SOCIOECONOMIC IMPACTS OF DROUGHT ON PASTORALISTS, THEIR COPING STRATEGIES, AND GOVERNMENT INTERVENTIONS IN MARSABIT COUNTY, KENYA

A thesis submitted in partial fulfillment of the requirements for the Master of Arts degree in Environmental Policy

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DECLARATION

I declare that this thesis is my original work and sources of information other than my own have been acknowledged.

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

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ABSTRACT

This study investigated the socioeconomic effects of drought on pastoralists, their coping and adaptation strategies, and the government interventions in Loiyangalani Division of Marsabit County. Using both qualitative and quantitative approaches, the study employed desktop review of relevant documents, semi-structured questionnaires, and interview schedules on key informants and focus groups. Multi-stage sampling method was used on households. To corroborate drought perceptions, rainfall data between 1970 and 2008 were analysed for trend and anomaly. Qualitative data were coded and subjected to thematic analysis, whereas, quantitative data were subjected to descriptive statistics.

Rainfall data shows a declining trend in precipitation between 1970 and 2008. Pastoralists in Loiyangalani perceived drought as lack of rainfall for one or more seasons and classified it as minor or major. Livestock mortalities and morbidity, human morbidity, conflicts, food insecurity, reduction of livestock prices, and increase in food prices were among the socioeconomic impacts of drought experienced. The coping and adaptation mechanisms employed by the pastoralists included mobility, herd diversification, herd splitting/merging, sale of livestock, and livelihood diversification amongst others. The study revealed that government intervention has been largely through provision of emergency food aid. The government has put in place policy and institutional framework to address the issue of drought. However, insufficient financing and low prioritization has hampered effective implementation of these policies. The study recommends a policy strategy geared towards diversification of pastoral livelihoods and promotion of their resilience. This includes establishment of road infrastructure, improvement of livestock marketing and trade, provision of veterinary services, development of water resources and provision of public health facilities.

Key words: Drought, coping, adaptation, socioeconomic impacts and government interventions

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CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

Drought occurrence among the pastoral communities is not new. In the past, pastoral communities in Eastern Africa have suffered numerous drought events (Oba & Lusigi, 1987). These have lead to human, economic and environmental costs, which are mostly borne by pastoral communities who exclusively depend on livestock for their survival and livelihood (Barton *et al.*, 2001). While drought affects both farmers and pastoralists, the impacts are greatest amongst the pastoralists, since they constitute the majority of human population in arid lands where there is frequent occurrence (Orindi *et al.*, 2007). Drought is a major cause of poverty in pastoral communities. It results in low stocking rate and livestock deaths, which leads to reduction of assets (Illius *et al.*, 1998). Moreover, drought depletes water sources and reduces quantity and quality of forage for livestock (Orindi *et al*, 2007). Furthermore, drought renders pastoralists helpless and vulnerable to food shortage. Cumulative effects of successive years of drought in Kenya have affected large population of pastoralists in Arid and Semi Arid Lands (RoK, 2008a). The Kenya Food Security Steering Group for instance estimated that 3.75 million people including 1.4 million pastoralists were adversely affected by the 2010/2011-drought episode. This has adversely affected pastoral communities in Kenya through depletion of water and pasture resources, decline in livestock productivity, increase in livestock mortality and morbidity, and severe food insecurity.

In most parts of Marsabit County, recent droughts have resulted in livestock mortality and morbidity, depletion of water resources, household food insecurity, and acute malnutrition of up to 32% amongst the children with escalation of resource conflicts (ALRMP, 2011). Furthermore, the 2011 drought has severely emaciated livestock thus declining their market values (VSF, 2011). Additionally, during the same period, food prices in the County had increased drastically due to food shortage attributed to drought and unfavourable terms of trade (VSF, 2011). Pastoralists were worst hit since they comprise the majority of the population in Marsabit County.

Pastoralists over the years combated drought impacts through different strategies (Fratkin, 2001). In the past when land was vast and human population low; coupled with low frequency of drought, pastoral communities responded through mobility, temporary adoption of hunting and gathering (Fratkin, 2001). Other drought strategies were herd splitting and livelihood

diversification including engaging in trade (Fratkin, 2001; Barton et al, 2001). Understanding these strategies is essential for the development of policy, infrastructure and support services that enhance their ability to cope with drought (Barton *et al*, 2001). Today, in the face of land scarcity, exploding human populations and frequent occurrences of droughts, pastoralists' traditional coping and adaptation strategies have been destroyed and pastoralists have been forced to migrate to towns for menial labour and migrate to famine relief camps (Hogg, 1983; Fratkin, Roth & Nathan, 1999). Pastoralists' drought strategies destruction has forced them to seek outside help (Oba & Lusigi, 1987). This help comes through intervention measures from government, non-governmental organizations and other humanitarian agencies.

Pastoral communities in Marsabit County have employed a number of coping and adaptation strategies to combat the effects of recent droughts on their livelihoods. Reductions of household food consumption, trading livestock, migration to towns were the strategies employed by inhabitants of Moyale, North-Horr and Maikona following the 2011 drought (VSF, 2011). Livestock mobility was employed by most pastoralists in the County, some moving as far as Southern Ethiopia in search of water and pasture (VSF, 2011). Moreover, some pastoral communities engaged in livelihood diversification activities including bee keeping among the Samburu of Ngurunit, charcoal trade and fishing among the Turkana of Loiyangalani (ALRMP, 2011).

Pastoral communities' vulnerability to drought is not just linked to natural factors, but also a function of political, socioeconomic and institutional constraints (Pavanello, 2009). Lack of political interests in pastoral areas has in most cases fostered inappropriate policies. These policies promote pastoral communities to settle, hinder mobility, alienate common resources and undermine customary institutions critical to effective management of scarce resources and response to drought menace (Pavanello, 2009). Additionally, little recognition of the values of pastoral livelihoods to local and national economies has resulted to lack of appropriate interventions and investments in such areas. There is also a lack of long-term development interventions and investments aimed at building the resilience of pastoral livelihoods, strengthening pastoral institutions and development of socioeconomic infrastructure (Longley & Wekesa, 2008). Lastly, government intervention to drought particularly in Kenya is largely

characterized by short-term emergency response instead of long-term initiatives that are centered on the promotion of pastoral livelihoods through enhanced provision of services and market infrastructure (Longley & Wekesa, 2008).

1.2 STATEMENT OF THE PROBLEM

Loiyangalani Division is found in arid part of Marsabit County. It is comprised of Rendille, Samburu and Turkana pastoralists who inhabit Kargi, Kulal and Loiyangalani locations respectively. Although livestock remains the traditional source of food and income, it is increasingly unsustainable as the severity of drought escalates. During the extended drought of 2008/2009 and 2010/2011, over 70 percent of livestock in the Division were decimated affecting about 20,000 pastoralists (ALRMP, 2011). Moreover, lack of good roads, livestock markets, veterinary facilities and inadequate health and water infrastructure have exacerbated the impacts of drought on pastoralists in the Division. Additionally, successive drought episodes have forced pastoral communities to rely on emergency food aid, which have reinforced the cycle of dependency.

Although studies have been conducted on impacts of drought on pastoralists' livelihood and their coping strategies in Kenya, little information on the same is known among pastoral communities of Loiyangalani Division particularly the Turkana pastoralists. Therefore, this study aimed to address this gap in knowledge.

1.3 RESEARCH QUESTION

What are the socioeconomic impacts of drought events on pastoral communities of Loiyangalani Division of Marsabit County? How do they cope and what are the government's responses?

To fulfill the aim of the study, four sub-research questions were addressed:

1. How do pastoralists perceive drought?
2. What are the effects of drought on their livelihood?
3. How do they address the impacts of drought?
4. How has the government addressed the impacts of drought?

1.4 STUDY AIM AND OBJECTIVES

1.4.1 Study Aim

The aim of the study was to assess impacts of drought on the livelihood of pastoralists, their traditional strategies to cope and government intervention measures in Loiyangalani Division of Marsabit County.

1.4.2 Objectives of the Study

1. To explore perceptions of drought among pastoralists' in Loiyangalani Division of Marsabit County.
2. To assess impacts of drought on their socioeconomics and investigate their coping and adaptation strategies.
3. To explore government responses in mitigating the impacts of drought.

1.5 SIGNIFICANCE OF THE STUDY

The rationale for this particular study is threefold:

First, pastoral communities are differentiated in certain aspects, for example, by their geographical location and ethnic backgrounds. Internal differentiation is also explicit in pastoral settings. Coppock (1994) argued that 'African pastoral communities are diverse and therefore the concept of average household is less significant in understanding the dynamics of pastoralist system or in stipulating blanket intervention approaches'. The concept of differentiation emphasizes that although pastoral communities may experience similar socioeconomic impacts of drought and apply common coping and adaptive strategies, different impacts may be experienced and different strategies may be applied. This study explored such distinctions within the pastoral group under investigation to enable the government to intervene based on the specific needs of different pastoral communities.

Secondly, the study necessitated the identification of key coping and adaptive strategies which might be supported, modified or enhanced to develop long-term drought management systems.
Finally, after establishing peoples' perceptions, ideas and opinions; review of existing literature and policy documents on government response, this study weighed the appropriateness and adequacy of government intervention measures, hence, recommends relevant policy actions

1.6 LIMITATIONS OF THE STUDY

There were inadequate financial resources to collect data in a larger Loiyangalani Division within Marsabit County owing to expansive geographical nature of the area. Therefore, a small area and only one pastoral community within Loiyangalani Division were sampled for this study. Furthermore, insecurity restricted research scope. To counter this, the researcher employed the services of police reservists in one cluster to collect data. Finally, since this research was conducted amongst the people plagued by drought, there were great expectations of financial or any other support. To address this challenge, the researcher with the help of the area Chief informed the respondents that this research was purely for academic purpose.

1.7 CONCEPTUAL FRAMEWORK

The Sustainable Livelihood Approach (SLA) formed a conceptual basis and was employed as a conceptual framework in this study. In this study it is used as a concept to advance understanding of the Turkana livelihood strategies amid the challenges of drought. SLA offers livelihood improvement opportunities through poverty reduction efforts by taking stock of the circumstances surrounding people as they perceive them (Heffernan *et al*., 2001). It evolved in mid 1980s to counter the 'basic needs' development approach of 1970s and top-down approach (Scoones, 1998; Ellis 2000). It disapproves top-down approach and stressed enhanced focus on people as actors of development (Chambers, 1983). Chambers (1987) argued that, SLA begins with real livelihood strategies of people looking at their areas and situations, what they have, and what their needs and interests are. Moreover, environmental and social elements are important dimensions of SLA. While environmental elements reflect sustainability of natural resource base, social dimension relates to livelihood adaptation, vulnerability, resilience and the ability of livelihood to cope with and recover from shocks and stress (Ellis, 2000). These shocks include droughts and their resultant impacts on the social and economic situations of people. SLA is therefore defined as 'a multiple assets approach where sustainability is seen in terms of available assets and an assessment of their vulnerability context i.e. shocks, stress and trends, and an examination of policy and institutional context within which assets exist' (DFID, 2004).

Heffernan *et al*. (2001) stated that SLA can be implemented on pastoral production systems and permits comparison of the vulnerability and/or sustainability of livestock based livelihood. This approach places people, particularly pastoral communities, in the centre of a network of interrelated influences that affect how they create a livelihood for themselves and their

households. Pastoralists have assets to which they have access to including natural resources, skills, knowledge, sources of credit, education and social networks. The extent of their access to assets is influenced by the vulnerability context. This takes account of shocks (e.g. droughts, epidemics), trends (e.g. economical and political) and seasonality (e.g. prices). Access is also influenced by the prevailing social, institutional and policy environment, which affects the ways in which pastoralists relate and use their assets to achieve their livelihood goals. Sustainable Livelihood Framework used for this study is described below (figure 1).

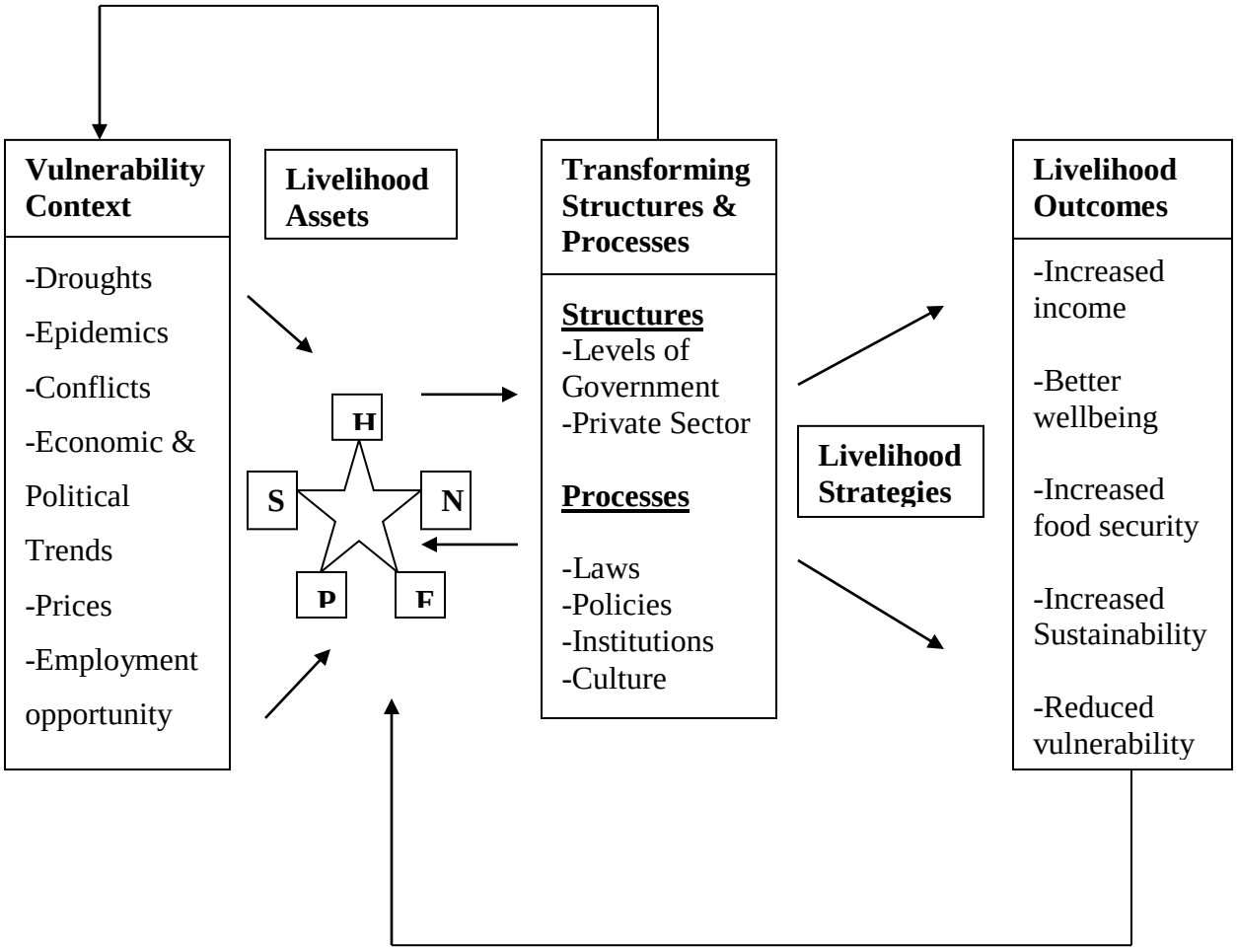

Fig 1: Sustainable Livelihood Framework (adapted from Ashley & Carney, 1999)

1.7.1 Description

1. Vulnerability

Central to vulnerability context in this study is drought. Pastoral communities in Kenya have experienced several drought episodes which have increased in severity and frequency in the last decade. Droughts have broaden the vulnerability context by resulting in epidemics, resource based conflicts and deterioration of terms of trade from livestock. Vulnerability also takes into account trends in economic and political situations.

2. Assets

Pastoral households depend on five assets namely: Human (H), Physical (P), Social (S), Financial (F) and Natural (N). These five types of assets are necessary for the achievement of a sustainable livelihood. Additionally, the ability to pursue livelihood strategies is dependent on basic material and social tangible and intangible assets that pastoralists have or can access (Heffernan *et al*., 2001). These include:

a) Human Assets

These are skills, knowledge, good health and ability to work to pursue different livelihood strategies. With regard to livestock keeping, traditional knowledge of land and other natural resources, availability of labour and good human health enables pastoralists, for instance, to pursue strategies such as mobility.

b) Physical Assets

Physical capital encompasses infrastructure such as health facilities, veterinary facilities, roads, markets, schools and communication. Additionally, human shelter, livestock enclosures and equipments used by pastoralists form physical assets.

c) Social Assets

These are social resources including social networks, relationship of trust or access to wider institutions of society, upon which pastoralists rely in pursuit of their livelihood.

d) Financial Assets

These are financial or economic resources which are available to households, and which provide them with different livelihood requirements. Livestock act as a form of financial capital to pastoralists in several ways e.g. as savings, as investment, means of generating cash in emergencies or by acting as collateral for credit.

e) Natural Assets

These are natural resources like land, water, air, genetic resources, wildlife and biodiversity. Main natural assets of great importance to pastoral communities are water and pasture resources to sustain pastoral production systems.

3. Livelihood Strategies

The framework also mentions livelihood strategies that households adopt in order to achieve livelihood outcomes. Pastoralists livelihood strategies are composed of different activities geared towards access of assets in all times including periods of stress occasioned by droughts. They include adaptation and coping strategies employed in periods of droughts.

4. Policies and Institutions

Access to five livelihood assets is influenced by transforming structures and processes (levels of government, laws, policies, culture and institutions). These also affect ways people adopt different livelihood strategies to achieve livelihood goals.

5. Livelihood Outcomes

The framework also indicates the ultimate goals that pastoralists are looking for, termed 'livelihood outcomes', which include increased income, better wellbeing, reduced vulnerability, increased food security and a more sustainable natural resource base.. Better wellbeing and increased food security would imply better nutrition and good health.

Generally, Sustainable Livelihood Framework conceptualizes pastoralists' livelihood in terms of their vulnerability, available assets, their livelihood strategies and the intervening political and institutional processes. This study fitted well in this framework in assessing livelihood challenges attributable to drought, livelihood strategies employed in mitigating those challenges and how the government through its institutions and political processes supported pastoral livelihood during droughts in the study area.

CHAPTER TWO: LITERATURE REVIEW

2.1 CONCEPTUALIZING DROUGHT

Wilhite (2002), described drought as a normal, recurring phenomenon of climate that practically occur in all regions of the world. It is different from aridity, since, while aridity is a permanent phenomenon restricted to low rainfall areas, drought is a temporary aberration that occur in both low and high rainfall areas (Wilhite & Svoboda, 2000). Drought is an outcome of the reduction of precipitation received over an extended temporal scope, which can be one season or more (Wilhite & Glantz, 1985; Wilhite & Svoboda, 2000). High temperatures, high winds and low relative humidity can aggravate severity of drought (Byun & Wilhite, 1999).

