This means that moneys for prompt responses can just be gotten by supplementary budgeting which consume time and diverts funds from investing in resilience building (GoK, 2015). Applying for external sources for drought mitigation funding is thus time-consuming, with many requirements needing to be fulfilled before submitting a proposal.

4.18.2 Lack of Accurate Data and Utilization of the EWS

Reliance on the part of the National Drought Management Authority on technical data from other sector departments, which are not always reliable, is a challenge. If the correct connections are not made and activities planned accordingly, it is vital that data accuracy is ensured and clearly understood in the sector departments.

There is a time-lapse between the information on looming drought from the early warning system and the reaction from the government. This is because declaring a drought is an indictment and political failure on the government's side. Therefore, late responses cost more and eventually lead to mistrust of the early warningsystem.

4.18.3 Weak implementation at the County Level

Most counties had not taken full responsibility for drought risk management. This results from the misconception that drought management is the responsibility of the central government. Full devolution of some functions has not taken place from the national level. Due to a lack of legislative capacity in the counties, legislation in the twenty-three counties targeted by the EDE may take time to materialize. Effectual drought risk management is constrained by the lack of personnel and strategies on policy direction at the county level.

4.18.4 Lack of Harmonization of Activities among Stakeholders

Diverse interests and approaches characterize the platform of coordination among drought

resilience actors. According to Duguma (2017), some donors work in line with government policy, while others do things beyond the control of the government. The absence of a common framework for planning and coordinating drought resilience activities increases the chances of cross-interventions among development partners and NGOs. Short-term projects focusing primarily on other livelihood systems in place of pastoralism are some factors that weakened some donor-funded projects as pertains to following a harmonized process in project implementation. The lack of involvement of Kenya's research institutions and universities to provide scientific information for drought initiatives was cited as a hindrance to effective drought risk management.

4.19 Highlights of Major Achievements

The NDMA (2018) reported that ending drought emergencies has been a challenge. However, Kenya is showing signs of progress in addressing this issue through partnerships, collaboration, and a shared focus. A comparative analysis reveals that, aside from the 2016/17 drought, Kenya has successfully managed all drought episodes since 2013 without requiring international assistance. Although the 2016/17 drought was sere, it had less impact on lives and livelihoods compared to the 2010/11 drought. This can be attributed to various factors, including an improved early warning system implemented by NDMA. Additionally, both national and county governments released funds as early as August 2016 to support the interventions outlined in the drought response plans.

The government estimated that Kes 21.2 billion was needed to respond to the drought situation. This response was implemented in different stages. To support vulnerable households during the drought, the national government received over Kes three billion from development partners. County governments also allocated funds for important interventions like providing water through trucks, drilling and equipping boreholes, improving health and nutrition, supporting livestock and providing food relief. The government made efforts to improve coordination among all stakeholders involved in the drought response through different committees.

Furthermore, since 2013, Kenya has purposely made substantial investments in the groundwork for DRM, which has resulted in notable progress indicators for EDE. By strategically investing in healthcare services, the country has successfully lowered the mortality rate of infants and children below fie by 31 to 22 and 74 to 52 per 1000,

respectively, between 2012 and 2014. Moreover, education indicators in areas prone to drought have shown significant improvement, with net enrollment rates in the ASALs increasing from 26.5% in 2012 to 37.5 in 2015. Furthermore, Kenya's efforts to to improve between Kenya and Ethiopia, upgrade customs and immigration services at the Moyale border town, and expand mobile phone network have facilitated the movement of people, goods and services in the ASALs.

4.20 Critique of EDE

There are several policy disconnects in the EDE strategy. For instance, under the sustainable livelihoods pillar, issues with multi-sectoral perspectives are approached haphazardly. The lack of a coordination framework for planning of activities for building resilience to drought increases the risk of replication of interventions amongst Relief Agencies and Non-Governmental Organizations. Planning remains in the control of national ministries or political actors with vested interests. Implementation of DRM is hampered by insufficient legislative capacity in the counties and an absence of collaboration among the administration and donors. Decentralization has shifted responsibility infrastructure planning, from national level to local administrations. Shortage of finances in the counties hampers infrastructure construction, and administrators sometimes lack the political will to let contractors work effectually and efficiently.