Drought is a natural hazard that is distinct from other natural hazards such as floods, hurricanes and tsunamis, earthquakes and wildfires among others. First, establishing the onset and end of drought compared to other natural hazards is difficult. This is owing to the fact that impacts of drought accumulate slowly over a long period of time and may remain for years after it elapses (Wilhite & Svoboda, 2000; Wilhite, 2000; WMO, 2006). This is the reason drought is referred to as a creeping phenomenon as coined by Tannelhill in 1947 (Wilhite & Svoboda, 2000). Secondly, the effects of drought are non-structural unlike the effects of other natural hazards. The impacts of drought are felt in large geographical scope than impacts that result from other natural hazards such as floods, earthquakes and hurricanes (WMO, 2006). Wilhite (2000) argues that wide spatial coverage and non-structural nature of impacts make it difficult for planners and decision makers to quantify impacts and provide disaster relief in the event of drought than for other natural hazards. Emergency workers, for instance, can easily respond to impacts of floods since they are structural and localized. They respond to such other natural hazards by restoring physical infrastructure, providing emergency medical supplies, shelter and supplying potable water amongst other interventions. These attributes of droughts as noted by experts have hampered the development of accurate, reliable and timely estimates of severity and impacts (Wilhite, 2000). Thirdly, the lack of single and world-wide accepted delineation of drought adds to the uncertainty about whether or not drought exists, and if it does its degree of severity. Wilhite and Svoboda (2000) argue that drought should be defined based on specific regions and impacts. This explains why there are numerous definitions of drought that have been developed over the years. Wilhite and Glantz for instance have analyzed more than 150 definitions of

drought. Additionally, when considering severity when describing drought, it is imperative to note that although severity of drought is a product of duration, intensity, and spatial extent, other factors such as by human activities and vegetation on water supplies play a critical role.

Droughts occur practically on all agro-ecological zones of the world and more than one half of the globe is prone to drought each year (Kogan, 1997; Wilhite, 2000). Moreover, in-as-much as it occurs in all climatic zones, its occurrence and impacts vary significantly from region to region (Hisdal & Tallaksen, 2000). Notably, drought is more outstanding when it occurs in potentially high and medium rainfall areas, while arid and semi arid regions of the world are most vulnerable (Hisdal & Tallaksen, 2000).

Drought is largely considered to be a natural event. However, as argued by Wilhite (2000), its risks for any given region are a product of both the regions' exposure and the vulnerability of societies to the drought event. Wilhite and Svoboda (2000) further expounded that, exposure to drought varies spatially and there is absolutely nothing that can be done to alter its occurrence, while vulnerability is determined by social, economic and cultural factors. These factors include population growth, demographic characteristics, technology, policy, social behaviour, land use patterns, water use, economic development, diversity of economic base and cultural composition.

Moreover, it is important to note that drought *per se* is not a disaster. Whether drought becomes a disaster depends on its impacts on local people, economies and environment, and their ability to cope with and recover from its impacts. Therefore, the key to understanding drought is to know the integration of its natural and social dimensions.

Although there are numerous definitions of drought as alluded in this text, the US based National Research Council (NRC) provided a concrete conceptual delineation of drought which was used in this study. NRC (2007) states that, 'drought is a deficiency of precipitation from expected or normal conditions that extends over a season or longer periods of time and where water is thus insufficient to meet the needs of human activities and the environment.' This definition was adopted in this study because it delineates drought in a holistic manner. It does not only view drought as a natural phenomenon, but it also gives its social, economic and cultural dimensions

particularly, in terms of its effects on human activities and their natural resource base. This definition is therefore, relevant to an array of economic, social and cultural assemblages of human societies including pastoralists – core subjects of this study.

2.2 IMPACTS OF DROUGHT

Human activities are linked to meteorological, hydrological, agricultural and socio-economic droughts highlighting the vital relationships that exist between human society, environment and water. Therefore, any disruptions to hydrological systems, such as those caused by drought, create a significant risk to human society and their social and economic systems (Wilhite *et al*, 2007). Risk can be defined as the probability of harmful consequences, or expected losses resulting from interactions between natural hazards and vulnerable conditions (ISDR, 2007). Thus, the magnitude and severity of drought impacts on social and economic systems of any particular human society will be dependent on the underlying vulnerability of the human population and particular region exposed to the event, as well as the underlying climate and weather patterns that determine the frequency and severity of the event (Wilhite *et al*, 2007).

Drought typically develops slowly, and as it evolves, the impacts accumulate and spread out in scope, extent and intensity (NRC, 2007). Moreover, as drought intensifies over time, its spatial scale expands and its societal consequences deepen (Wilhite & Buchanan-Smith, 2005). Socioeconomic infrastructures are affected, as well as the supply of social services, and there emerge serious distributive consequences for the less well off members of society, particularly among the pastoral communities (Pereira & Cordery, 2009). Trends in the spatial distribution of water, population size, demand and competing uses all gain heightened significance and increased stress at times of drought (Von Braun &Teklu, 1999).

2.2.1 Socioeconomic Impacts of Drought on Pastoral Communities in Kenya

For one to understand how drought affects pastoral communities, it is imperative to appreciate how their livelihood is affected by drought. Direct impacts of drought on pastoral communities' livelihood are the depletion of water resources and reduction of vegetation quality and quantity (Sommer, 1998). Constrained availability of water resources and pasture due to drought

adversely affect livestock body and health conditions, milk production and eventually livelihood security for pastoral communities which principally depend on livestock and livestock products.

During drought episodes, pastoral communities are faced with two processes that adversely affect their livelihood and survival (Toulmin, 1995; Sommer, 1998; Orindi *et al*, 2007). First, drought reduces the level of productivity from livestock resulting from losses occasioned by high mortality rates, low calving rates, reduced milk production, poor body condition and susceptibility to diseases. This makes pastoral investments less viable and pastoral households unable to provide for their needs (Orindi *et al*, 2007). Secondly, in the event of prolonged and severe drought, pastoralists are compelled to slaughter their livestock or dispose them to markets to avoid losing their livestock to starvation. Moreover, pastoral communities are also faced with dynamics in trade that adversely affect their purchasing power represented by their livestock (Toulmin, 1995). This is attributed to the situation whereby drought also affects farming groups, thus leading to reduced supply of grains available in the market. Besides, there will be an increased likelihood of farmers' demand for livestock and livestock products to fall due to reduced productivity from farming and deteriorated condition of livestock. Livestock prices will tend to reduce drastically, while prices of grains and other food crops will rise sharply, reducing the purchasing power of pastoral communities. Toulmin (1995) illustrated these processes by dividing drought into three phases based on pasture production, livestock numbers and condition, and grain and livestock prices (Table 1)

Table 1: Phases of Drought and Effects on Pastoral Communities

Phase	Effects
First	• Decline in forage production • Imbalance between livestock numbers and available forage • Livestock numbers dwindle through mortalities and sales • Conditions of livestock become worse and grains harvest fail • Grains prices rise and livestock prices reduce
Second	• Herd numbers continue to fall as deaths and sales continue • Shortage of grains continue to keep food prices high • There is still pressure on herders to further sell livestock in order to purchase food
Third	• Livestock numbers remain below the level, which could make effective use of the available pasture • Poorer may still be under pressure to sell livestock due to food shortage • Richer households may be able to reconstitute herds • Some pastoral households become totally destitute and must receive food aid

Source: (Toulmin, 1995)

Pastoralism is the dominant livelihood in Arid and Semi Arid Lands which forms 80% of Kenya's land mass. Over 85% of the population of this region is engaged in livestock production. However, this key livelihoods faces significant challenges due to lack of pasture and water as a result of drought, animal diseases, lack of access to markets and conflicts triggered largely by competition for resources. In arid and semi arid regions of Kenya, drought is the most widespread and common of all natural hazards affecting pastoral communities. From the year 1990 to the year 2010, the government of Kenya declared five national disasters attributable to drought in 1992/93, 1995/96, 1999/2001, 2004/2006 and 2008/2009 (Huho & Mugalavai, 2010). In northern Kenya, about three million pastoralists were impacted on by severe droughts of 2006 and 2008/2009, which have been increasing in frequency and severity over time (Howden, 2009). Howden (2009) further asserted that droughts in arid and semi arid areas in Kenya have

increased and will continue to increase in frequency from once in every ten years in 1970s; once in every five years in 1980s; once in every two to three years in 1990s; and up to four times in the period between the year 2000 and 2010.

Pastoralist are forced to migrate, trekking long distances in search of pasture and water for their animals during periods of drought, migration often triggers conflict as well as upsurge in animal diseases. Drought results in loss of large numbers of livestock which leads to livelihood crisis among the population. The current drought has seen pastoralists in emergency areas lose their animals and reports indicate that up to 80% of the livestock, particularly the more vulnerable sheep and cattle have been lost (UNDP, 2012).

1) Livestock Mortalities and Morbidity

Drought adversely affects the pastoral communities by reducing the availability of pasture and thereby resulting in death of livestock (Morton, 2005). It may also directly kill livestock through lack of drinking water. Livestock mortalities from starvation and disease outbreaks affected approximately 70 percent of livestock in most ASAL districts during the 2011 drought (RoK, 2011c). This has depressed livestock productivity, altered herds composition and usage. For instance, among the Maasai pastoralists of Narok, mature cattle used to form 50-60 percent of the herd but currently, this has increased to 80-85 percent on average annually, indicating low productivity (RoK, 2011c). Following massive deaths of cattle in Kajiado County, some Maasai households have started keeping camels. Moreover, severe and devastating drought of 2009 and 2011 decimated livestock population in Mandera, Wajir and parts of Marsabit County (ACTED, 2011). The Borana and The Gabra pastoralists lost over 60 percent of their cattle, while the Somali pastoral group in Mandera and Wajir lost over 70 percent of their livestock to these droughts (ACTED, 2011)

Following successive drought episodes of 2008/2009 and 2010/2011, pastoral areas in Kenya faced massive depletion of pastures and water leading to deterioration of livestock body condition and reduced immunity. This situation triggered immense migration of livestock from one region to another including national parks, high altitude areas of Mt. Kenya and permanent water sources (RoK, 2011c). This further resulted in increased and widespread disease outbreaks in some parts of pastoral areas. Some of the major outbreaks included Foot and Mouth disease in

Kajiado and Pestes des Petits Ruminants in Isiolo, Kajiado and Garissa (RoK, 2011c). Additionally, weakening livestock, drought may also increase their vulnerability to a range of livestock diseases, both during the dry phase and during a succeeding recovery phase when parasites may flourish in newly rainy conditions (Morton, 2005). Apart from starvation, drought-related livestock diseases such as tick-borne, foot and mouth, lumpy skin disease, contagious caprine pleuropneumonia, and contagious bovine pleuropleumonia, shoat pox and anthrax were reported to cause massive livestock mortalities among the pastoralists in Mukogondo area in Laikipia pastoral zone (Huho, *et al.*, 2010).

2) Impacts on Livestock Trade and Marketing

Economic impacts of drought to pastoralists are demonstrated by deteriorating livestock body conditions and massive livestock deaths, which lead to decline in livestock prices (Huho *et al.*, 2011). Pastoralists experience decline in levels of productivity from their herds following losses in livestock capital from deaths, low calving rates, low milk production and weight loss, which consequently reduce the market value of livestock. It is therefore a fact that drought results in destruction and collapse of pastoralists livelihoods, dependence on food aid and long-term destitution. Furthermore, reduction of pastoralists' purchasing power is one of the important economic effects of recurrent droughts. To cater for their nutritional and energy needs, pastoral communities purchase cereals and other foods with the proceeds from sales of livestock and livestock products (Morton & Barton, 2002). However, during drought periods, pastoral communities' purchasing power dwindles because, pastoralists lose livestock through mortality and therefore cannot sell their stock; poor body conditions of livestock result in poor prices; and rise in grain prices prompts pastoralists to sell more stock (Morton & Barton, 2002). Combination of these factors eventually results in famine and destitution among the pastoral communities.

Drought has also been attributed to irregular flow of market of livestock and livestock products. Poor response to drought by sales of livestock has been shown to occur not because pastoralists have low attachment to their livestock, but can be attributed to factors such as, knowledge that restocking after drought will be difficult and physical difficulties in getting livestock to markets among other limitations (Morton, 2005). Moreover, drought is likely to cause a disruption in

flows of livestock to both domestic and export markets, possibly by gluts during drought onset and probably by scarcities during drought and post-drought phases (Barton & Morton, 2001). This will make the physical and financial planning of livestock marketing more difficult, both for government authorities and for the private sector (Barton & Morton, 2001).

3) Escalation of Resource Conflicts and Insecurity

Conflicts between pastoral communities and between pastoral communities and farmers are attributed to drought phenomenon. Drought has had a role in triggering violent conflict, as pastoralists move deeper into settled zones and as competition for water points, key grazing resources and livestock itself intensifies between different groups in many parts of Africa (Toulmin, 1983). Moreover, during dry spells occasioned by drought, pastoralists move with their livestock in search of water and pasture. It is during such episodes that conflict arises over herding territories and replenishment of lost livestock (Leff, 2009). The concentration of livestock in areas with scarce pasture and water resources due to drought will definitely lead to skirmishes as has already been reported in some of the areas in northern Kenya (UNDP, 2011). According to UNDP 2011 situation analysis on drought-related conflicts in Northern Kenya, the drought situation has occasioned migrations of pastoralists within and without their traditional territorial grazing areas including movement to the neighboring countries of Ethiopia and Somalia. Moreover, some communities in northern Kenya and other countries in the Horn of Africa have been reported to have armed themselves to safeguard their little and dwindling pasture and water resources from outsiders. This has resulted in escalation of boarder disputes and inter-community resource-based conflicts (UNDP, 2011). For instance, recent conflicts in Isiolo, Turkana and Pokot Counties were mostly caused by droughts (RoK, 2011c)

4) Impacts on Education

Drought has enormous impact on education particularly in ASALs such as north eastern Kenya where school enrolment rates show huge discrepancies in comparison with other districts with less incidences of drought. The impact of 2011 drought on education has shown varied impact for the ASAL districts. In Turkana District for instance, children are taken to school including the underage and non-school going, to access food provided by the government (RoK, 2011c). Parents prefer to leave their children in schools as they migrate in search of food. In Garissa

District, the situation is different (RoK, 2011c). In Garissa, pastoralists' children have dropped out of school as they move with their parents in search of water and pasture. This situation have huge impact and especially for the female children whose education are severely hampered as they are withdrawn from school to support their mothers in search of food, take care of other children as their parents search for food or in other cases, they are married off early for the family to recover livestock and access food.

5) Destitution

Some pastoral households which previously relied on livestock have lost a livelihood source and have hence been rendered destitute. This is evidenced by upcoming settlements along main roads and peri-urban areas in Turkana, Garissa and Wajir Counties (ACTED, 2011; RoK, 2011c). For example, in Wajir County, it was reported that nearly 60 villages emerged in peri-urban areas following the 2011 drought (ACTED, 2011). These pastoralists depended on food aid from close food distribution points; remittances from family members; small herds that survived drought; and cash transfers from different actors. It is estimated that 21 percent of mobile pastoral households in Wajir had dropped out of pastoralism (ACTED, 2011).

Different publications have extensively touched on impacts of drought on pastoralists' livelihood in Kenya. Most studies provide an array of similar impacts across most pastoral groups. Little information is however available on impacts of drought on pastoralists in the study area and particularly on Turkana pastoral community. This study assessed impacts of drought on this pastoral group to avail lacking information, which might reflect similarities or differences with what is already known.

2.3 PASTORALISTS' DROUGHT COPING AND ADAPTATION STRATEGIES

2.3.1 Definition of Coping and Adaptation Strategies

Coping strategies refer to ways people respond to declining entitlements and food availability in abnormal seasons or years (Davies, 1996). They are short term responses to an urgent and in-habitual decline in access to food and means of survival (Davies, 1996). Coping strategies are helpful in the short term; however they may not bring a meaningful change on livelihood.

Moreover, coping strategies may not be economically and environmentally sustainable. For instance, concentrating livestock in one water point, increased charcoal production and collection of fuel wood are examples of environmentally unsustainable practices, while sale of breeding and lactating livestock are examples of a coping strategy unsustainable at a household level (Barton *et al*, 2001). Different coping strategies are practiced by pastoralists depending on different stages of drought i.e. mild, medium and acute.

Adaptation strategies on the other hand involve using all available options at all times to survive and to preserve assets to safeguard continuity of livelihoods (Davies, 1996). Contrary to coping strategies, adaptation strategies involve a permanent alteration in the ways of addressing external shocks and food requirements (Davies, 1996; Oba, 1997; Barton *et al*, 2001). Additionally, adaptation may be practiced by pastoral communities after each period of severe drought as a way of recovering from the crisis. It is at times difficult to draw a line between coping and adaptation strategies when referring to how pastoral communities respond to drought events. This is attributed to the fact that some strategies such as livestock marketing, livestock mobility and livelihood diversification have features which can be both of coping and adaptation strategies (Barton *et al*, 2001).

2.3.2 Pastoralists' Drought Coping and Adaptation Strategies in Kenya

Pastoralists as a matter of necessity have for many years developed a number of drought coping mechanisms, which for many years have enabled them to live through drought events (Huho et al, 2011). Their adaptive, coping and risk management strategies in the event of drought include mobility, livestock sales, herd splitting, livestock diversification, maximizing livestock density and livelihood diversification (Mworia,& Kinyamario, 2008; Huho *et al*, 2011).

i. Mobility

Historically, African pastoralists have managed uncertainty and risks associated with arid lands including drought through livestock mobility (Scoones, 1994). In order to cope and adapt with the unreliable rainfall and pasture distribution, pastoralists must practice mobility. Two modes of mobility are practiced: Resources exploitation mobility and escape mobility (Oba, 1997). Resource exploitation mobility responds to unpredictable pasture and water resources availability

while escape mobility involves long distance migration to escape drought conditions. All are practiced to ensure maximum livestock survival. Long distance movement of pastoralists and their livestock across districts and international borders is one of the key drought response strategies. Within a district or ethnic groups' territory, mobility is carried out in refuge grazing areas and/or next to permanent water points (Barton *et al*, 2001). It is important to note that negotiations and agreements are vital prerequisites if a pastoral community seeks access to a grazing land and water outside their territory (Barton *et al,* 2001). Mobility in periods of drought occur in an organized manner proceeded through a series of events and knowledge of grazing areas. Initial drought movement begins from the local dry-season areas on the periphery of water sources, through to safe refuge grazing zones and finally ending mobility cycle in distant refuges (Barton *et al,* 2001). Mobility enables the opportunistic use of forage and water resources; these include moving to minimize the effects of droughts, and being able to use underused pastures distant from settlements, or those that are only seasonally available (Bovine & Manger, 1990).