There is also the lack of capacity between the different levels of government. For example the constitution assigns the duty of managing water, sanitation, and rural roads to the county governments. However, these local governments struggle to find engineers and technicians who are qualified and experienced. Due to the challenging living conditions in these areas, it is difficult to attract skilled individuals. As a result, county governments often end up hiring personnel who do not possess the necessary levels of competence. In addition, counties have hired staff with similar skills but there is no system in place for sharing services between counties. Furthermore, there has been no consideration given to the idea of transitioning national or regional institutions into technical service providers for counties. These gaps will have an impact on the quality of planning, contracting and supervision for infrastructure projects.

Institutions face various capacity challenges at every level. Some of these challenges are broad, like meeting the constitutional requirements of public participation, fairness, openness and accountability when planning public resources. Others are more specific to managing

drought risks, like the need for new contingency surge mechanisms and coordination structures that go beyond just being efficient and instead focus on maximizing the benefits of different programs and projects.

One drawback is that the EDE fails to connect crucial changes it encompasses with approaches that strengthen the commitment of both the public and politicians. For example, political reforms are the only way to tackle vulnerability. The constitution offers tools to facilitate these reforms, but their implementation is dependent on garnering public awareness and support.

In terms of the peace and security pillar, there exists crucial institutional, policy, and legal frameworks for the promotion of peace-building and conflict management. For example, certain policies are still in the process of being finalized or have been approved have not yet been put into action. Despite the accumulation of extensive experience in peace-building among the various actors and the successful management of conflicts, violent inter-communal disputes continue to persist. Conflicts related to natural resources are widespread in the ASALs. More recently, these conflicts have been intensified by disagreements surrounding political or administrative boundaries, as well as by the increasing sophisticated weapons and criminal networks. Failing to effectively address conflicts stemming from resource disputes can have severe implications for the management of drought risks as large areas of land may be abandoned due to the fear of violence.

Currently, the power shift from the MPs to the County Governors is causing a bottleneck in the parliament's efforts to maintain control over budgets and legislation. This is one of the reasons why there are delays in passing necessary laws. Another reason is that the County Assemblies lack technical expertise and need help in writing important policies and bills. Tensions have been reported between the County executive (Governors and Cabinet) and the County Assemblies. For instance, County Assemblies are using their power to reject budgets in the counties. There is an inter-county Council of Governors that plays a crucial role in integrated planning. However this forum must be encouraged to pass laws addressing important issues like livestock and the pastoral economy.

In Kenya, planning processes typically occur before sectoral resources are clearly defined. This approach is also followed the county level, where the initial County Integrated Development Plans (CIDPs) serve as inspirational documents without a clear evidence-based foundation for project prioritization. As a result, the implementation of these plans heavily depends on the availability of funds at the county level. Additionally, there are concerns regarding the fulfillment of the constitutional mandate for effective public participation.

The EDE has attempted to address certain issues, but there are still some important aspects that have been overlooked. The assumption is that by providing infrastructure an environment that promotes livestock marketing can be created. However, the CPP Pillar for Sustainable livelihoods emphasizes the need for an improved road networks and communication system to enhance livestock marketing systems. This overlooks the significance of managing pastoral markets and value chain addition. It is clear that when county and national roads are in poor condition, with low road density and long distances to markets, it is therefore necessary that new and improved roads are constructed to rectify this shortage.

However, CPF Pillar 2 for Climate-Proofed infrastructure acknowledges that the coordination between construction of roads and the funding of other economic projects are hardly surveyed in a harmonized way. Therefore, it cannot be assumed that constructing new roads alone will alleviate poverty and improve resilience. It is essential to address the necessary complementary hard infrastructure and regulatory environments to maximize the benefits for all economic actors, particularly the poor. For example, in order to markets closer to the cattle rearing areas, various infrastructure improvements such as watering points, loading ramps, sheds and restoration of decrepit amenities are crucial. In Kenya's dry lands, it is vital to determine how roads construction can improve the pastoralists' lives and, in the end, enhance peace and security in the region. Additionally, it is important to consider the complementary investments and policies to support those who may be negatively affected by the improved marketing networks or improve the benefits for the underprivileged.