In Marsabit County for instance, the Gabra who are Chalbi nomads utilize the Chalbi desert margins; the north east shores of Lake Turkana and the Mega plateau in Ethiopia, while the Rendille who predominantly keep camels migrate to the fringes of Mount Kulal and towards fringes of Ndoto mountains (ACTED, 2011).

ii. Livestock Sales

Pastoralists also respond to drought by selling their livestock. Distinguished from regular sales whereby livestock sold are surplus male and cull female, sales during drought might include breeding females (Barton & Morton, 2001). Additionally, drought time livestock sales are characterized by low prices and poor livestock body condition.

iii. Herd Splitting

Practiced not only as means of risk spreading but also as means of maximizing use of scarce range resources. For example where there is plenty of browse and no grass, these areas are reserved for browsers (camels and goats), but where there is only grass without browse pastoralists will choose such areas for grazing of cattle and sheep. To achieve this strategy, pastoralists divide their livestock into separate herds, which are then grazed separately. Moreover, within clans and kinship group, borrowing and sharing of animals for the purposes of

subsistence and reproduction is a common practice. This practice shields the poorer households from the adverse impacts of drought while at the same time help the wealthier ones to spread risk during drought periods (Barton & Morton, 2001; Barton *et al* 2001). Although practiced by most pastoral communities, it is largely employed by the Turkana, Samburu, Rendille and Gabra pastoralists (Barton, 2001).

iv. Livelihood Diversification

In response to a rapidly diminishing rangelands resource base and the declining livestock productivity, pastoral households find themselves in a situation where they have to seek alternative income and subsistence means in order to obtain food and supplement declining supply of livestock products. Livelihood diversification has therefore become a common phenomenon in most pastoral households. Many pastoral communities in the recent past have embraced a wide variety of alternative income generating activities, usually taken on a more intense basis to cope with drought (Morton & Meadows, 2000). These activities may include collection of firewood, charcoal burning, collection of gum Arabic among other activities. The Turkana pastoralists of Turkana County engage in different livelihood diversification options including aloe production, wage employment, retail trade, farming along River Turkwel and fishing in Lake Turkana (Ouma, 2011)

v. Livestock Diversification

Herd diversification is a common adaptation strategy practiced by most pastoralists in Kenya. This strategy involves use of a broad array of livestock species (cattle, camels, donkeys, sheep and goats), which utilize different parts of the forage and have varying resistance to drought (Kashaye *et al*., 1998). Accordingly, sheep and cattle are more sensitive to drought, whereas goats, donkeys and camels are more resistant to drought induced stresses (Ouma, 2011). Although common among most pastoral communities in Kenya, the Turkana, Somali, Rendille and Gabra communities complete herd diversification strategy. The Samburu, Borana, Maasai and Pokot pastoralists have started to include camels in their herds as a way to compensate high rates of cattle mortality (RoK, 2011c).

Although numerous studies on pastoralists' drought coping and adaptation strategies were conducted in Kenya, scanty information is available on the same for pastoralists of Loiyangalani Division. Moreover, hardly any research has ever been conducted amongst the Turkana pastoralists of Loiyangalani Division of Marsabit County. To bridge this gap, the study explored drought strategies employed by this pastoral group both in the past and present times.

2.4 DROUGHT MANAGEMENT AND INTERVENTION STRATEGIES

Drought is not an abrupt phenomenon; rather it evolves over a long period of time (Roossi, 2003). This feature is vital as it makes intervention and mitigation measures of impacts of drought possible, if appropriate and reliable monitoring systems are in place (Cancelliere & Mauro, 2007). Additionally, adequate and appropriate plans and actions to reduce social and economic impacts of drought are ingredients of an effective intervention measures (Roossi, 2003). Carney (1998), defines drought management as a process of managing and reducing impacts of drought in order to prevent it turning into a famine. He identified four elements of drought management that include: preparedness, mitigation, relief and reconstruction.

A. Preparedness

This element entails, 'planning how to respond incase drought occurs and working to increase resources available to respond effectively' (Carney, 1998). The reasoning behind planning is to save lives and minimize damage by preparing to respond appropriately when drought is imminent. It is pre-disaster activities that are carried out within the disaster risk management context, based on sound risk analysis (ISDR, 2007). It includes the development of overall drought preparedness strategy, policy, institutional structures, warning and forecasting capabilities, and plans that define measures geared towards helping communities which are at risk safeguard their livelihoods by being alert to hazards and taking actions in the event of an imminent drought threat.

B. Mitigation

This element involves activities which eliminates or reduces the impacts of drought. This approach implies that many intervention measures can be employed to reduce the effects of drought on socioeconomic and environmental aspects (Carney, 1998). Drought mitigation is any

structural measure (e.g. water development infrastructure, appropriate marketing structures) or non-structural (e.g. policies, awareness, knowledge development, public commitment and operating practices) undertaken to limit the adverse impacts of drought (ISDR, 2007).

C. Relief

This element involves activities that are carried out during and immediately after drought has occurred (Carney, 1998). An example of relief is emergency assistance to victims of drought i.e. provision of emergency food aid and medical supplies.

D. Reconstruction

Reconstruction is the process of restoring disrupted systems to previous or near previous states. It involves short and long term measures of restoring vital life support systems and full restoration of drought ravaged areas (Carney, 1998).

Disaster prevention, preparedness and recovery programmes are vital since they offer governments opportunities to initiate long-term development programmes which reduce vulnerability to droughts (Carney, 1998).

In many developing countries, approach to drought management has been reactive through crisis management. This traditional approach has been ineffective owing to untimely response, poor coordination and poor target to drought stricken areas and people (Wilhite, 1997; WMO, 2006). Additionally, post-impact response and emergency relief tend to increase societal vulnerability to drought (Wilhite, 1997). New strategies put much emphasis on shifting from crisis management to risk management. Risk management is a holistic strategy of drought management involving forecasting, prevention, mitigation and preparedness in pre-drought phase along with policy implementation of post-drought measures of relief and rehabilitation under crisis management (Wilhite, 1997). This approach further involves data collection, analysis, modeling and forecasting drought (Wilhite, 1997).

2.4.1 Drought Management for Pastoral Communities

Drought early warning system, drought contingency planning and policies to support pastoral communities' resilience to drought are key components for drought management policy for

pastoral areas (Barton *et al.*, 2001). Moreover, Barton *et al* (2001) further emphasized that drought contingency planning must consequentially allow for the execution of three sorts of measures:

- Mitigation - to minimize the impact of drought on pastoral production systems and livelihoods;
- Relief - to cater, first in a targeted way, to the interests of those made destitute by drought;
- Rehabilitation of pastoral production systems from the outcome of drought.

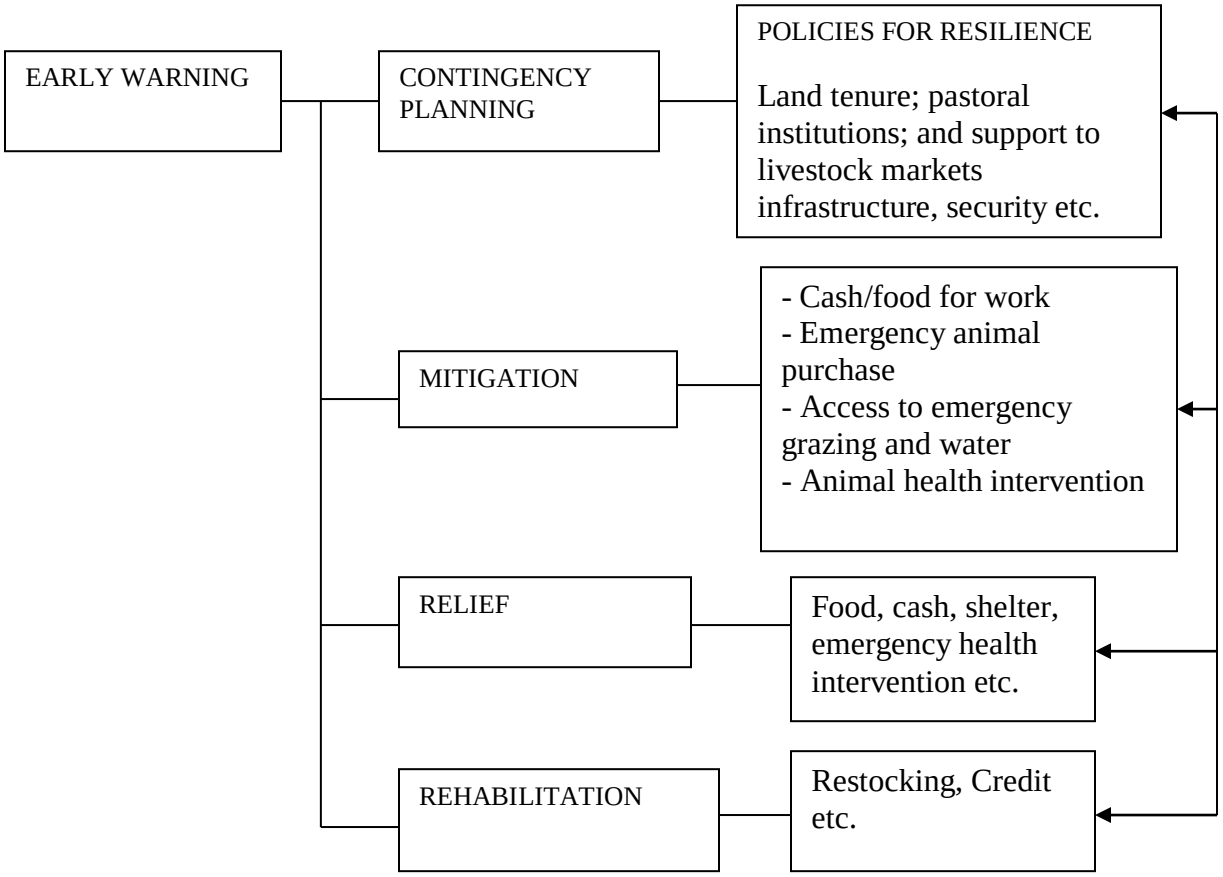

Fig 2: Components of Drought Management in Pastoral Areas

Source: Barton *et al.*, 2001

There are close linkages among these components. Specific policies for resilience are not only closely related to mitigation, but are also necessary for specific mitigation measures. Accordingly, strategies to guarantee access to specific grazing reserves during drought periods must be developed in the general policy on pastoral land tenure, and the effectiveness of emergency marketing interventions may be severely limited by a lack of marketing infrastructure and price distortions in end markets (Barton *et al*, 2001).

There are also interrelations between mitigation measures, relief and rehabilitation. Relief should ideally be targeted on particularly vulnerable sections of the population that cannot be reached by mitigation measures. It is also argued that restocking after drought will make livestock purchase as a mitigation measure easier.

1. Drought Early Warning

An early warning system (EWS) can be defined as a system of data collection and drought monitoring in order to provide timely notice when drought threatens and thus to elicit an appropriate response (Davies *et al.,* 1991).

Kenya had initiated drought Early Warning Systems (EWS) at the district level as part of a national policy to decrease the threat of famine and food insecurity in the arid districts. These attempts to alleviate the effects of drought have been due to collective resources of government, NGOs and development partners (Swift, 2001). Kenya is one of the only countries in the world to have designed and put into practice EWS targeted on drought in the pastoral livestock sector (Barton, 2001). The Kenyan EWS are efficient and effective in terms of identifying the various stages leading to emergency. However, they are expensive to run unless funds are immediately available to enact contingency plans (Barton, 2001; Swift, 2001). The range and type of indicators used in EWS include: weather, natural vegetation, crop production and storage, animal disease, nutrition, animal production and mortality, unusual movements by herders, livestock sales and prices, cereal prices, herders taking unusual jobs, human health and nutrition.

2. Contingency Planning

EWS must be combined with a contingency plan to allow government and donors to take action to, and mitigate the effects of drought. If there is no capacity to take action to the data gathered by the EWS, then the investment is wasted. The justification behind early warning is that it allows government and donors to intervene promptly and avoid humanitarian crises by early intervention to mitigate the impact of drought (Barton, 2001).

In Kenya, successful drought contingency plans decentralized to district level were first developed in Turkana district, northern Kenya (Swift, 2001). The Turkana drought contingency plan had the following main components:

- An overall drought policy, setting out the plan's objectives of minimizing the impact of drought.
- A set of preparedness measures; creation in advance of necessary physical infrastructure, a bureaucratic structure to manage the plan across line ministries, plans to negotiate with donors at an early stage of drought, agreed procedures and information provision and training about them.
- A definition of warning stages to be generated by the EWS and to trigger responses from government.
- A set of plans for specific mitigation, relief and rehabilitation measures.
- A commitment to the general promotion of drought resilience.

The mitigation of the impact of drought on pastoral communities' livelihoods will be dependent upon a range of activities, and/or strategies, not all being required under each circumstance, some supported by the government, others by donors and, perhaps most important of all, by the communities themselves (Swift, 2001).

3. Policy Areas to Promote Drought Resilience among the Pastoralists

There are specific policy areas where states, at either local or national level can contribute to drought resilience among the pastoral communities, and enabling the functioning of specific mitigation strategies. These policy areas include pastoral institutions building, support of pastoral marketing, infrastructure and security.

a. Pastoral institution building

Establishment and support of home-grown pastoral institutions is one of the prerequisites to help in mitigation of drought. Traditional institutions are essential in supporting traditional coping strategies.

Pastoral associations should have a role to play in various ways including conflict resolution, negotiated tenure regimes for dry-season and drought-time grazing, communal management of water resources, the protection of grazing rights, access to and management of the natural resources, the delivery of human/livestock health services, revenue collection by charging for grazing rights and water use and collective livestock trade and marketing (Barton, 2001). A case in point is where pastoral associations in Wajir with support from Oxfam had positive impacts in natural resources management, water management and conflict resolution (Odhiambo *et al.,* 1998). They should also be lawfully established institutions that mobilize financial resources and support community based natural resource management which are flexible and encourage mobility (Barton *et al,* 2001). Additionally, pastoral institutions should be a link between the government and the community. They should actively participate in all activities and decisions that affect pastoral communities.

b. Support to pastoral marketing

Livestock markets are essential for supporting pastoral livelihoods. Therefore, it is imperative for governments to establish markets in pastoral areas to enable smooth running of livestock trade. Marketing interventions during drought episodes should commence just before the onset of drought, since at this time pastoralists will sell their livestock at good prices and therefore boost their purchasing power (Barton, 2001). There are however, some macro-economic and sectoral policies e.g. external trade policies on livestock and livestock products and subsidies on crop inputs and feed that constrain pastoralism (Pratt *et al.,* 1997)

c. Infrastructure

A number of public infrastructures are essential to support drought resilience, and as a prerequisite for specific drought mitigation interventions (Barton, 2001). They include:

- Road networks and some market infrastructure to enable sales of livestock.

- Water-points to facilitate movements of stock to enable drought-time grazing.
- Infrastructure for human and animal services e.g. healthcare facilities and veterinary services.

d. Security

Large areas of most ASAL districts of northern Kenya, for instance, are subject to restricted access and utilization due to resources use conflicts (Barton *et al*, 2001). Improved security is a prerequisite for more efficient grazing land-use and especially drought-time grazing in the region. Many of the areas of worst security happen to be in the remote ranges used for drought-time grazing. Preparation for the provision of security should be a key consideration in drought contingency preparation and also in government's general policy towards pastoral areas (Barton, 2001). Directly negotiated agreements between pastoralist groups are critical and this should be initiated and enforced by the government.

2.4.2 Policy and Institutional Framework for Drought Management in Kenya

A. Policy Framework

Kenya does not have one particular drought management policy. However, there is a policy framework, albeit scattered in various sector policies. In addition, there are also cross sectoral policies to address and manage drought related emergencies. Some sectoral and cross-sectoral policies relevant for drought management in arid and semi arid lands (ASALs) and with particular reference to pastoral communities and their livelihood are discussed. These policies include Strategy for the Revitalisation of Agriculture (SRA 2004); National Livestock Policy (2008); Food Security and Nutrition Policy (2011); Draft ASAL development Policy (2010); and National Disaster Draft Policy (2010).

1) Strategy for the Revitalisation of Agriculture (SRA 2004)

With reference to pastoral communities and strengthening their livelihood, SRA provides the following policy strategies (RoK, 2004):

- Development of new modalities for control of livestock diseases and enhancing private sector participation in livestock disease control

- Development of a participatory extension system responsive to the needs of pastoral communities and encourage participation of community based organisations (CBOs), Non-Governmental Organisations (NGOs) and Community Based Animal Health Workers (CBAHW)
- Support the promotion of ASAL based rural livelihood programmes

2) National Livestock Policy (2008)

With reference to pastoralists' livelihoods, the policy strategies include (RoK, 2008b):

- Involvement of pastoralists in the planning, development of range and pasture rehabilitation packages. Furthermore, it envisages facilitation of monitoring and control of grazing areas, degradation, urban expansion, settlements, cultivation and other kinds of encroachment on the livestock zones, and to make effort to ensure conservation of trees.
- Development of initiatives for drought preparedness and recovery programmes for mitigation and poverty alleviation. Moreover, the policy puts in place cost-effective measures to reduce livestock mortalities through sound range management practices, effective disease control and development of appropriate livestock market infrastructure.
- Institutionalization of drought Early Warning System and adoption of the necessary mitigation interventions including development of medium-term and long-term plans for emergency preparedness. Further, the policy envisages establishment of mechanisms for emergency livestock off-take and establishment of a revolving fund for recovery after drought. It also envisions promotion of peace building and establishment of conflict early warning systems with full participation of pastoralists.
- On pastoralism, the policy recognizes pastoralism and agro-pastoralism as viable production systems and notes diversification of the pastoral economy as an option to cushion pastoral livelihoods against vulnerability to drought.

3) The Draft ASAL Development Policy (2010)

This policy envisages the inclusion of the needs of all poor people of the ASALs in all national policies and planning frameworks. It further envisions reduction of peoples' vulnerability including pastoralists from drought and strengthening their capacity to respond to drought. It also provides for development of physical infrastructure, livestock production and marketing systems,

water resources, education and human capital development, health, tourism, trade and industry. All these to be realized through sustained investments by the government, private sector and development partners. In order to address issues affecting ASALs including drought, the policy notes that investments will be made to improve road infrastructure and communication networks (RoK, 2010).