Misuse of funds can hinder Drought Risk Management, as a substantial amount of money might be allocated for various activities in a short time. This involves procuring goods, services, and supporting field operations of different organizations involved in responding to drought. Consequently, the chances of malpractice and corruption increase posing a threat to the effectiveness of the drought response.

4.21 Discussion

4.21.1 Demographics

4.21.2Respondents Age

This research showed that most respondents (60%) were between 31-50 years. Thehousehold head's age was an essential factor in determining a household's vulnerability levels (Bobadoye *et al.*, 2014); for instance, households with heads aged over 50 are more susceptible to drought than those headed by young people.

As a result, old heads of families are most likely less adept in organizing adaptation strategies for cushioning their families against climate induced shocks and survive harmful impacts of recurrent drought (Magal *et al.*, 2014, Kagunyu *et al.*, 2014, Lekapana *et al.*, 2016). Conversely, the relatively young average age of the household heads could indicate enhanced drought resilience in Mosiro ward.

4.21.3 Sex of Respondents

The survey revealed that a majority of family heads interviewed (75%) were men, while 25% were females. Female and widow-headed households are most vulnerable to drought and have the least coping and adaptive capacity (Magal *et al.*, 2014). However, most of the respondents are males, showing they could have robust drought coping strategies.

4.21.4 Marriage

This research demonstrates that most of the household heads, 90%, are married, 7% were single, and 3% were divorced. As key informants and focus group discussants indicated, marriage is a valued cultural institution. All adults in the community are expected to be married and start families. All 18-year-old girls were expected to be wedded except when enrolled in learning institutions, as early marriage for girls is common.

Similarly, Kagunyu (2014) posited that collaboration within family settings is highly valued since it enhances the effectiveness of the pastoral community’s drought adaptation strategies.

4.21.5 Level of Education

This survey shows that 21% of the respondents do not have any education, while 44% have attended elementary school, 21% have attended high school, and 14% have attended college. These findings show that most household heads have little or no education. Undoubtedly, illiteracy compels the community in Mosiro ward, largely drought-prone, to depend on the pastoral livelihood system for subsistence. These findings agree with the Narok Smart Survey (GoK, 2018), which indicated that most adults in Narok County had little or no education. Similarly, (Ongoro and Ogara, 2011; and Kagunyu *et al.*, 2014) described elevated levels of illiteracy in Kenya's pastoral communities. Illiteracy hampers information access, thwarts droughts' recovery, and constrains the diversification of livelihoods (Omolo, 2010; Kagunyu, 2014). Illiteracy also limits an individual's capability to take up employment opportunities and constrains the capacity to obtain knowledge and practical information that can enrich a person’s drought adaptation capacity (Bobadoye, 2016).

4.21.6 Main Sources of Income

This study shows that most people in Mosiro ward earn their livelihoods from cattle keeping (figure 4). However, they have diversified their income by engaging in crop cultivation, livestock trading, business and services, government employment, and tourism. The study concurs with Omtiti and Irungu, 2002), who indicated that pastoral communities had embraced a sedentary diversified economy in some places, practicing livestock keeping and farming. For instance, pastoralists in Narok and Kajiado Counties are becoming successful farmers producing cereals.

4.21.7 Explanations for the declining number of livestock

The study reveals that livestock holdings per household declined (figure 5). Increasingly severe, frequent, and lengthy dry spells have made raising cattle harder in Narok, forcing many pastoralists to rethink this old tradition amid massive losses due to drought and disease outbreaks. According to Amwata (2014), recurrent droughts in the rangelands resulted in substantial cattle losses, thus discouraging the pastoralists from replenishing their stock post-drought.

4.21.8 Precipitation

From the analysis of rainfall data for Narok station from 1964 to 2015, instances of low mean

rainfall were many and were experienced in different years. The trend was also increasing over time (Figure 4). More negative anomalies were recorded from the analysis of rainfall anomalies than positive ones.

This shows that many episodes of inadequate rainfall occurred in Mosiro ward. Similarly, negative rain abnormalities showed raised incidence and intensity of famines; shown by intervals the rainfall was constantly lower than the long term yearly mean. Severe droughts occurred in 1969, 1971/72, 1974, 1983, 1988, 1993, 2008, and 2010. These descriptions of precipitation variances corroborated the statistics on recollected incidences of drought by the respondents in the survey.

4.21.9 Perceptions of Drought

The pastoral community in Mosiro ward primarily understood drought as a naturally occurring phenomenon characterized by a deficiency of rain for a single or several seasons. This definition matches the definitions in the existing scripts. For example, famine was termed as a deficit of rainfall for prolonged durations, by especially a season or more (Assaye, 2017). Drought was perceived as a natural phenomenon and part of the climate from the study. It was caused by industrial pollution, deforestation, climate change/global warming, and mystical powers: God/Satan (figure 11). Some respondents attributed drought as an 'act of God/Satan' as punishment for noncompliance with customary practices. Similarly, (Ndlovu, 1993) demonstrated that pastoral communities often attributed rain failure to the abandonment of certain customary practices.

4.21.10 Perceived Effectiveness of the Drought Adaptation Strategies Mobility

Mobility was rated as very effective by most of the participants in Mosiro ward. Mobility was considered an important adaptive mechanism for coping with drought. Key informants stated that they practiced migration in the present and in the past. Similarly, it was observed that livestock mobility, in anticipation of seasonal pasture and water availability changes, is a prominent adaptation strategy employed by pastoralists (Rass, 2006).

From the study, pastoralists in the ward travel to far-off places like Loitoktok and Laikipia, searching for pasture for their livestock. These concurred with Saranta (2013), who stated that

migration is among the strategies adopted by Maasai pastoral community that ensures that livestock have access to grazing land, water, and avoid overgrazing.

4.21.11Diversification of Herds

An important adaptation stratagem enabling pastoral community to survive severe environmental conditions for millennia is the diversification of herds (Speranza, 2010). Livestock diversification has environmental and commercial associations since various cattle types have diverse grazing and water requirements and respond in different ways to famine and illnesses.

The finding concurs with Meuret (1994) that goats had the distinctive ability to use fodder not efficiently used by some ungulates like cows. In addition, goats demonstrate a flexible feeding tendency deriving from their body structure, like the capability to move their upper lip and rigorous browsing. Their changeable stomach microbes allow them to survive in severe surroundings. Diversification of cattle is an appropriate stratagem; however, to adequately address the local community's increasing livelihood needs, there is a need to institute new high-production capacities and breeding models.

The survey demonstrates that new drought-resistant breeds that graze less, like the Sahiwal cows and dopers, are being raised by the pastoral community in Mosiro area. The respondents testified that dairy goats eat smaller amounts of fodder than cows and produce nourishing milk. The pastoral community in Mosiro ward is cushioned from the effects of drought by herd diversification. Similarly, Rass (2006) observed that pastoral communities diversified their herd composition for millennia considering that some species are better suited for dry and arid environments and are thus resistant to drought.

The small stock is easier to sell and requires less forage. This is partly consistent with Barton (2001), who similarly stated that pastoral communities in Kenya's arid lands moved to rearing dromedaries in place of cows. Pastoralists in the Sahel and Namibia have been practicing diversification of livestock composition (Hall and Ruane, 1993).
Diversifying cattle composition is an adaptation stratagem patent in Mosiro ward and across Africa. It offers leverage during famine since a number of these cattle types tolerate drought to a reasonable extent.

4.21.12 Taking Children to School

The pastoral community saw children's education as an effective adaptation strategy. The pastoralists believe that educating children is an appropriate adaptation strategy. Education was perceived as a feasible alternative livelihood stratagem in a changing environment that makes the pastoral livelihood system unreliable and unsustainable.

For centuries, pastoralists were not keen to educate their children since they perceived education as an exit strategy. Nevertheless, with the increasing urbanization, land-use changes, and extreme climatic events such as drought, education is seen as the most appropriate means of preparing pastoralist children for future uncertainties. Opiyo (2013) and Kagunyu (2014) described children's schooling as a feasible and effective adaptative strategy in Kenya's dry lands faced with recurrent droughts.