4) Food Security and Nutrition Policy (2011)

This policy recognizes that drought results in damage to household capital and assets, and triggers distress sale of assets to households for the sole reason of buying food. The policy further notes the role of drought in massive deaths of livestock due to depletion of pasture, water resources and emergence of livestock diseases, and the role of drought in escalation of violent conflicts. Loss of livestock, the policy notes, increases pastoralists' vulnerability and food insecurity (RoK, 2011a). The policy points out that destocking, proper grazing and water management coupled with investment in infrastructure such as water points, roads and markets, are essential to safeguard the livelihood of pastoral communities (RoK, 2011a).

5) The Draft National Disaster Policy (2009)

This policy aims to increase and sustain resilience of vulnerable communities to hazards through diversification of their livelihoods. This entails a shift from the short term relief responses to longer term action and development. It lays emphasis on preparedness on the part of the government, communities and other stakeholders in disaster risk reduction activities. It also aims at establishing and strengthening the institutional framework for disaster management, forging partnerships with like-minded institutions, networking and main streaming disaster risk reduction in the development process so as to build the resilience of vulnerable groups to cope with potential disasters including droughts (RoK, 2009).

B. Institutional Framework

1) Kenya Food Security Meeting (KFSM)

KFSM is the main coordinating body that brings together food security actors in a forum where information is exchanged, options debated and decisions on activities formulated for referral to

the Government of Kenya and donors (RoK, 2003). It is an open forum of high level presentation of a broad grouping of organizations at the national level with interest in food security.

KFSM is responsible for addressing food security issues, building trust, shared purpose and understanding, as well as maintaining institutional memory of the key national actors. It provides the mechanism to channel decisions upwards to the appropriate government bodies and donors, and is a mechanism for advising, accountability and legitimacy (RoK, 2003).

2) Kenya Food Security Steering Group (KFSSG)

The overall role of the KFSSG is to act as a technical 'think tank' and advisory body to all relevant stakeholders on issues of drought management and food security (RoK, 2003). The steering group will provide effective guidelines on methods and approaches for the coordination of both information and appropriate response measures. Furthermore, the KFSSG promotes, strengthens and supports the multi-agency approach to drought management and food security which has evolved in Kenya.

3) District Steering Group (DSG)

At the District level, the District Steering Group (DSG) is the main coordinating structure for drought management and drought response. The roles of DSG are (RoK, 2008c):

- Preparation, adoption and dissemination of early warning system bulletins.
- Facilitation of preparation of drought contingency plans;
- Supervise the network of field monitors spread in strategic locations in the districts in order to ensure that that information coming out of the monitoring exercise was credible and consistent;
- Conduct quarterly community-level meetings in order to feedback information collected to the community and to receive feedback so that the data collection exercise is participatory rather than extractive in nature;
- Develop frameworks for assessing implementation capacity of partners in the district and maintain a database for all relevant implementing partners;

4) Arid Lands Resources Management Project (ALRMP)

The origin of ALRMP emerged from the need to have interventions which are consistent with local livelihoods strategies, including mobile pastoralism and responsive to local priorities in order to reduce vulnerability and build resilience to shocks. The first phase of the project i.e. ALRMP I, was implemented from 1996-2003 in ten districts including Mandera, Marsabit, Tana River, Turkana, Samburu, Isiolo, Baringo, Garissa, Moyale and Wajir. It was jointly financed by the Government of Kenya and The World Bank. The major activities for ALRMP I included: drought management, marketing and infrastructure, community development and project implementation support (RoK, 2005).

In the second phase (2003–2010), the geographical area was expanded to include semi-arid districts. ALRMP II was designed to build upon successes of ALRMP I and to foster economic growth and reduce poverty within the framework of Kenya's Poverty Reduction Strategy Paper (PRSP). Its development objective was to enhance food security, increase access to basic services, and reduce livelihood vulnerability in 28 drought-prone arid and semi-arid land districts of Kenya (RoK, 2005).

5) Drought Management Authority (DMA)

Drought Management Authority is established under by legal notice number 171 of the States Corporation Act (Cap 446). The DMA is the successor to the Drought Management Directorate established within the ALRMP. Its roles and mandate include (RoK, 2011b):

- Establishment, institutionalization and coordination of structures for drought management.
- Supporting drought-related policy formulation and coordinating preparation of contingency action plans and risk reduction plans.
- Undertaking risk reduction awareness and education, and coordinating the implementation of risk reduction activities.
- Generating, consolidating and disseminating drought management information, and coordinating the implementation of drought mitigation and relief activities.
- Developing clear evidence based criteria for both the contingency fund and other financial sources appropriated to deal with drought.

2.6.2 Government Interventions in Selected Pastoral Areas

The Kenyan government intervention measures following recent droughts (2008/09 and 2011) that ravaged pastoral communities in arid and semi arid areas in Kenya have been largely through provision of emergency food aid. The number of food insecure people in Kenya following the 2011 drought stood at 3.7 million, and the majority of the worst affected were pastoral communities in ASAL areas (RoK, 2011c). The Kenyan government allocated 9 billion shillings for the purchase of food for the affected population (RoK, 2011c). For many years, food assistance programs have formed the largest component of humanitarian assistance supported by donors in Kenya. In 2011 for instance, 84% of the food aid appealed for was received, compared to the 29% of received for agriculture and livestock, 15% for health and 40% for water sanitation and hygiene (RoK, 2011c).

Other intervention strategies executed by the government included water and livestock based interventions. Water related interventions include water trucking/tinkering, borehole development and maintenance, distribution of water tanks and construction of water pans. Livestock based intervention include destocking, provision of livestock health services and livestock feeds.

1. Water trucking or tinkering:

This activity involves delivering water by wheeled transport to communities or institutions. While this activity largely supports humanitarian activities and provides water for domestic use, the water occasionally also benefits livestock. Following 2008/09 water trucking was undertaken by the government through arid lands development project in most pastoral areas including Turkana, Isiolo, Samburu, Marsabit, Kajiado and Laikipia at the total cost of Ksh. 29,784,695 (Zwaagstra *et al.,* 2010). This intervention helped people get water for domestic use, water needs for schools were catered for and weak livestock left at home also benefited from water trucking.

2. Borehole development:

This type of water-related intervention involved construction of boreholes and other support in form of provision of diesel, spare parts and pumping equipment and emergency repair of

boreholes, support to rapid maintenance units and capacity building of users associations. The government funded the construction of 105 boreholes in pastoral areas including Samburu, Turkana, Marsabit, Kajiado, Laikipia and Isiolo Districts at the cost of Ksh. 45,452,394 during drought episode of 2008/09 (Zwaagstra et al, 2010).

3. Destocking:

Two types of destocking were carried out following the 2008/09 drought:

(I) **Commercial de-stocking:** this activity builds on existing marketing structures and is designed to improve access to markets. This was done in a number of ways such as transport subsidy or through direct purchase of livestock at points where livestock is bought mainly for immediate transport and slaughter at Kenya Meat Commission (KMC). In this case, the trader/producer delivers the livestock at the final collection point. The second method, also used by KMC was that livestock is bought directly from producers in the affected districts and transported for slaughter at the risk of KMC .In the inventory, the only example of commercial de-stocking are the KMC interventions (Zwaagstra *et al.,* 2010).

(II) **Slaughter off-take:** this activity was first piloted in Samburu District by Oxfam during the 1984 drought (Zwaagstra *et al.*, 2010). For some time it was used as a last-resort intervention whereby livestock, mainly shoats which are already in poor condition are bought by agencies and then slaughtered and in most cases the resultant fresh meat is distributed to needy families. An earlier variant was that meat was dried and subsequently stored and distributed. This is seldom used now due to added complexities caused by logistics and need for suitable storage. A recent variant has been where slaughter/purchase points have been established and remain operational for a number of weeks.

The government through financial support from the donor community spent Ksh. 124, 557,330 for implementation of both commercial and slaughter off-take interventions in drought hit districts including Marsabit, Isiolo, Turkana, Kajiado, Samburu and Laikipia (Zwaagstra *et al.*, 2010)..

4. Livestock health interventions:

Vaccination, control of ecto/endo parasites, provision of drugs and associated trainings were intervention measures undertaken by the government to address livestock morbidity in pastoral areas. The government through the Ministry of Livestock Development spent Ksh. 35,159,622 in Marsabit, Samburu, Isiolo, Turkana, Kajiado and Laikipia (Zwaagstra *et al.,* 2010). Over 1.7 million animals were reached by health interventions between July 2008 and December 2009. Livestock health interventions including vaccination and de-worming were carried out as drought progressed and in instances of destocking exercise. Community Animal Health Workers (CBHW) were identified and trained in livestock disease surveillance and animal treatment (Zwaagstra *et al.,* 2010).

5. Hay and supplementary feeds:

At the height of the drought, the Government sent to all arid and semi arid districts hay and supplementary feeding at two intervals. The first interval was between July and September 2009 while the second interval was between October and December 2009. This included hay survival mash, molasses and survival cubes (Zwaagstra *et al.,* 2010)

CHAPTER THREE: STUDY AREA AND METHODS

3.1 STUDY AREA

This study was conducted in Loiyangalani Division which is one of the six administrative units of Marsabit County (figure 4). Constraints attributed to expansive geographical nature of Marsabit County including limited time and financial resources only allowed one division to be sampled. Moreover, the study focused on the Turkana community in the Division.

The climate of the area is hot and very dry with mean annual temperature of between 24 and 30 degree celcious (Avery, 2010). The whole of the study area belongs to what is referred to as Agro Climatic Zone VII (Avery, 2010). This zone receives very low rainfall (only between 150 and 350 mm per annum) and very high evapotranspiration with annual potential evapotranspiration of between 2100 and 2500 mm (RoK, 2002; Avery, 2010).

The study area lies between 300 and 450 meters above sea level. The topographical features are quite variable and the common features include plains, plateaus, hills and minor scarps (Anyumba, 2003).

There are areas of barren land where vegetation is very scarce in the study area. However, most of the land is covered by deciduous dwarf shrubs, such as *Indigofera spinosa, Duosperma eremophilum, Sericocomopsis hildebrandtii, Acacia reficiens, Acacia mellifera* and *Commiphora africana.* The most prominent trees in the study area are *Acacia tortilis* and *Delonix elata* found along the *laggas* (DRSRS, 2007). Annual grasses that are common during the rainy season include *Aristida mutabilis, Aristida adscensionis* and species of *Enderopogon* and *Cenchrus*. Along and close to Lake Turkana, the salt tolerant grass *Sporobolus spicatus* is common (DRSRS, 2007). Although the vegetation is scarce and under great pressure of exploitation by livestock, they play an important role in the life of pastoralists in the study area.

The study area suffers from scarceness of wildlife. This is attributed to increase in poaching and intense competition between the wildlife and livestock. For instance, elephants and black rhinos were once plentiful until mid 1970s, but are now locally extinct due to poaching (DRSRS, 2007). Similarly, other wildlife species including Greater kudu, Oryx, Gerenuk, Grant's gazelle, Giraffe

and Grevy's zebra were also found, but are now locally extinct. However, there are many species of reptiles, including venomous snakes, such as saw-scaled viper, puff adder, cobra and lizards. Additionally, scorpions and other invertebrate fauna are also common. Outside the study area in other parts of Marsabit County, there is a variety of animal species protected in Marsabit National Park and Reserve, Sibiloi National Park, Central Island and South Island National Parks (DRSRS, 2007).

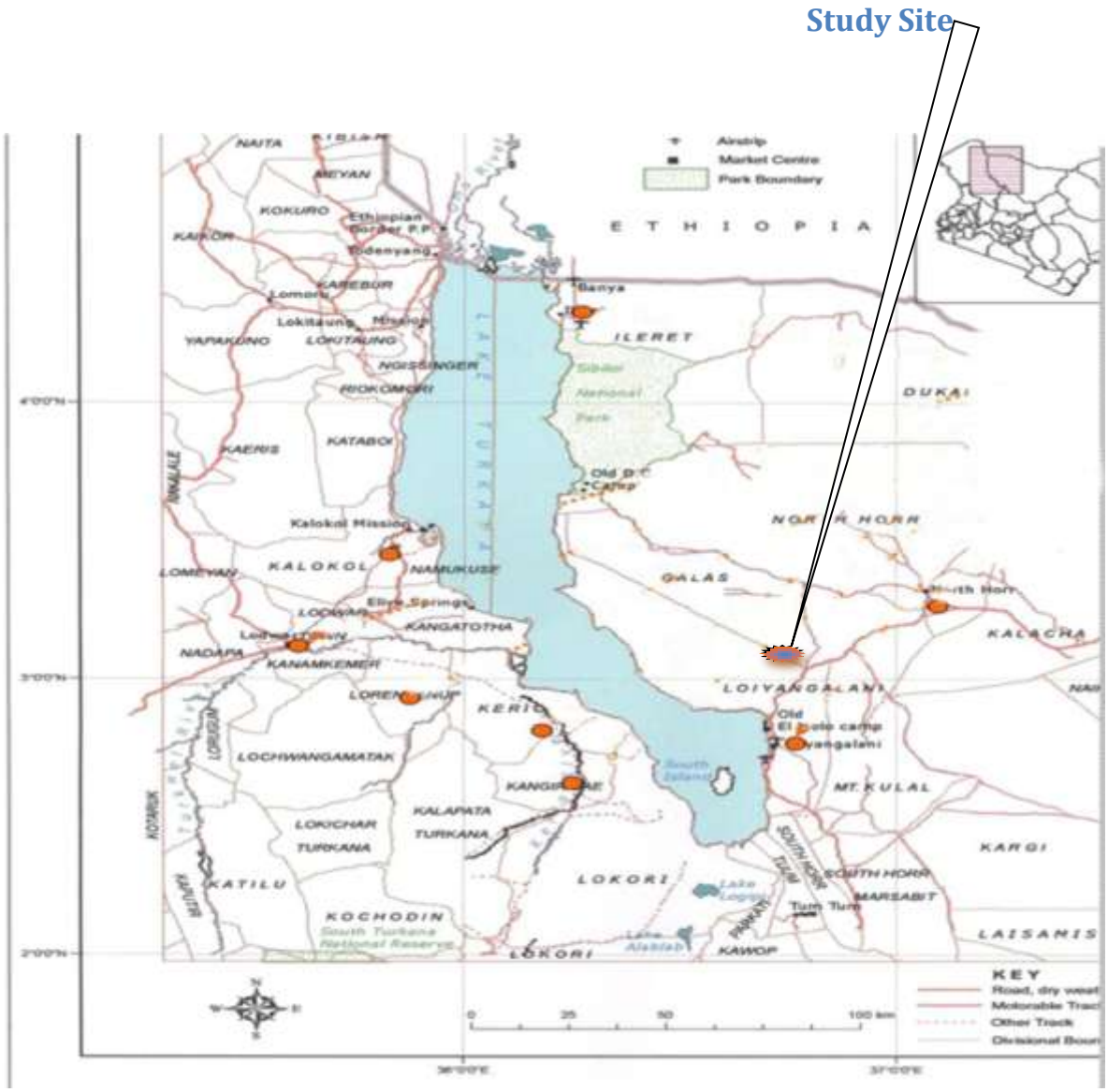

Fig 3: Map Showing the Study Site

3.2 STUDY DESIGN

3.2.1 Data Collection Methods

In this study, both primary and secondary data were collected. In answering the research question, objectives one and two were addressed through primary data. Focus group discussions, key informant interviews and household survey were employed to get views of individuals, key community informants and households about how drought has impacted on their socioeconomic situations, and their coping and adaptation strategies. Objective three was addressed by both primary and secondary data. Primary data collection instruments were employed to get views of the pastoralists on their opinions and perceptions about government interventions. One government policy document was reviewed to obtain data on how the government responded to drought in the study area. Finally, key employees in relevant government departments including public administration, health, education and livestock were interviewed as key informants to obtain data on implications of drought to pastoralists and government intervention measures.

3.2.2 Sampling Procedure

1. Sampling households

According to the records held by the area Chief, there were about 200 households living at the study site in five clusters. Two clusters were selected randomly for the study. This was due to homogenous nature of the population in the study site. Multi-stage sampling method was used in selecting respondents. The purpose of choosing this method was to avoid bias and ensuring a representative sample is selected. Households studied were randomly selected. The sampling procedure was used as follows:

A. Sampling stage one: The five clusters were given numbers 1-5. Two of the numbers were picked at random since two clusters were used for the study.
B. Sampling stage two: All the households in the two clusters that were picked were then listed separately to form a sampling frame. Numbers were then assigned to households in two selected clusters. The numbers were then written onto separate pieces of paper and folded. All the folded papers were thereafter put in a basket that was shaken thoroughly. Numbers were then drawn from the basket, one after another, until the sample size was reached. A random sample of 20 households was picked at each of the two clusters in the study site. A total of 40 households were studied.

2. Sampling key informants and focus group discussion participants

No sample frame was prepared for the key informants and focus group discussion participants. Key informants are people perceived to have particular insight or opinions about the topic under study. In my study, the main criteria for selecting the key informants were their extensive knowledge of the cultural practices related to drought, both today and in the past, and their length of stay in the study site. For focus group discussion, ten participants were chosen at equal measure in five clusters i.e. two participants from each cluster. Gender equity was also a consideration in that one male and one female were selected.

3.2.3 Data Analysis

Qualitative analysis was an ongoing process that was conducted right from the field. After collection of data, field notes were prepared and organized into categories. Then development of a coding scheme followed i.e. coding responses and assigning numbers to the categories. Analysis was then conducted with the aim of searching for emerging patterns, themes and consistency of ideas. Data was then presented in a narrative way.

The data collected from the questionnaires were coded and entered into an excel spreadsheet after which analysis was done using the Statistical Package for the Social Sciences (SPSS). Quantitative data were then subjected to descriptive statistics after which the results including demographic information, household characteristics, and coping and adaptation strategies used by the respondents were summarized in tabular and graphical forms. Rainfall data for the study area was graphically presented.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 RESULTS

4.1.1 Rainfall Data

Figure 5 below presents the annual rainfall in the study area for a period of 39 years i.e. from 1970 to 2008.

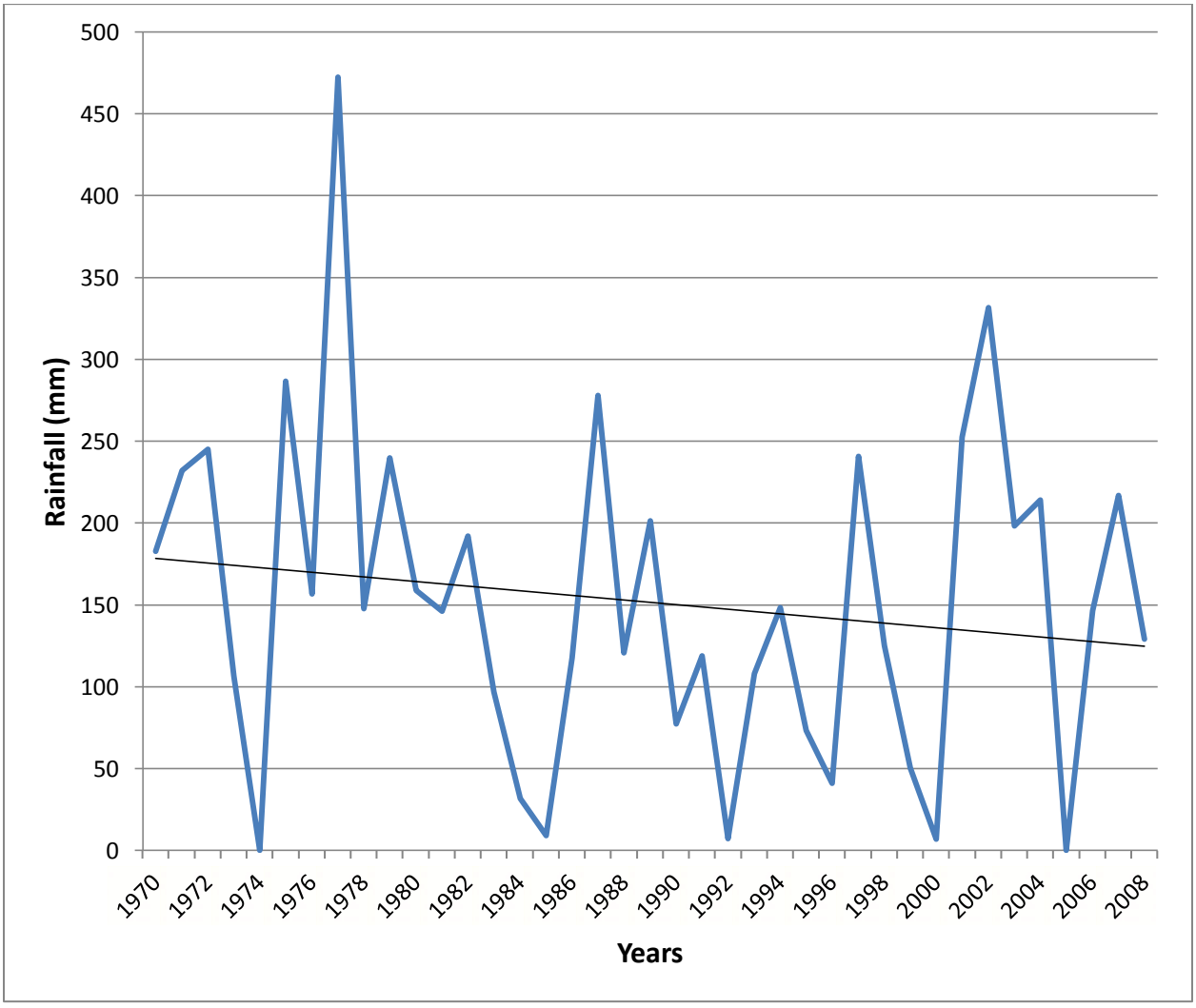

Fig 4: Annual Rainfall for Loiyangalani Division between 1970 and 2008

The highest total annual rainfall of 472.3 mm was recorded in 1977 while the year 2000 recorded the lowest annual precipitation at 6.8 mm. Subsequently, very low annual precipitation was recorded in 1985 and 1992 with 9.0 mm and 7.1 mm, respectively. No precipitation was received

in the years 1974 and 2005. The figure shows that there was generally a declining trend of precipitation received in the study area from the year 1970 to 2008.

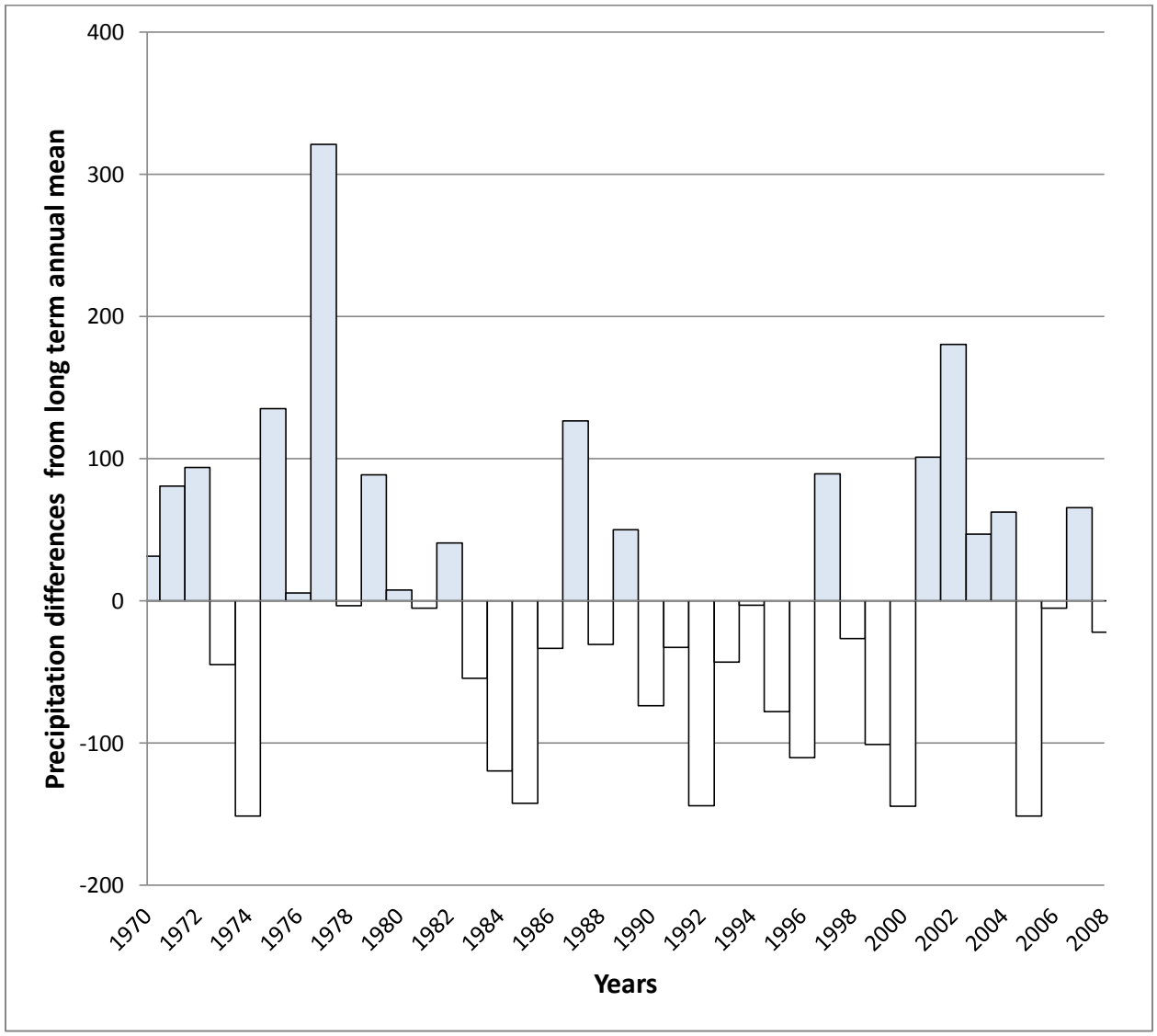

Fig 5: Rainfall Anomalies in Loiyangalani Division for the Period between 1970 and 2008

Figure 6 above shows the rainfall anomalies in the study area for a period of 39 years beginning from 1970 to 2008. The long-term annual mean from the rainfall data collected for that period was 151.4 mm. Negative precipitation anomalies featured between 1973 and 1974, with 51 and 151.4 mm below the long-term annual average, respectively. The years between 1983 and 1986 steadily recorded precipitation below the long-term annual mean with the highest and the lowest anomalies in 1985 and 1986, respectively. There were negative precipitation anomalies between

1990 and 1996, with the highest anomaly of 144.3 mm below the long-term annual mean being recorded in 1992. Similarly, from 1998 to 2000 precipitation was below long-term annual mean with the year 2000 recording 144.6 mm below the long-term annual mean.

4.1.2 Household Characteristics

The study found that 88% of respondents were household heads and with 12% being spouses. There were 82% males and 18% females among respondents. Most (43%) respondents were aged between 36 and 55 years. 83% of the respondents were in a monogamous marriage, 10% were polygamous and 7% widowed. Most (55%) households had between 4 and 6 members; (18%) had a maximum of 3 individuals; (18%) had between 7 and 9 members; (7%) had between had 10 to 12 members; and the least (2%) households had 13 to 15 individuals. respectively. 97% respondents had no formal schooling, with only 3% attaining primary level education. 68% of households had no child in a school and only a few number of children attended primary school. 75% of respondents indicated that men were the most economically active members of the household and only 25% indicated women to be the most active members. All respondents indicated that the most inactive members of the households were young children and the very old. 98% of households had temporary houses and only 2% having semi-permanent houses. Refer to table 2 for household characteristics.

Table 2: Household Characteristics of pastoralists in the study area

Characteristic	%
Marital status of respondents	
Married monogamous	83
Married polygamous	10
Widowed	7
Age of respondents (years)	
20-35	32
36-55	43
Over 55	25
Sex of respondents	
Male	82
Female	18
Household size	
1-3	18
4-6	55
7-9	18
10-12	7
13-15	2
Type of house	
Temporary	98
Permanent	2

4.1.3 Socioeconomic Characteristics of the Households

The only source of livelihood for the households was pastoralism with 60% owning between 1 and 20 sheep, 65% owning 1 to 20 donkeys and 45% owning 21 and 40 goats; and only a few households owned camels, cattle and poultry (Table 3). On other physical assets, 77% of respondents owned none; only 8% and 15% owned radios and mobile phones respectively. All respondents mentioned drought, human and livestock diseases, and poverty as major constraints on their wellbeing. Major problems encountered with regard to livestock keeping included livestock diseases, shortage of water and pasture (100%); livestock rustling (93%) and 75% considered lack of markets (Figure 6). All respondents indicated that the main sources of water for the livestock were hand dug wells which were not managed and nothing was contributed by households to their maintenance. Most (80%) of respondents sold 1-10 goats; (53%) sold 1-10 sheep and (12%) sold 1-10 donkeys; (3%) and (5%) sold 1-10 camels and poultry respectively in the last one year (Table 4). Most (88%) respondents sold livestock during drought, with (12%)

sold to generate income. (97%) and (3%) of respondents disclosed that they had received and/or given (1 to 10) and (11 to 20) shoats respectively in the last one year. 82% of respondents lost 1-20 sheep while 10% lost 1-20 goats to diseases in the last one year and only 5% lost 1-20 camels (Table 5). 53% of respondents lost 1-20 sheep and 42% lost 1-20 goats to drought in the last 5 years (Table 6).

Table 3: Type and Proportions of Livestock Owned by Households

No. of livestock	**Cattle**	**Sheep**	**Goats**	**Camels**	**Donkeys**	**Poultry**
	%	%	%	%	%	**%**
0	97	5	0	87	32	75
1 – 20	3	60	32	8	65	22
21 – 40	0	35	45	5	3	3
41 – 60	0	0	10	0	0	0
61 – 80	0	0	8	0	0	0
Over 80	0	0	5	0	0	0

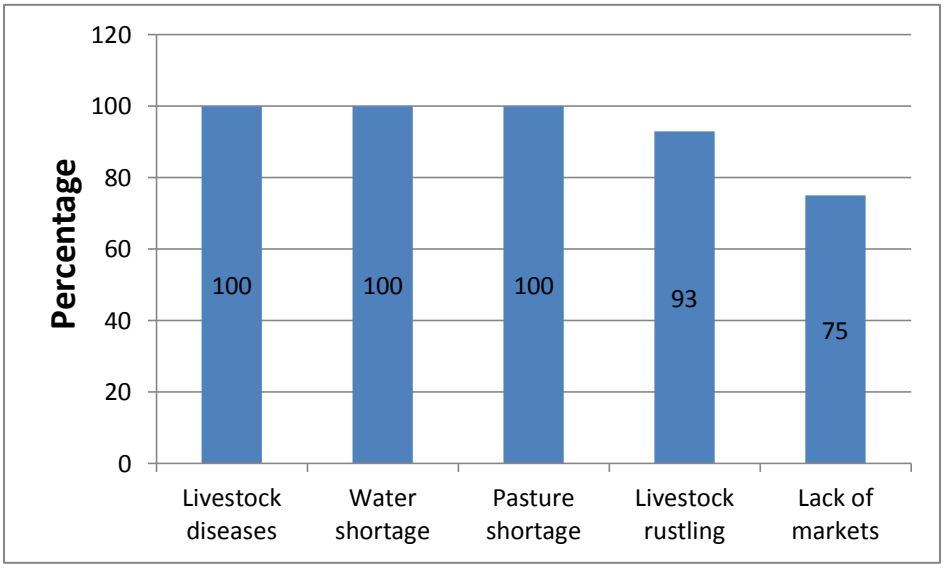

Fig 6: Major Problems Encountered with Livestock Keeping

Table 4: Proportions of Livestock Sold in the Last One Year

No. of livestock	cattle	sheep	Goats	camels	Donkeys	Poultry
	%	%	%	%	%	%
0	100	35	15	97	88	95
1-10	0	53	80	3	12	5
11-20	0	12	5	0	0	0

Table 5: Livestock Lost to Disease in the Last One, Five and Ten Years

Livestock Species	No. of years	Livestock numbers					
		0	1-20	21-40	41-60	61-80	Over 80
		%	%	%	%	%	%
Cattle	1	100	0	0	0	0	0
	5	100	0	0	0	0	0
	10	100	0	0	0	0	0
Sheep	1	0	82	5	8	3	2
	5	20	55	7	8	5	5
	10	40	23	22	5	7	3
Goats	1	80	10	7	0	0	3
	5	27	53	10	5	3	2
	10	38	30	22	5	5	0
Camels	1	95	5	0	0	0	0
	5	93	7	0	0	0	0
	10	95	5	0	0	0	0
Donkeys	1	85	15	0	0	0	0
	5	72	28	0	0	0	0
	10	70	30	0	0	0	0
Poultry	1	90	10	0	0	0	0
	5	95	5	0	0	0	0
	10	97	3	0	0	0	0

Table 6: Livestock Lost to Drought in the Last One, Five and Ten years

Livestock Species	No. of years	Livestock numbers					
		0	1-20	21-40	41-60	61-80	Over 80
		%	%	%	%	%	%
Cattle	1	98	2	0	0	0	0
	5	97	3	0	0	0	0
	10	100	0	0	0	0	0
Goats	1	5	68	10	15	2	0
	5	13	42	30	5	10	0
	10	30	20	15	15	7	13

Sheep	1	3	72	23	2	0	0
	5	10	53	20	7	5	5
	10	27	20	23	10	7	13
Camels	1	85	13	2	0	0	0
	5	82	18	0	0	0	0
	10	87	13	0	0	0	0
Donkeys	1	75	23	2	0	0	0
	5	70	30	0	0	0	0
	10	70	30	0	0	0	0
Poultry	1	100	0	0	0	0	0
	5	100	0	0	0	0	0
	10	100	0	0	0	0	0

4.1.4 Perceptions and Understanding of Drought

Respondents perceived drought differently. Most (48%) respondents perceived drought to be a deficiency of rainfall for a season or more, 30% understood it to be depletion of water and pasture, 20% perceived it to be period of hunger and destitution and 2% understood drought to be an act of God (Table 7). Traditional sources i.e. use of rainmakers and seers, was the only source of information on weather forecast relied on by the pastoralists in the study area.

Table 7: Households Perceptions of Drought

Perception	**%**
Deficiency of rainfall	48
Depletion of water and pasture	30
Period of hunger and destitution	20
Act of God	2

Data from household survey on perceptions and understanding of drought were corroborated and expounded by the key informant interviews and focus group discussions. The Turkana pastoral community in their *Ng'aturkan* language refers to drought as *akamu.* According to most key informants, drought (*akamu)* is lack of rainfall for one or more seasons. One key informant (an old man in his mid 70s) said:

> *Drought is a natural occurrence. It is when the skies fail to 'open-up' and give water for people and livestock.*

Drought has also been described as a phenomenon that adversely affects a wide range of living things. This was summed up by the assertion from one key informant who mentioned that:

> *Drought is a 'monster' that does not spare anything – not our livestock, not wild animals, not plants, not human beings and not even small insects.*

Additionally, drought was perceived to be an act of God and ancestors. Respondents argued that when people in the community fail to follow traditional practices, norms and values, and perform bad deeds that are against community values, there are usually ancestral retribution and God's anger. The consequence of this is usually a punishment in form of lack of rainfall which can continue until that time when people seek God's and ancestral interventions.

The Turkana pastoral community classify drought (*akamu)* into two: *Akamu niishi* (small drought) and *akamu naapolon* (big drought). Respondents concurred in a focus group discussion that they experience two rainy seasons in a year i.e. short and long rains. *Akamu niishi* occurs when rain fails in either short or long season, while *akamu naapolon* occurs when rain fails in both short and long seasons.

Key informants recalled past droughts from their own experiences and through stories from elders. Drought occurrences in the last ten years was easily remembered and freely discussed in the focus group discussion sessions, with middle-aged members also actively engage in the discussions.

Key informants concurred that in the past especially in 1950s, 60s and 70s the area was rich with varieties of vegetation, people were healthy and wealthy, and food shortage was unheard-of. They also recalled that water and pasture were in plenty. These were general recollections of the past years, which they considered years of plenty. Despite these good recollections of the past, drought was experienced. Key informants revealed severe droughts in the past were experienced only once in ten years. Minor drought events occurred in between the ten year period, but key informants considered this to have insignificant impacts on their livelihood unlike the occurrence of severe drought episodes. They described six drought episodes that occurred in the past. The six drought episodes are briefly discussed below.

1950s to 60s – there was a major drought event that occurred in 1950s. This drought episode was named *'namotor'* meaning unbearable. People experienced a lack of rainfall for a period of more than one year. The Turkana pastoralists lost many livestock and started eating carcasses of livestock including donkeys and dried hides. This drought was all over the Turkana region both on the western and eastern parts of Lake Turkana. This was also the period when the Turkana people started eating *'posho'* (maize flour) provided by the colonial government.

1960s to 70s – a major drought was experienced in early 1960s. This drought was named *'nataparach'* meaning in the morning. The onset of this drought was unexpected since it occurred on a rainy season. Key informants narrated that it started raining heavily one morning until evening. The end of that rain marked the beginning of severe drought that proceeded for a period of one year.