4.21.13 Splitting of Herds

This survey has demonstrated that in Mosiro ward, splitting of herds is commonly practiced among the pastoralist's households. Nevertheless, wealthy families employ the stratagem mainly, and the divided herd is dispersed among clan members and poorer relatives who offer labor. Livestock allocation amongst clan members and networks is widespread in the pastoral community of Mosiro ward. Most respondents confirmed that they had been part of a social setup that received and gave out livestock. Herd splitting is a time-proven stratagem for distributing drought-related risks among pastoral communities. Likewise, Morton (2001) reported that the distribution of cattle in relationship set-ups, where cows are lent for sustenance and reproduction, is mutual in various communities. Herd splitting is how wealthier families spread risks and guarantee the availability of cheap herding labor, while for low-income families, it is a form of insurance (Morton, 2001).

4.21.14 Table banking and Self-Help Groups

The respondents reported table banking and self-help groups as effective adaptation strategies. This is a way in which members of the pastoral community get unsecured loans at minimum interest rates. Pastoral women borrow funds from these cooperatives to invest in alternative income-generation activities. The youths also reported using money from the self-

help groups to start petty businesses and buy motorcycles for *Boda Boda* taxis. The study concurs with Bobadoye (2014), who asserted that pastoralist women practice merry-go-round funding to acquire finances for alternative income-generating activities and pay school fees for their children.

4.21.15 Diversification of Livelihoods

The study reveals that livelihood diversification is an effective adaptive mechanism embraced by 59% of the respondents. As a result of high drought frequency, many households in Mosiro ward undertake additional income-generating activities to supplement earnings from animal production. To improve their living standards and enhance their social support abilities as they struggle to survive, households construct a portfolio of different activities, hereby referred to as livelihood diversification (Ellis, 1995). For centuries, pastoral communities have explored alternative income-generating opportunities that they adopted more intensely to adapt to the impacts of drought, including fishing, collecting and selling fuel wood, burning and selling charcoal, among others (Morton & Meadows, 2000). This supports the conclusions by Barton (2001), demonstrating that though with limited opportunities, pastoralists in Kenya have diversified their livelihoods by participating in alternative economic undertakings like collecting firewood and burning wood coal for sale.

4.21.16 Water Harvesting

The respondents rated water harvesting as an effective adaptive stratagem. In Mosiro ward shortage of water both for the people and livestock usage is a significant shortfall in Mosiro ward. This shortcoming is additionally complicated by recurrent drought leading to the drying up of water bodies. The Pastoral community also deals with this shortage by buying water from vendors with water bowsers, harvesting rainwater, and traveling long distances to fetch water. The study concurs with Bobadoye (2014) and Korir (2020), who reported that the Maasai pastoralists used the water harvesting adaptation strategy to cope with recurrent drought impacts.

4.21.17 Institutional Interventions

The administration delivered relief food-aid, water, and forage, to the pastoral community and their livestock. Also developed and rehabilitated water infrastructure and provided water

harvesting equipment like water tanks. In partnership with the African Development Bank, the government has initiated the Mosiro irrigation project to alleviate food insecurity.

The government also conducts training in animal health and in value addition. However, most of the respondents deemed these government interventions inadequate. Respondents felt the government should construct more water infrastructure, enhance livestock health training, initiate a livestock insurance scheme, and expand extension and animal health services. Some NGOs provided relief food, conducted training in animal health, and constructed water infrastructure (table 8). Assistance by NGOs was deemed insufficient.

4.21.18 Adequacy of Current Policy in Drought Risk Management

The study reveals that the country has made remarkable progress as regards achieving the objective of ending drought emergencies by the year 2022. Political reforms and ongoing intuition building have enhanced drought management nationally and in the counties. With continued collaboration and political will at the national and county levels, these changes devolving functions related to the EDE pillars and the consequent incorporation of disaster risk management into the County Integrated Development Plans have ensured the effective implementation of DRM strategies at the grassroots. Empowerment efforts have strengthened the counties' capability to implement DRM activities on the ground.

The paradigm shift to a bottom-up approach signals the end of short-term development interventions that did not involve public participation. Integrating local knowledge into development and planning by letting the vulnerable people prioritize their needs has enhanced local ownership and commitment in the counties, consolidating DRM activities' sustainability.

Establishing a multi-level coordination platform has enhanced the coordination and harmonization of DRM efforts between the government, donors, and other humanitarian agencies. By linking relief to development, the government has taken the right path towards a double-track approach in drought management, superior to the previous one-dimensional approach. Nonetheless, several critical concerns remain despite the continuing efforts to streamline disaster risk management. These include; insufficient contingency funding, lack of

accuracy and usage of information from the Early Warning System, lack of capacity in the counties, and poor coordination and harmonization between the government and developmental partners. These remain challenges to the effective management of drought risks in the counties.

Given the above developments, Kenya is on the right track toward a positive move for effective drought risk management. However, more concerted efforts are needed for these advances envisioned in the political developments to translate into tangible socio-economic benefits at the grassroots.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the key results of the survey and offers recommendations for policy formulation. The recap is organized as per the study objectives, with the study findings as the basis for the recommendations.

5.2 Summary of the findings

5.2.1 Demographics

The study revealed that most households were headed by males performing vital roles of making important decisions. This implies a significant disparity as pertains to making decisions as womenfolk hardly make imperative decisions in the household. Also, the majority of the respondents were married.

The study also shows low literacy levels among the respondents and that most of them derived their livelihoods from pastoralism. However, most have diversified their livelihoods and engaged in crop farming, livestock trading, formal employment, and employment in the service sector.

The study further revealed that livestock holding per household had declined. The decline was attributed to recurrent drought and diseases. That keeping large herds was no longer viable.

The study also revealed that the major setback in Mosiro ward was water shortage. The majority sourced water from dams and water pans shared with livestock. Furthermore, the water is not potable and therefore has profound health implications. Drought was primarily perceived as a normal occurrence that led to precipitation failure for a season or more by the pastoral community of Mosiro ward.

The survey discovered that the pastoralists in Mosiro ward reported that drought was caused by deforestation, charcoal burning, loss of vegetation cover, pollution from industries, and climate change.

5.2.2 Drought adaptation strategies and perceived effectiveness

The study revealed that pastoralists in Mosiro ward had developed indigenous strategies to adapt to recurrent drought. This included mobility, herd splitting, livestock diversification, livestock sales, slaughtering weak animals, supplementary feeding, livelihood diversification, rainwater harvesting, harvesting wild fruits and vegetables, food consumption adjustment, Table banking, Self Help Groups, and sending children to school.

The study revealed that mobility was the primary strategy used by pastoralists to adapt to recurrent droughts Mosiro ward. It was also deemed the most effective. Herd splitting and livestock diversification were ranked as effective drought adaptive strategies in the Mosiro ward. The respondents rated rain harvesting and sending children to school highly. School feeding programs are essential for keeping pastoralist children in school.

5.2.3 Adaptation challenges

The pastoral community faced some challenges while trying to adapt to the droughts. These included a lack of cash, poor infrastructure, e.g., roads, and access to restricted areas like game parks, forest reserves, conservatories, and private farms. Insecurity resulting from conflicts hindered their movements during migration.

5.2.4 Government Interventions

As demonstrated by this study, the government tackled various drought impacts in Mosiro ward through local institutions. These were water-related, livestock-related, and health-related interventions. Water-related interventions included water provision for human and livestock consumption and water harvesting equipment such as water tanks. The government also rehabilitated existing boreholes and water pans.

Livestock-related interventions included animal feeds and nutritional supplements, restocking, livestock disease surveillance, and vaccination. The government also provided veterinary services and animal health training. Government-owned Ewaso Nyiro tannery adds value to hides through tanning.

Health-related interventions included providing relief food and nutritional supplements to children and pregnant and lactating women.

The government also offered early warning services through the NDMA. However, the data

on monitoring the drought situation was subjective. The meteorological department also issues weather bulletins to help pastoralists cope with drought. However, there were very few weather stations in Narok County, and the only functioning station was in Narok County. Therefore, the government should establish more weather stations in the study area to help pastoralists make timely animal movement decisions.

The government primarily provides emergency relief after a drought situation becomes critical. For example, when food insecurity and hunger become unbearable, emergency food assistance and supplementary feeding for children are provided. Therefore, the government's interventions are perceived as kneejerk and haphazard.

According to the pastoralists, institutional drought mitigation measures must be supportive of the livelihood system by improving the provision of water resources, veterinary and human health services, and establishment of cattle marketplaces.