1960s to 70s – a severe drought occurred in late 1960s. Key informants narrated that in that year a star with a tail was spotted and this was followed by a severe and prolonged drought. This drought was named *'etop e kothim'* meaning a star with a tail. During the occurrence of this drought warriors and young girls died while searching water for livestock.

1970s to 80s – during the eclipse of the sun in the early 70s a severe drought event which lasted for one year was experienced. This drought was named *'aribokinet'* meaning darkness. Massive livestock mortalities were experienced.

1980s to 90s – in 1980s drought that lasted for a period of almost two years was experienced. This drought was named *'namunyomunyo'* meaning it doesn't have ears. Even with the interventions from traditional rainmakers, prayers and sacrifices from the elders, there was no rain. This drought event was accompanied by an outbreak of cholera that killed many people.

1990s – 2000 – a drought event that lasted for over a year occurred. Massive death of livestock was experienced. Many people moved to relief camps and were provided with relief food supplies from the government. Relief food provided includes yellow maize and soya bean flour. This drought was coined *'napusing'iro'* – named after the colour of the soya bean flour provided.

Focus group session revealed that in the last ten years, eight minor droughts and four major droughts occurred in the study area.

To further get in-depth pastoralists' perceptions of drought, study sought to find out what the Turkana pastoralists consider indicators of drought occurrence. In the focus group session and interviews with key informants, livestock, vegetation, soil, wind, water and human behaviour indicators were identified and described.

With regard to livestock, drought occurrence is indicated by deterioration of body conditions of livestock i.e. sheep, goats, donkeys and even camels reduce body weight accompanied by protrusion of ribs and loss of hair in their skin. Additionally, livestock become lethargic and lack stamina to walk for long distances. This situation restricts livestock especially sheep, the young and the aged to shades, denying them opportunity to feed on few available pasture. Moreover, reduction in production of milk for lactating livestock or lack of it is another crucial livestock indicator. For example, individual lactating shoats can barely produce milk to fill 300 ml cup per day while lactating camels can barely fill a 3 liter milk guard (*akurum*). The young suckling livestock barely get enough milk from their lactating mothers and eventually they succumb to such situations. Livestock mortalities are important indicator of drought occurrence. In severe and prolonged drought events, livestock mortalities become evident. First the young and aged sheep succumb to drought, then kids and mature sheep followed by goats. In case of camels and donkeys, only the very young and very old succumb to prolonged drought. It is only in isolated cases that mature and strong camels and donkeys succumb to drought. Almost all, but a few, will perish in the long run.

Conditions of vegetation provide signals of a looming or occurring drought. Respondents mentioned that gradual disappearance of grass and shrubs, change of their colour from greenish to brown, coupled with continuous grazing leave bare grounds and stumps of grass and shrubs clearly indicate 'bad years'. Secondly, when mature trees such as *esekon, etiir, edung, engol, ebei* and others lose leaves, fail to flower and produce fruits and berries, clearly indicate a period of drought.

Wind and soil indicators play crucial roles as indicators of drought. Presence of dust bowls caused by wind erosion and dryness of soil is evident during drought episodes. In addition, change of wind patterns and direction indicate occurrence of drought. One key informant described this indicator and said:

> *According to my experience as an elder in this village, when there is change in wind patterns and especially when wind direction is from east to west consistently for more than three months, then this shows that drought is occurring. However both the northerly and westerly winds bring good tidings. We the Turkana people have termed the winds blowing from east to west akoro**.** Akoro is a Turkana word for hunger. This wind has been named so since it brings hunger and suffering to people.*

Further probing on the question of this particular type of wind, the key informant mentioned that it is usually hot and dry, and blows at high speed. He further related it to how it affects livestock by reducing their grazing and browsing time, and their uptake of scarce grass and browse. He said:

> *Livestock can therefore not graze and browse for long and many can be seen under trees for long hours. This affects their productivity and leads to weakness.*

Respondents also considered conditions of water resources as indicators of drought occurrence. Depletion of water in hand-dug wells, drying-up of seasonal streams and rivers are some of the signals of drought. When this happens some people move with their livestock either to areas with permanent water sources away from settled areas while the majority move and settle at the shores of Lake Turkana- a distance of about 30 kms from the study area. Both people and livestock drink water from the lake (*nanam)*. People settle at the lake shore temporarily until drought ends. One elderly woman – also a key informant- said that:

> *At least at the lake shore we can get water for ourselves and our livestock. We can also access lake shore vegetation*

for our livestock. When you see households (awi) living along the shores of the lake, it is because of drought.

Change in activities and behaviour of people were also considered indicators of a looming or occurring drought. This was summed up by one man in a focus group session. He said that:

Women go and gather fruits, berries, roots and tubers from trees to be used as food for the family. Men and women have resorted to collecting firewood, making charcoal and transporting to the nearby trading centre to sell or exchange for cereals, maize and other foodstuffs. This usually does not occur during good seasons. Men and women will be seen along the shores of the lake begging for fish. Men will learn to fish, follow fishermen and adopt fishing for the entire drought period.

4.1.5 Socioeconomic Impacts of Drought

While (100%) respondents considered effects of drought to be depletion of pasture and water resources, loss of livestock, poor human and livestock health and increased food prices, 95% included famine and 97.5% indicated reduction in livestock prices (figure 7).

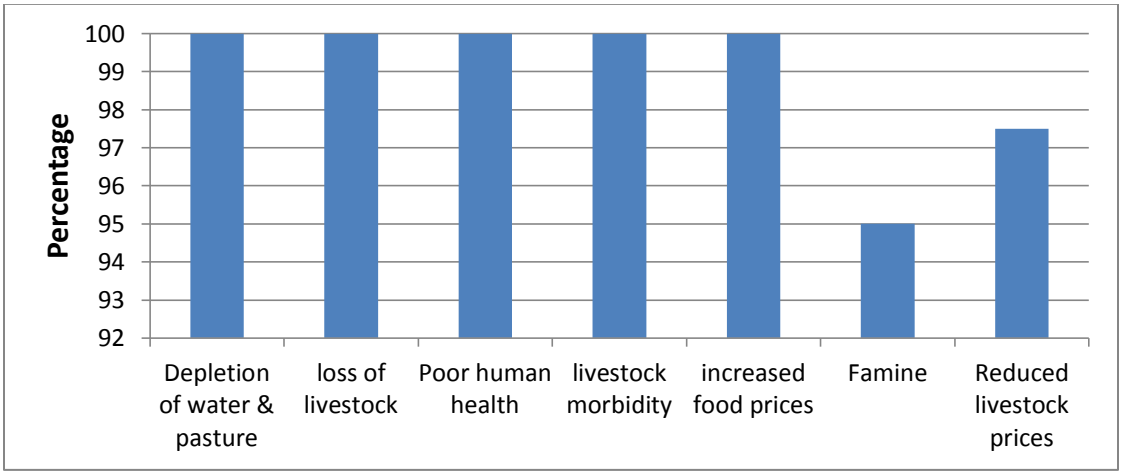

Fig 7: Socioeconomic Impacts of Drought on Pastoral Households

Seven predetermined socioeconomic parameters were used to guide discussions and interviews on socioeconomic impacts of drought. They included livestock asset, people's health and food security, livestock and food prices, social integration at family, clan and community levels, indigenous knowledge systems, formal education, and conflicts and insecurity.

1) Livestock assets

Key informants and members of the focus group discussion mentioned that in the past they used to keep large numbers of various livestock species including goats, sheep, camels, cattle and donkeys. They argued that this was made possible by abundant availability of water and pasture, less frequent droughts and minimum incidences of insecurity in the past. In the last ten to fifteen years, large herds of livestock especially sheep and cattle were decimated by drought. People's priorities in the study area changed with almost all households abandoning cattle keeping and continued keeping resilient livestock species such as goats, camels and donkeys. On further probing on why they still keep sheep despite experiences of decimation. Several responses were brought forth. Some respondents mentioned that sheep are important in many cultural activities while others said that sheep are fast growing and are important source of income for the households.

Livestock - their main source of livelihood - are affected adversely by drought in two ways. First, they mentioned that drought result in emergence of livestock morbidity. Slow and stunted growth of young animals, disappearance of hair on skin and hide, loss of teeth and gum injuries caused by tough stumps of vegetation are some of the livestock health problems associated with drought. Secondly, respondents stated that drought cause livestock mortalities. Depletion of forage and water resources due to prolonged drought events directly cause livestock deaths. They mentioned that infants and aged livestock are first to succumb to drought. Infant herds hardly get enough milk to suckle from their mothers and are usually disowned by their mothers in the process, while the old herds are often weak and lethargic to walk for long distances in search of water and pasture. As drought progresses and grass get depleted, mortalities of sheep will follow and finally as browse from shrubs depletes goats and camels will then succumb to drought. They however stated that mortalities of all livestock species occur when drought is prolonged and widespread.

2) Human health and food security

Good body and mental health is imperative to individuals from pastoral communities to execute socioeconomic and cultural activities involved in livestock keeping. In a focus group discussion session there was a concurrence that drought result in poor human health. Further discussion on how drought result in poor health elicited two important responses. Firstly, they mentioned that drought leads to loss of livestock which consequently leads to food insecurity and impoverishment. They further mentioned that lack of adequate food result in general body weakness and malnutrition. Although this affects all individuals in the community, children, pregnant and lactating women, and the elderly are the most affected. Impoverishment associated with loss of all livestock results in mental ill health and psychological problems to those members of the community affected. Secondly, drought leads to depletion of water resources which exacerbates poor sanitation. A question was posed to respondents in the focus group discussion on how poor sanitation was linked to depletion of water resources. They mentioned that they use hand dug wells for domestic and livestock use. They further stated that water from the wells are not clean and is consumed without any kind of treatment. Additionally, the wells are not protected, and therefore they are prone to contamination from people, livestock and wild animals. All these result in perennial water borne diseases affecting children, men and women in the study area. Moreover, those who settle along the shores of Lake Turkana in drought periods consume saline lake water which is unsuitable for drinking.

Findings from the Divisional Public Health Officer disclosed that drought in the year 2011 has resulted in widespread food insecurity among the pastoralists in the whole Division including the study area. This has resulted in malnutrition to pastoral community members and particularly to most vulnerable group including children, lactating, pregnant mothers, and the elderly. About 200 children below 5 years suffered from acute malnutrition. The respondent stated that during drought in the same period, incidences of water borne diseases especially amoebic dysentery, typhoid and diarrhea increased whereby, a total of 84 households had at least one member affected. This was attributed to use of non-potable water and poor sanitation due to lack of adequate water supply caused by drought.

3) Livestock marketing and food prices

Before discussing effects of drought on livestock prices and market, a question on whether respondents generally sell their livestock was posed. There was a concurrence that they do sale their livestock. Respondents were further asked why, when and where they sell their livestock. This questions elicited several responses from the respondents. They stated that they sell livestock to buy food, pay for health care, buy clothing, buy different species of livestock and pay debts. On the question on when they sell their livestock, a handful of respondents mentioned that they sell during rainy seasons; few others mentioned that they sell their livestock before the onset of drought; majority of respondents stated that they sell livestock during drought seasons; and no respondents mentioned that they sell livestock when drought ends. Finally on the question of where they sell their livestock, respondents stated that they either take their livestock to the nearest trading centre or wait for livestock traders to purchase livestock from where they are located. They however mentioned that there are no formal livestock markets in areas they occupy or in trading centres.

The study revealed that livestock prices vary depending on seasons and the body conditions of livestock. During rainy seasons or just before the onset of drought when the body conditions and weight of livestock is good, different species of livestock fetch good income e.g. a mature goat or sheep can fetch between 2000 and 3000 shillings, while a mature camel can fetch between 30,000 and 40,000 shillings. Sale of livestock during drought seasons result in drastic decline of livestock prices. Respondents mentioned that a mature goat or sheep can fetch as low as between 300 and 500 shillings while a mature camel can barely fetch 15,000 shillings. This is attributed to poor body conditions and poor life weight of livestock caused by drought. Respondents also stated that there is low demand for livestock from livestock traders during drought seasons.

Most households purchase only maize, beans, maize flour, tea leaves and sugar after selling livestock. Prices of foodstuffs tend to increase during drought seasons. The respondents mentioned that prices of foodstuffs never decrease after it has increased. They mentioned that two years ago (2010) a kilo of maize was 40 shillings and a kilo of sugar was 100 shilling. They further revealed that during the 2011 drought season the prices of these two commodities increased to 80 and 180 shillings per kilo respectively. Despite occurrence of precipitation in

2012, the prices of foodstuffs remained constant. I visited two shops in Loiyangalani town, interviewed shop attendants to confirm this position and I found out that the prices of these commodities were as the respondents mentioned.

The Livestock Marketing and Development Officer stated that during drought events, large numbers of livestock of poor quality are flooded to the markets. These livestock usually fetch low income due to poor prices. He further mentioned that the government has not developed any livestock market in Loiyangalani Division. This compels pastoralists to sell their livestock to middle men who transport livestock to satellite markets in Laisamis and Ilaut and to farthest markets in Marsabit, Isiolo and Nairobi. The respondent mentioned that lack of livestock market coupled with poor transport infrastructure has lead to poor livestock development and marketing for the pastoralists in Loiyangalani Division.

4) Customary rites and rituals

Customary rites of passage including child birth, initiation and marriage are usually celebrated both as cultural and social activities. These activities are usually celebrated by a whole community as opposed to a single clan, family or household. They are accompanied by slaughtering sizable herds of sheep, goats or camels for performance of specific traditional rituals and feasting. Marriage ceremonies for instance are followed by payment of dowry. Grooms are required to pay between 100 and 120 sheep and goats, and about 20 camels. In the past this was possible since large numbers of livestock were owned by households. Dowries were promptly paid by grooms and they could afford to practice polygamy. Presently, customary celebrations including marriage are seldom practiced and are less vibrant as they used to be in the past. Some key informants revealed that men can take women as their wives and delay payments of dowry or pay in installments until they get old. This breakdown of customary rites and activities is attributed to decimation of livestock by drought. Drought has also forced individuals and their families to abandon traditional customs by adopting alien practices like fishing, fuel-wood gathering and charcoal making. This in a nutshell results in breakdown of social and cultural values, traditional customs, social cohesion and norms.

5) Indigenous knowledge system

The study revealed that indigenous knowledge has been an integral part of the Turkana pastoralists in the study area and elsewhere. Key informants pointed out that they had rich knowledge for utilization and protection of land, plants, animals and water resources. They affirmed that traditional knowledge was necessary for their existence. It helped the community to cope with adversities associated with drought, human and livestock diseases. Knowledge of areas with permanent grazing reserves and water resources ensured people move their livestock to such areas before the onset of drought. Knowledge of weather through observation of wind patterns, stars and conditions of vegetation enabled the pastoralists in the study area to take action before drought occurs. Knowledge of plants suitable for consumption as human food prevented households from hunger and starvation brought about by drought. Knowledge of medicinal plants helped the community cure human and livestock diseases. Traditional knowledge was not a preserve of a few individuals, but of the whole community and it was passed on to the younger generation by older members of the community.

There was a concurrence from key informants and respondents from focus group session that indeed drought disrupted their indigenous knowledge system. Depletion of water and forage in all areas including areas of permanent grazing reserves and water resources attributable to frequent and intense droughts have reduced their options of mobility. Drought have resulted to disappearance of vital medicinal and food plants that were used for treatment of human and livestock diseases, and as human food. High frequency of drought has made prediction of weather patterns difficult, thus disrupting such an important indigenous knowledge. Adoption by some households of alien livelihood options such as fishing has disrupted practice of indigenous knowledge system. Such individuals and households seldom practice indigenous knowledge and rarely pass it on to their children.

6) Formal education

The study revealed that the majority of the respondents do not take their children to school. They argued that lads and young girls play critical roles in taking care of livestock and therefore they considered not taking them to school. Regarding formal education one male respondent posed:

If I take my children to school who will look after my remaining goats and sheep?

They also argued that taking children to school is losing them i.e. 'giving them up' to government, and with respect to girl-child, formal education presents a great loss of 'revenues' in terms of future dowries.

During drought events, young boys and girls help the old folks look after the few livestock left behind near the homesteads, while the warriors, teenage girls and the middle-aged roam with livestock to far distances. Despite losing most livestock to drought, respondents mentioned that households with girls are certain that through dowries, the livestock numbers will increase. Although respondents faced difficulties in responding to how drought affects formal education, a closer interpretation of their arguments reveals how drought contributes to their disinterest in formal education.

Key informants from the education sector revealed that most pastoralists from Loiyangalani Division view formal education with contempt since they don't understand the value of education on their livelihood. They mentioned that population density of pastoralists children is low in both schools compared to population density of non pastoralists children i.e. retail traders, civil servants, other workers and fish traders. The head teacher of Loiyangalani primary school mentioned that the school has a total population of 674 pupils and from this population, 202 or a mere 30% of children come from different pastoral communities. The school head of El-molo Bay primary school stated that from a total population of 356 only 89 pupils or a paltry 25% come from different pastoral communities. They further mentioned that apart from low enrolment rates, there are high drop-out rates of children from pastoral communities despite introduction of free primary education. A question was posed on the number of children from the study site attending both schools. The two respondents stated that 24 and 52 pupils from the study site attend Loiyangalani and El-molo Bay Primary Schools respectively. There is no school in the study site and the higher number of pupils from the study site in one school compared to the other is attributed to its close proximity – about 30 kms - from the study site. Loiyangalani primary school which has very few pupils from the study site is about 43 kms away. These pupils live with their relatives who reside in Loiyangalani Township.

The study further revealed that drought is a major contributing factor for poor enrolment rates and high drop-out rates of pastoralists' children from Loiyangalani Division generally and in the study site in particular. They mentioned that during drought episodes, households use school going children to herd livestock near homesteads and therefore they cannot be enrolled in schools. Secondly, teenage pupils drop out of school to follow their elderly family members who roam with livestock in search of water and pasture during drought seasons. Thirdly, female pupils drop out of school to be married off as households seek to recover livestock lost to drought. They also stated that pastoralists who have been impoverished by drought allow their children to go to school for the sole purpose of getting food.

7) Conflicts and insecurity

The study showed that drought results in internal conflicts, resource use and territorial conflicts, and banditry. Internal conflicts occur within the community when individuals steal livestock for sale or slaughter for food. This can occur in both drought and rainy seasons. Internal conflicts also arise when individuals providing labour to more wealthy members of the clan or family during drought accumulate more livestock to themselves contrary to mutual agreements. Resource use and territorial conflicts occur when members of one community trespass on territories of other community and use their pasture and water resources during drought episodes. Conflicts also occur through inter-community livestock rustling and banditry. Although livestock rustling are executed during good years (rainy seasons); they serve as ways of recovering livestock lost during drought seasons.