The respondents believed that government assistance was not adequate. They recommended that the administration ought to upscale the provision of water infrastructure by sinking more boreholes and building more dams and water pans, enhancing livestock health training, providing livestock insurance, improving veterinary services, and expanding extension services and that the Mosiro irrigation scheme should be expanded to cover a wider area and more people registered.

5.2.5 Challenges to Livestock Development in Mosiro Ward

During drought, mobility hinders government interventions such as disease control measures, e.g., vaccination campaigns. There is also a lack of vaccines, skilled personnel, and poor coordination of these poorly funded exercises.

The pastoral community is also not receptive to some modern fodder conservation methods. The pastoral community tends to self-treat their livestock. There is also a lack of markets for livestock in Mosiro ward. Poor prioritization, planning, and implementation in livestock development interventions, coupled with weak policies and a weak policy framework, hampers livestock development in Mosiro ward.

5.2.6 Adequacy of the Current Drought Management Policy Framework in Kenya

Kenya is on the right track towards a positive move towards effective drought risk management. However, more concerted efforts are needed for these advances envisioned in

the political developments to translate into tangible socio-economic benefits at the grassroots.

5.3 Conclusions

The survey concludes that the majority of the participants were pastoralists with low levels of education. Most of the households were headed by males. Lack of water is a significant problem in the study area. Respondents perceived drought as a natural occurrence exacerbated by human activities like deforestation, industrial pollution, and climate change. The pastoral community has traditional weather forecasting methods.

The pastoralists have developed some drought adaptation strategies. The main one is mobility, which was rated as highly effective. Change of land use constrained mobility as some formerly used grazing grounds have been designated protected areas and farms. Adaptation is constrained by a lack of funds and livestock markets, insecurity, and poor infrastructure, in the study area.

The government's interventions mainly included providing relief food, livestock feeds, and water during a drought. However, these were rated ineffective by the study area's pastoral community.

The government departments' efforts to mitigate the impacts of drought were constrained by poor prioritization, lack of funds, poor coordination, and implementation. There is also a lack of trained personnel and equipment. These and the lack of a proper policy framework hinder livestock development in Mosiro ward.

5.4 Recommendations

The study reveals that although livestock mobility is a highly effective adaptation strategy, it poses a challenge to effective animal disease control. The government should institute disease control measures considering the mobile nature of pastoralism and provide mobile veterinary services in Kenya's rangelands. Mobility is constrained by insecurity as resource-based conflicts among pastoralists themselves and between pastoralists and crop farmers were rampant, particularly on the migratory routes; therefore, security should be enhanced.

Mobility is also constrained by the designation of land as conservancies, game parks, and

forest reserves, which are fenced, thereby restricting access to pastoralists and their animals. Policies that promote communal land ownership and a shift to customary land tenure are added benefits to pastoral livelihoods and the conservation of the rangelands.

Livelihood diversification was rated highly but was constrained by a lack of funds. Self-help groups (SHGs) and table banking came in handy in providing much-needed finance through savings and loans. It is, therefore, necessary that institutions like banks start providing loans to the pastoralists to facilitate livelihood diversification and restocking, particularly during the drought recovery period. An Index Based Livestock Insurance should be initiated together with an improved livestock marketing program.

Education of children was deemed as an effective adaptation strategy as it was perceived as a good exit strategy from pastoralism, and therefore, more schools should be set up to raise the literacy level in the study area.

5.5 Further Research

The survey recommends further inquiry to evaluate the monetary implications and advantages of the recognized effectual adaptation stratagems to determine the most cost-effective ones.

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APPENDICES

Annex 1: Questionnaire for household heads in Mosiro ward, Narok East sub-County Part A: Household demographics

This questionnaire will be administered to the head of selected households in Narok County. The questionnaire aims to (1) determine general household and economic characteristics, (2) assess the perception of the pastoralists on drought, (3) describe and evaluate the effectiveness of the adaptation strategies of the pastoral communities and the challenges they face while coping with frequent drought (4) describe the institutional interventions by the GoK & NGOs and (5) evaluate their effectiveness in mitigating the adverse effects of drought, (7)Evaluate the current drought risk management strategy.

Questionnaire No_____

1. Ward _____
2. Village_____
3. What is the gender of the head of the household? Male ( ) Female ()

4. What is the age of the household head in years? ----------

5. What is the educational level of the household head?

Informal education ( ) Primary ( ) Secondary ( ) Diploma ( ) University ( ) others

1. How many years has the household head lived in the area? ----------
2. What is the size of your household? ----------
3. What is the marital status of the household head? ----------

4. What are your sources of water for domestic use? (Allow multiple responses) Boreholes ( )), Dam ( ) water pans, rivers ( ) tap water ( ), dry river beds ( ) any other……

Part B Socio-economic characteristics

1. What are the sources of your family income?

Sources	(tick as appropriate)
Livestock keeping	
Livestock trading	
Crop farming	
Tourism	
Business	
services	
Government employment	
Others (specify)	

2. Use the table below and provide an estimate of the average number of livestock you owned during the periods listed below

Livestock group		Number of livestock owned			
	Now 2017	5years ago	10years ago		
Cows					
Goats					
Sheep					
Camels					
Donkeys					
Poultry					
Others					

What do you think is the reason for this variation over the years? ----------

Part C Perception of drought

Q 3.1	What is your understanding of drought?		
Q 3.2	What causes drought? Tick where appropriate	God/Satan	
		Disregard of traditions	
		Lack of rainfall	
		Deforestation	

Part D; strategies employed by households to deal with recurrent droughts How does your household respond to the drought events?

What are the challenges in trying to adapt to the effects of drought?

Rate the adaptation strategies below based on their level of effectiveness.

S/No.	Adaptation Strategy	Very Effective	Effective	Moderately Effective	Less Effective	Not Effective
	Migration /mobility					
	Diversify herds					
	Herd splitting					
	Livestock sales					
	Supplementary feeds.					

	Social networks, e.g., SHGs					
	Rain harvesting					
	Sending children to school					
	Animal health training					
	Slaughtering weak animals					
	Harvesting wild fruits & vegetables					
	Livestock donations					

Do you have free mobility of your livestock during drought events ( ) Yes ( ) No Have you ever received support or credit facilities during a drought-induced problem? ( ) Yes ( ) No What do you suggest could be appropriate and effective strategies for adapting with recurrent drought in your community?

Annex 2: Interview Guide for Interviews with Key Informants Introduction

My name is Peter Kaguai, a graduate student with the Centre of Advanced Studies in Environmental Law and Policy at the University of Nairobi in Kenya. As part of the study program, students are expected to engage in field research and produce a thesis covering their areas of interest. Therefore, I am conducting a study on the drought adaptation strategies and government intervention measures among pastoralists in Narok County.

I guarantee that the information gathered in this exercise will be strictly used for academic purposes, and the respondents‟ confidentiality will be respected. I would like to request your participation in this exercise.

Thank you in advance.

Interview questions

1. What is your understanding of drought?
2. In your opinion, what shows that the drought has occurred?
3. How often has drought occurred in the past? Say in the last 50years.
4. How often has drought occurred in this area in the last ten years?
5. What adaptation strategies have been adopted by the pastoral community in Mosiro Ward?
6. What other livelihood options do people have in the event of severe drought?
7. What has the government done to help reduce the impacts of drought?
8. Is the government response helpful?
9. What is the current drought risk management strategy in Kenya?
10. Does the current drought risk management strategy adequately address the issue of drought in the country?

Annex 3: Interview Guide for Interviews with Government Departments Interview Guide for Interviews with local Administration (Area Chief)

1. What is your understanding of drought?

2. What has the government done to address drought impacts?

3. In addressing socioeconomic issues attributed to drought, what challenges have the local, regional administration faced?
4. What is the current drought risk management strategy in Kenya?

5. Does the current drought risk management strategy address drought issues adequately?

Annex 4: Interview Guide for Interview with County Livestock Development and Marketing Officer

1. What is your understanding of drought?

2. What has the government done to improve the socio-economic situation of pastoralists of Mosiro through livestock development and marketing?

3. How effective are the government intervention measures in mitigating drought impacts in Mosiro ward?

4. What challenges impede livestock development in Mosiro ward?

5. What is the current drought risk management strategy in Kenya?

6. Does the current drought risk management strategy address the issue of drought adequately