The area Chief echoed these sentiments from community key informants by stating that droughts in the past and recently resulted in armed conflicts and insecurity in the study area. Scarcity and depletion of forage and water resources caused by drought increased resource competition between different pastoral groups and consequently resulting in escalation of armed conflicts. Resource competition is usually between Turkana and Samburu pastoralists. Secondly, as pastoralists from the study area move with their livestock in search of forage and pasture, they at times encroach on other pastoral community's territories and are faced with hostility as a result. He further mentioned that increase of ownership of illegal small arm by different pastoral

communities within Loiyangalani Division and its neighbouring areas have exacerbated armed conflicts among the pastoralists.

4.1.6 Drought Coping and Adaptation Strategies

While all respondents considered mobility as the main strategy, 63% employed livestock diversification, 68% considered income diversification, 10% used livestock management adjustment (e.g. changes in feed, water and grazing land use) and 3% used savings (Figure 8). For respondents who diversified income, 5% sought wage employment while 95% engaged in fish, charcoal and fuel-wood trade for subsistence. All respondents disclosed that they never preserved water or pasture in anticipation of drought. Most (75%), however, disclosed that they relied on permanent water sources and grazing reserves within the Loiyangalani Division while 25% disclosed that they relied on permanent water sources and grazing reserves in other areas outside the Division.

To cope with food shortage occasioned by drought, all respondents indicated that they liquidate productive assets e.g. livestock, adjust food consumption, use social networks and rely on public relief food programmes.

Households which diversified livestock placed high preference on goats, camels and donkeys. Additionally, protection of specific plant species and areas were considered by (77%) respondents (Table 8). Most (70%) respondents indicated that they borrowed money from friends and relatives in drought seasons, while (30%) borrowed in other seasons. Borrowed money was mainly used to purchase food (Table 9).

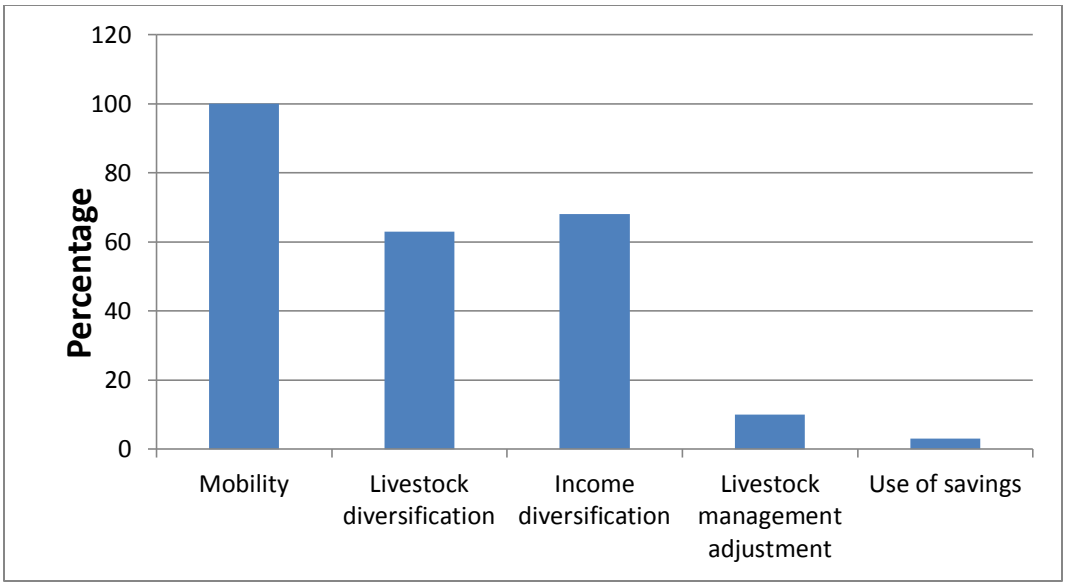

Fig 8: Drought Coping and Adaptation Strategies

Table 8: Practices for Using and Conserving Natural Resources

	Frequency	**%**
Having drought community grazing reserve	8	20
Protection of specific plant species or areas	31	77
Having individual or communal user rights for water/grazing	1	3
Total	**40**	**100**

Table 9: Reasons for Borrowing Money from Friends and Relatives

	Frequency	**%**
N/A	12	30
buy food	16	40
pay for healthcare	10	25
fund cultural ceremonies	2	5
Total	**40**	**100**

Community key informants and participants of focus group discussions corroborated data from the household survey and provided new information on various coping and adaptation strategies used. The study revealed past and present strategies that were adopted. These included, mobility; food preservation; hunting and gathering; Livestock distribution (labour), livestock loaning and

social networks; herd diversification; sale of livestock; livelihood diversification; food consumption adjustment and sharing; and herd splitting and merging.

A. Mobility

In the past, community warriors, middle-aged men and young women would move with livestock at the onset of drought to far distances, as far as Omo Delta in search of water and pasture. A small number of livestock especially lactating females, the young and the aged stock were left with the older members of the community and the lads. These livestock were fed with twigs, leaves and pods of trees. As drought worsens, members of the community move with few livestock to areas of permanent water sources such as swamps and the lake shores where they accessed water and pasture.

In focus group session it was mentioned that mobility is still practiced although not as much as in the past. However, it was the main strategy in the past years owing to availability of vast lands and various options of permanent grazing reserves and water sources. Moreover, in the past households kept large numbers of livestock and therefore during drought episodes, they moved their large herds to prevent massive livestock mortalities. Although mobility is still practiced, factors such as reduction of grazing range, availability of few grazing reserves and water sources, insecurity and reduction of households' herds restricted movements of people and their livestock to nearby grazing reserves and water sources.

B. Food preservation

Turkana households preserved milk and meat – their staple food – before the onset of drought to meet their food requirements during drought seasons. Milk was preserved by drying. The process involved storing milk in a guard for few days to ferment and coagulate. After coagulation and fermentation, milky water will be separated from the coagulant. The coagulant will then be put on goat's skin and sun dried for one day. The dried coagulant will then be put on a flat stone and pounded using a fist-sized spherical stone. The end result of this process is powdered milk which is then stored in traditional bags made from goat's skin. This milk is mostly given to small children, but can also be consumed by adults for the entire drought period.

Meat preservation was also an important drought coping strategy used by the Turkana pastoralists. Two methods were used to preserve meat: sun drying and dipping into sheep's fat. Just before the onset of drought, a number of sheep and goats are slaughtered by a household, then all flesh are stripped-off the bones, some flesh will be made into stripes and dried in the sun while others will be cut into pieces and dipped into a guard of sheep's fat after it has been heated and cooled. Sun dried stripes of meat are then wrapped on goat's skin for storage and consumption during the drought season. A guard will be used to preserve a mixture of flesh and sheep's fat for the entire drought period. Large animals e.g. camels are slaughtered by large, wealthy families and clans. Meat from large livestock is preserved using same procedures the only difference being sheep's fat is replaced by camel fat while goat's skin is replaced by camel's hide. The preserved camel flesh is then shared amongst the family or clan members who then chose to consume in drought periods.

C. Hunting and gathering

Past adaptation mechanism involved temporary hunting of wildlife and gathering of food from vegetation. Large herbivores like buffalos, elands and zebras were speared while small herbivores such as antelopes, impalas and hares were captured using traditional snares. Birds such as ostriches and guinea fowls were also hunted. Wildlife was in abundance despite drought occurrence. Gathering and consumption of wild fruits, roots, tubers and pods from some tree species was practiced especially in the event of severe drought episodes. Hunting was a preserve of men while gathering was done by women.

D. Livestock distribution (labour), livestock loaning and social networks

Wealthier members of the clan or family distribute some of their livestock to poor members to provide labour during drought seasons. This practice may continue even after drought elapses. There is usually an agreement for 'payment' for example, for every ten calving goats or camels distributed, the poor member of the clan is given one kid or a calf. This ensures that the poor family member accumulates livestock over a period of time to recover from the loss attributable to drought. Similarly, livestock distribution cushions the wealthy members of the clan or family from the effects of drought, since there is available labour from the less wealthy members of the

clan who roam with livestock in search of water and pasture. This system cuts across all clans and families.

In the past the Turkana pastoral community coped with drought events by use of social networks. Sharing of food, giving and receiving livestock as gifts was practiced by families, clans and friends as a way of safeguarding households from drought. Moreover, there was a system where more wealthy members of the clan or family will give four or five female goats/sheep/camels to the members of the clan or family who lost considerable number of livestock as loans. They will then keep those livestock species and after accumulating a sizable number of livestock, they payback the same number they were given as loans to the loaner and some additional number depending on the size of livestock accumulated. In case the member of the clan given the loan takes long to recover lost herds, the loaner will wait until such time the livestock numbers of the loaned member increase. In case he loses the loaned livestock, the loaner may forfeit the loan.

E. Herd diversification

Herd diversification is a practice that involves keeping a variety livestock species. This strategy is not only important to cushion pastoralists' livelihood against drought but also against livestock diseases. Key informants concurred that households kept diversified species of livestock in the past. Although most species of livestock were kept including sheep and cattle, they preferred to keep large numbers of goats, camels and donkeys since they were considered hardy and can withstand adverse impacts of drought.

F. Sale of livestock

Recent experiences of drought have compelled pastoral community in the study area to sale some of their livestock. During the focus group discussion, respondents mentioned that they sale livestock to get money to buy foodstuffs such as grains, cereals, legumes, tea leaves and sugar, and other stuffs such as blankets and tobacco. Others mentioned that they sale livestock to buy fishing equipments such as fishing nets and hooks to engage in fishing activity during drought. Additionally, others sale livestock species like sheep in order to get money to purchase hardy species such as goats.

G. Livelihood diversification

Some pastoralists in the study area have shifted to other livelihood options either as supplementation of pastoralism or as permanent shift away from pastoralism. For those who settle near the lake shores, men engage in fishing activities while their wives, young boys and girls look after the livestock nearby. Others, especially women and some men engage in collection of firewood and making charcoal which they transport using donkeys to the nearest shopping centre for sale. Those who have lost all their livestock to drought opt for wage employment. For instance there are those who settle along the lake shore to gather and buy dried fish from fishermen for fish traders for a wage, while there are some who move to shopping centres to take up jobs as housemaids and houseboys. Others, especially men have relocated in shopping centres to start business as livestock traders. They commence by transporting their few herds to shopping centres, slaughter and sell meat in butcheries, they continue with this practice routinely by buying livestock from fellow pastoralists.

H. Food sharing and food consumption adjustment

Focus group session revealed that food sharing is a concept that has been practiced by the Turkana pastoral community for a long time. In the past food sharing was practiced as a way of enhancing community values including social cohesion, belongingness and unity. In the past, this was not a strategy to cope with drought since respondents considered those years as years of plenty and food insecurity a minor concern. In the recent past however, food sharing has assumed a different purpose i.e. practiced as a way of cushioning households from food insecurity attributable to frequent droughts. Clan, family members and friends share meat, milk, and foodstuffs. For instance one household with sizable herds can slaughter a goat or a sheep and share the meat with their relatives who cannot slaughter their livestock owing to their small number. Clan members or friends with camels share milk with clan members or friends who do not own camels. Although what is shared might be of small quantities, it can prevent the less fortunate members of the community from hunger and starvation.

Food consumption adjustment is another strategy employed by the Turkana pastoral community in the study area to cope with food insecurity attributable to drought. There are three ways households practice food consumption adjustment: by consuming small portions of food, eating

one type of meal and by skipping meals. Small portions of milk especially sour milk, meat and other foodstuffs like grains and cereals are consumed every day by a household as and when available. Incase only one type of meal is available, for instance grains, it will be consumed as one meal in a day. There is an exception in food consumption adjustments whereby small children, lactating women and the old are provided with three meals in a day even when only one type of food is available.

I. Herd splitting and herd merging

Herd splitting was mentioned as a strategy of dividing different livestock into small herds and distributing to different family or clan members to be grazed separately. Key informants revealed that herd splitting is practiced, albeit by households with considerable herd size. Some livestock are left with old members and lads at settled areas, while other divided herds are grazed in different areas by warriors, middle aged men and young girls. This is a way of distributing risks associated with drought.

Herd merging is a practice of bringing livestock species together for collective grazing. According to discussions in focus group session, this involves mixing goats and sheep from different households with same kinship. Donkeys from different households belonging to the same kinship are similarly merged and grazed collectively. Same practice applies to camels. Herd merging, however, is practiced by households with few herds of livestock, as opposed to wealthy households who practice herd splitting.

4.1.7 Government Interventions

With regard to government interventions, (95%) of respondents indicated that the government intervened only by providing emergency food aid, while only (5%) of respondents indicated that they received development aid.

Community key informants pointed out that the government intervention is only through provision of relief food supplies comprising maize, beans and cooking oil. Similarly, the area Chief stated that the government has responded majorly through provision of emergency relief food aid to pastoralists in the study area and particularly to households which lost large numbers

of livestock. Respondents from focus group discussion mentioned that in rare cases small children, pregnant and lactating mothers are provided with supplementary foods (nutritious soya bean flour and plum nuts). They further mentioned that beneficiaries of the relief food supplies are households registered by the Assistant Chief of the area and new households that migrated to the area do not benefit from the relief food. Relief food supplies are provided in situations when the impacts of drought have worsened i.e. when livestock mortality is rife and starvation imminent.

To address malnutrition, government in conjunction with the World Food Programme supplied highly nutritive unimix, soya bean flour and plum nuts. The Divisional Public Health Office in liaison with the Provincial Administration distributed these foods to households with most vulnerable groups in the whole Division including the study site. This program has been ongoing until the onset of rainfall in February 2012. The interviewee further stated that monthly mobile clinics were set-up in pastoralists' settlement areas including the study area where people were treated of water and poor-sanitation related ailments such as typhoid, amoebic dysentery and diarrhea.

To address resource conflict, the Area Chief stated that they have established a peace and security committee composed of provincial administration, civic leaders and five elders from each pastoral community i.e. Turkana, Samburu, Gabra and Rendille. The committee holds monthly meetings in different pastoral areas, through government facilitation, on measures to address insecurity. Different committee members are charged with the responsibility of communicating and implementing such measures with their respective communities. Such measures include enhancement of peaceful co-existence and sharing of scarce resources. Secondly, the provincial administration has intervened through implementation of disarmament directive from the government. He mentioned that the government have encouraged voluntary repossession of illegal arms. He however, mentioned that they are faced with a number of difficulties when implementing interventions to address armed conflicts and other impacts of drought on pastoralists. These include insufficient budgetary allocation, inadequate logistical support and personnel.

According to ALRMP Marsabit District drought bulletin of 2011, other government intervention measures following the 2011 drought in the Division included:

- Water related intervention was carried out through construction of water tanks and drilling of boreholes in Kargi Location.
- The government supplied hay and other livestock supplementary feeds to cattle keepers of Gatab Location.
- Livestock disease surveillance was conducted in South-Horr and Gatab Locations.
- Destocking programs were rolled out in Gatab Location. This included both commercial de-stocking and slaughter off-take.
- Restocking activities were carried out to the poor pastoralists in Loiyangalani Location whereby 200 Turkana and Samburu households were selected and given ten goats each.
- The government also rolled-out livelihood diversification program through the ALRMP. The Turkana households in Loiyangalani location who dropped out of pastoral livelihoods were procured with fishing nets and other fishing equipments.
- The ALRMP constructed two primary schools and one dispensary in Loiyangalani Location.

Key informants and respondents from focus group discussion were asked of their opinions on the usefulness and adequacy of the government support through relief food aid. This question educed mixed responses. Few respondents mentioned that this support is very useful since it prevents starvation, but decried its adequacy in terms of quantity provided. Other respondents stated that the support is not useful and inadequate since it is not provided always, while a number of respondents said it perpetuates a culture of over-dependence. Most respondents concurred that more interventions to support their livelihood are required. These include water resource development, restocking, purchase of their livestock during drought at good prices and provision of security.

4.2 DISCUSSION

4.2.1 Precipitation

The rainfall data collected from 1970 to 2008 shows that the study area received very low annual precipitation averaging 151.4 mm in the long-term. Furthermore, there was a declining trend of precipitation received in the area (Figure 4).

From the analysis of rainfall anomalies, there were more negative anomalies recorded as compared to positives ones. This shows that more periods of insufficient precipitation were experienced in the study area (Figure 5). Moreover, negative rainfall anomalies indicated increased frequency and severity of droughts. This is demonstrated by periods when precipitation was consistently below the long-term annual average. For instance, in a seven year-period between 1990 and 1996, the area was hit by frequent droughts. Similarly, in the period between 1983 and 1986, the study area experienced precipitation below the long-term mean. Severe droughts occurred in 1974, 1985, 1992, 2000 and 2005. These are periods when there were either total rainfall failures (especially in 1974 and 2005) or very negligible precipitation. These accounts of rainfall anomalies are consistent with information on recalled periods of droughts by pastoralists studied. Their accounts of droughts in the past revealed that in the periods from 1970 to 1980; 1980 to 1990; and 1990 to 2000, at least one severe drought hit the study area.

4.2.2 Demographics

From the study, it was noted that almost all households were headed by males who perform key role as overall decision makers. This implies that there is a great disparity in decision making since women hardly make important decisions in the family set-up. Additionally, monogamy dominantly featured in the households. Moreover, there is high illiteracy rate among the pastoral community studied. This was indicated by a lack of formal education on the part of adults and the presence of a large number of non-school going children in the households. Furthermore, with most households averaging between 4 and 6 individuals, the household size implies that the area has a low population density. In addition, the pastoralists studied live in temporary shelters, an indication that they hardly settle in a place permanently, since pastoral lifestyle involves constant movements. Table 2 illustrates the demographic characteristics of households.

4.2.3 Perceptions and Understanding of Drought

The Turkana pastoralists studied largely perceived drought as a natural happening that leads to lack of rainfall for a season or more. This delineation is consistent with findings existing in literature. For instance, drought has been described as a deficiency of precipitation over extended periods of time, most notably a season or more (NRC, 2007). From the study, key informants perceived drought as an 'act of God', as a way of punishing people following disobedience of traditional religious practices, norms and values. This concurs with the findings from Ndlovu (1993) who discovered that moral decadency and the abandonment of some traditional practices were often attributed for failing rains. Moreover, the findings revealed that only traditional sources were relied on for information on weather forecast. Findings on drought perceptions are illustrated in table 7.

4.2.4 Socioeconomic Impacts of Drought

Drought has adversely affected the livelihood of Turkana pastoralists in Loiyangalani Division. The study revealed that major impacts included depletion of water and pasture; loss of livestock; poor human health and livestock morbidity; increased food prices; famine and reduction of livestock prices. These impacts are illustrated in figure 8.

Reliance on seasonal wells, coupled with absence of water and pasture preservation practices exacerbated the effects of drought on forage and pasture. This has consequently resulted in livestock deaths and reduction of livestock ownership, where more than 70% of households lost 1-20 sheep in the last one year. This finding concurs with Huho *et al* (2010) who observed that 2009 drought has resulted in loss of Maasai livestock in Mukogondo Division of Laikipia District from starvation. Therefore, since livestock are the main source of livelihood to pastoralists, their decimation disrupts pastoral socioeconomic existence.

The study also showed that drought lead to poor health of pastoral households. Cases of malnutrition increased during drought episodes owing to food insecurity. This mostly affected children under 5 years, whereby up to 200 suffered from acute malnutrition following the 2011 drought. In the same period, incidences of typhoid, diarrhea and amoebic dysentery were rampant, as a total of 84 households had at least one member affected by one of these ailments.

From the findings, drought in the year 2011 has resulted in drastic reduction of livestock prices (by almost 1000% for shoats and 100% for camels) and rapid increase of prices of grain and other food stuffs by up to 100%. This is more or less consistent with the findings of the research conducted among the pastoralists in Niger whereby following the 2005 drought, the prices of millet and sorghum increased more than 80%, while livestock prices plummeted by more than 100% (Williams, 2002).

4.2.5 Drought Coping and Adaptation Strategies

i. Mobility

The pastoralists in the study area considered mobility as their key strategy to cope with drought. They employed this strategy both in the past and in present times – as alluded to by community key informants. Similarly, Rass (2006) noted that mobility is a prominent livelihood strategy employed by pastoralists in anticipation of seasonal or annual changes of pasture and water availability. It was noted that in the past, Turkana pastoralists in the study area could move to distances as far as Omo Delta in Southern Ethiopia not only to access pasture for their livestock, but also to explore trade opportunities with other pastoral groups. In recent times, however, mobility has been restricted to divisional or county level due to reduced livestock holdings, reduction of grazing range, availability of few grazing reserves and water sources, and insecurity.

ii. Herd Diversification

The study showed that although herd diversification was dominantly employed in the past, it still plays an important role in cushioning pastoralists in the study area against drought. This finding concurs with Rass (2006) who noted that pastoralists have for decades diversified livestock species in their herd taking into account that there are species well suited in arid environments and are more resilient to drought. Pastoralists studied place high preference on goats, donkeys and camels as opposed to cattle since from their experience, these livestock types adapt well in harsh arid environments and can withstand drought episodes. This is partly consistent with findings by Barton *et al* (2001) who found that pastoralists in northern Kenya shifted towards keeping camels as opposed to cattle. Similarly, Hall and Ruane (1993) have shown that livestock diversification is highly practiced in the Sahel and Namibia.

iii. Herd Splitting/Sharing and Merging

The study has shown that herd splitting is a common practice among the Turkana households in the study area. However, this strategy is mainly practiced by the well-off households and the split herds are distributed to their family members and poor kinsmen who provide labour. Sharing of livestock among family, clans and friends is also highly practiced by the pastoralists in the study area. Almost all households revealed to have involved in a social network practice of receiving and giving livestock. Similarly, Morton (2001) have shown that sharing of livestock within kinship networks, where animals are borrowed for subsistence purposes and reproduction is common in many pastoral societies and acts as a form of insurance for poorer households, as well as a way for wealthier households to spread risks and ensure a supply of herding labour (Morton, 2001).

The study also disclosed herd merging as another strategy employed by Turkana pastoralists in Loiyangalani Division. It emerged as a practice whereby poorer households merge their livestock for collective grazing. The main purpose of this strategy is to enhance accumulation and survival of livestock through breeding and reproduction. It also allows the members of the poor households to engage in other productive and income generating activities. In the long run, even though the poor households engage in other livelihood activities, this strategy ensures that they do not drop out of pastoral livelihood.

iv. Livelihood Diversification

From the research findings, pastoralists in the study area have shifted to other livelihood options either as supplementation of pastoralism or as permanent shift away from pastoralism. Similarly, Morton & Meadows (2000) observed that various pastoral groups have for decades explored a wide range of income-earning opportunities, and are taken up on a more intense basis to adapt with drought effects. Fishing, fuel wood and charcoal trading activities were highly preferred as additional sources of income. This corroborates findings by Barton *et al* (2001) who have shown that although opportunities may be limited, some Turkana pastoralists of north-west part of Kenya diversify their income-earning activities and become involved in the collection of firewood, charcoal burning.

4.2.6 Government Responses in Mitigating Impacts of Drought

The study shows that the government through its local institutions addressed some impacts of drought on pastoralists in the study area. The main intervention measure following droughts in 2008/09 and 2011 was through provision of emergency food aid. This has considerably abated starvation from chronic food shortages. Furthermore, acute malnutrition especially among the small children was addressed through introduction of supplementary feeding programme. This entailed provision of highly nutritious foodstuffs. The study revealed that as a result of such a programme, incidences of infant mortalities has reduced in the study area. In addressing drought-related resource conflicts, the government facilitated the establishment of community peace committees and implemented disarmament activities in Loiyangalani Division. The peace committees encouraged a culture of natural resource sharing and peaceful co-existence among different pastoral communities in Loiyangalani and neighbouring Divisions. These interventions by the government in the study area were however largely in response to emergency situations and little has been done to enhance and improve pastoral livelihood and their resilience to drought menace. For instance, the study shows that the government has not addressed issues related to water development, livestock trade and marketing and livestock diseases.

CHAPTER FIVE: CONCLUSION, RECOMMENDATIONS AND POLICY IMPLICATION

- **CONCLUSION**

The delineation of drought by the pastoral community studied is generally consistent with past studies on drought globally. They refer to drought as a natural phenomenon which results in deficiency of rainfall for one or more than one season. It is classified as mild and severe. These classifications are considered on temporal basis i.e. mild droughts occur when there is lack of rains for one season, whereas severe droughts involves two or more seasons without rainfall. Turkana pastoralists have for decades been accustomed to droughts. However, they were less frequent in the past as opposed to present times. Through practice of indigenous knowledge, the Turkana pastoralists have for many years developed a system of drought prediction which had enabled them to respond appropriately particularly in the past. Although they still rely on traditional sources for weather forecast, frequent droughts have adversely affected indigenous knowledge systems including precise predictions of droughts.

Livestock keeping is the main source of livelihood to pastoral community studied. Despite the fact that past drought events impacted on pastoral community studied, drought impacts on their livelihood presently are more adverse. Loss of livestock due to depletion of water and pasture, and drought-related livestock diseases have consequently resulted in decline of livestock ownership, food insecurity and famine. This has made the majority of pastoral households studied to rely on emergency food aid. Increase of resource conflicts and livestock rustling attributed to drought have left families impoverished. Poor livestock quality in drought seasons resulted in drastic decline of livestock prices and low purchasing power of pastoralists. Moreover, lack of livestock markets and poor road infrastructure has hindered livestock trade.

There are notable changes in terms of coping and adaptation strategies employed by the pastoralists studied. There are past strategies which are no longer practiced. For instance, hunting wild animals, food preservation and livestock loaning were practiced in the past due to abundance of wildlife and livestock. There are emerging strategies which were not employed in

the past. They include livelihood diversification, herd merging, food consumption adjustment and sale of livestock.

Government interventions have been largely through emergency response to drought when it reaches crisis level. For instance, emergency food aid and supplementary feeding for children is supplied when food insecurity and malnutrition becomes unbearable. Moreover, mobile clinics only cater for pastoral needs in the aftermath of drought situation. Lack of livestock markets in the Division makes it difficult for pastoralists to sell their livestock at appropriate time and at good prices. Poor physical infrastructure in Loiyangalani Division including poor road networks hampers livestock trade and marketing, further exacerbating the adverse impacts of drought. Intervention measures by government are piecemeal and are done in a selective manner. For instance water related intervention was only implemented in Kargi Location while destocking, livestock disease surveillance and supply of hay was only implemented in Gatab Location. The pastoralists indicated that government interventions should support their livelihood, through development of water resources, establishment of livestock market infrastructure and provision of livestock and human health services.

- **RECOMMENDATIONS AND POLICY IMPLICATIONS**

I. Integration of Indigenous Knowledge Systems into weather monitoring

The indigenous knowledge systems used in crisis anticipation and response to droughts are very important in safeguarding the lives of the pastoral communities. Therefore, they should be incorporated into conventional weather monitoring systems. Indigenous knowledge has actually sustained pastoral communities' lives, and their continued usage shows how much trust has been invested in them. Indigenous knowledge therefore cannot be ignored in any study of the emergence of drought-related crises. Policies should therefore, support research and extension that responds to the needs and interests of pastoralists, and which draws on their extensive indigenous knowledge.

II. Communicating weather predictions

From the findings, it was evident that the pastoral group studied does not have access to weather information. The government should put in place a communication channels, either through the

local administration for the purposes of relaying weather information to pastoralists in areas where they occupy.

III. Traditional institutions

Traditional pastoral institutions are essential in drought mitigations. They play a key role in implementation of traditional coping and adaptation strategies, and in inter-community conflict resolutions. Drought policies that affect pastoralists should recognise the importance of traditional institutions of pastoral communities and integrate their livelihood strategies into policy implementation plans and activities.

IV. Establishment of livestock markets and improvement of road infrastructure

Lack of livestock markets have hindered livestock trade and marketing in Loiyangalani Division. Pastoralists are forced to sell their livestock at very low prices to middle men who then transport to areas as far as Nairobi. Poor road infrastructure in Marsabit County as a whole impedes livestock trade and movement of people and goods. It further exacerbates the impacts of drought on pastoralists in Loiyangalani Division. The government's developmental policies should support the marketing of pastoral livestock and livestock products, with emphasis on enhancing the development of marketing and roads infrastructure. In addition, policies should support the development of credit and financial services for pastoralists, drawing especially on private sector provision of livestock loans and insurance.

V. Development of water resources

Drought has depleted water resources in areas occupied by pastoralists in Loiyangalani Division. Pastoralists rely on seasonal wells for domestic and livestock use. The government should develop permanent water sources that is adequate and in good quality for livestock and human use. Boreholes and water pans should be constructed.

VI. Improvement of livestock health services

The government should provide and improve livestock health services by conducting livestock disease surveillance, vaccination and deworming in routine basis in the whole Division.

Moreover, pastoral community members i.e. community animal health workers should be identified and trained on livestock disease identification and treatment.

VII. Improvement of human health

More health centres should be constructed to cater for prevention of human diseases. Mobile clinics should set up in different pastoral settings and pastoral communities should be trained on proper hygiene and sanitation. Community health workers should be deployed in all pastoral areas in the Division.

VIII. Financial and logistical support

Inadequate financial and logistical support to different government departments in the Division has curtailed implementation of different intervention measures. The government should increase financial support and provide adequate logistical support to various departments relevant for drought management in the Division.

REFERENCES

Aklilu, Y. and Wekesa, M. (2001) Livestock and livelihoods in emergencies: Lessons learnt from the 1999-2001 emergency response in the pastoral sector in Kenya, OAU-IBAR, Nairobi, Kenya.

ALRMP. (2011) Marsabit District drought monitoring bulletin, Government Printers: Nairobi, Kenya

Anyumba, J. (2003) Draft of water resources field report in conservation and Community development program in Lake Turkana. Nairobi, Kenya.

Avery, S. (2010) Hydrological impacts of Ethiopia's Omo Basin on Kenya's Lake Turkana water levels and fisheries, AfDB, Nairobi, Kenya.

Barton, D., Morton, J. & Hendy, C. (2001) Drought contingency planning for pastoral livelihoods, Policy Series15, Chatham, UK: Natural Resources Institute.

Barton, D. & Morton, J. (2001) Livestock Marketing and Drought Mitigation in Northern Kenya. In Morton, J (ed.) Drought, Planning and Pastoralists: Experiences from Northern Kenya and Elsewhere, NRI, Chatham.

Botterill, L. & Fisher, M. (Eds.) (2003) Beyond drought: People, policy and perspectives, Melbourne: CSIRO Publishing.

Bovin, M. & Manger, L. (1990) Adaptive strategies in African arid lands, Uppsala: Scandinavian Institute of African Studies.

Cancelliere, A. & Mauro, G. (2007) Drought forecasting using the standardized precipitation index. *Water Resources management 21(5*).

Carney, D. (1998) Sustainable rural livelihoods, Department for International Development, London.

Chambers, R. (1983) Rural development: Putting the Last first, Harlow: Longman Scientific and Technical, Essex

Chambers, R. (1987) Sustainable rural livelihoods: A strategy for people, environment and development. *IDS Commissioned Study 8*, London.

Chambers, R. & Conway, G.R. (1992) Sustainable rural livelihoods: Practical concepts for the 21st century, IDS Discussion Paper 296, Brighton: Institute for Development Studies, UK.

Coppock, D. L. (1994) The Borena plateau of southern Ethiopia: Synthesis of Pastoral Research, Development and Change, 1980-91. Addis Ababa: International Livestock Center for Africa (ILCA).

Davies, S. (1996) Adaptable livelihoods: Coping with food insecurity in the Malian Sahel. Basingstoke: MacMillan.

Davies, S., Buchanan-Smith, M. and Lambert, R. (1991) Early warning in the Sahel and Horn of Africa: The state of the art. A review of the literature. Volume 1 of 3, Research Report No. 20. IDS, Brighton, U.K.

DFID. (2004) Sustainable livelihoods guidance sheets. London: Department of International Development.

DRSRS. (2007) Nature's benefits in Kenya: An atlas of ecosystems and human well-being. Department of Resource Surveys and Remote Sensing, Ministry of Environment and Natural Resources; Central Bureau of Statistics, Ministry of Planning and National Development and International Livestock Research Institute, Nairobi.

Fratkin, E. (2001) East African pastoralism in transition: Maasai, Boran and Rendille Cases. *African Studies Review*, 44(3):1-25.

Fratkin, E. M., Roth, E.A. & Nathan, M. A. (1999) When nomads settle: The effects of commoditization, nutritional change and formal education among the Ariaal Rendille pastoralists of Kenya. *Current Anthropology* 40(5):729-35.

Hall, S & Ruane, J. (1993) Livestock breeds and their conservation: A global overview. *Conservation Biology* 7: 815-825

Hogg, R. (1983) Destitution and development: The Turkana of north-west Kenya. *Disasters* 6(3):164-168.

Howden, D (2009) The great drought in East Africa: No rainfall for three years. Available at: http://www.infiniteunknown.net/2009/10/03/thegreat-drought-in-east-africa-no-rainfall-for-three-years/gov/fews/africa/index.php (Accessed in August 2011).

Hisdal, H. & Tallaksen, L.M. (2000) Assessment of the regional impacts of Drought in Europe. *Drought Event Definition: Technical Report No 6.*

Huho J.M. & Mugalavai E.M. (2010) The effects of droughts on food security in Kenya. *The International Journal of Climate Change: Impacts Resp*. 2(2):61-72.

Huho, J.M., Ngaira, J.K.W. & Ogindo, H.O. (2011) Living with drought: The case of Maasai pastoralists living in northern Kenya. *Educational International Research Journals. Vol. 2(1) pp. 779-789.*

Huho J.M., Ngaira J.K.W. & Ogindo, H.O. (2010) Drought severity and their effects on rural livelihoods in Laikipia District, Kenya. J. Geo. Reg. Plann. 3(3):035-043.

Illius, A.W., Derry, J.F. & Gordon, I.J. (1998) Evaluation of strategies for tracking climatic variations in semi-arid grazing systems. *Agricultural Systems* 57:381-398.

ISDR. (2005) A Seamless approach to the global problem of drought. A report submitted in World Conference on Disaster Reduction, 18-22 January 2005, Kobe, Hyogo, Japan.

ISDR. (2007) Drought risk reduction frameworks and practices: Contributing to the implementation of Hyogo framework for action, preliminary version.

Leff, J. (2009) Pastoralists at war: Violence and security in the Kenya-Sudan-Uganda border region. *International Journal of Conflict and Violence: Vol. 3 (2) pp. 188 – 203.*

Longley, K. & Wekesa, M. (2008) An analysis of Kenya's drought response: Lessons from the 2005–06 drought response in pastoral areas, HPG Commissioned Report.

Morton, J. (2005) Pastoralist coping strategies and emergency livestock market intervention. In: McPeak, J G and Little, P D (eds.) *Livestock marketing in Eastern Africa: Research and policy challenges*, ITDG Publications, London.

Morton, J. (2001) Pastoralism, drought and planning: Lessons from Northern Kenya and elsewhere, Chatham, UK: Natural Resources Institute.

Morton, J & Barton, D (2002) Destocking as a Drought Mitigation Measure: Clarifying rationales and answering critiques. *Disasters* 26 (3).

Morton, J. & Meadows, N. (2000) Pastoralism and sustainable rural livelihoods, NRI Policy Series 11. Chatham, UK: Natural Resources Institute.

NDMC. (2006) Impacts of droughts. Available: http://www.drought.unl.edu/monitor/interp.htm (Accessed in July 2011).

Ndlovu, S. (1993) Managing natural disasters: the role of non-governmental organizations. Paper presented at the Annual General Meeting: Christian Care, Mutare, 25 November 1993.

Oba, G. (1997) Pastoralists' traditional drought coping strategies in northern Kenya. Report commissioned by Government of the Netherlands, DGIC and Government of Kenya, Department of Relief and Rehabilitation, Office of the President, Nairobi.

Oba, G. & Lusigi, W. (1987) An overview of drought strategies and land Use in African pastoral systems, Pastoral Network Paper 23a, Overseas Development Institute, pp. 1-33.

Odhiambo, O., Holden, S. & Ackello-Ogutu, C. (1998) Oxfam Wajir Pastoral Development Project: Economic Impact Assessment. Nairobi: Oxfam.

Orindi, V. A., Nyong, A. & Herero, M. (2007) Pastoral livelihood adaptation to drought and institutional interventions in Kenya. In Human Development Report 2007/08. UNDP.

Oxfam. (2006) Making the case: a national drought contingency plan for Kenya, Oxfam International Briefing Paper, London.

Pavanello, S. (2009) Pastoralists vulnerability in the Horn of Africa: Exploring political marginalization, donors policies and cross-border issues, London: ODI.

Pratt, D. J., Le Gall, F. & De Haan, C. (1997) Investing in pastoralism: Sustainable natural resource use in arid Africa and the Middle East, World Bank Technical Paper, No. 365 Washington DC: World Bank.

Rass, N (2006) Policies and strategies to address vulnerability of pastoralists in Sub-Saharan Africa, PPLPI Working Paper No. 37. FAO, Rome, Italy

RoK. (2002) Marsabit District Development Plan 2002 – 2008, Ministry of Planning and National Development, Republic of Kenya.

RoK. (2003) Arid Lands Resource Management Project, Environmental Assessment and Management Framework, ALRMP Phase II, Government Printers, Nairobi.

RoK. (2004) Strategy for Revitalization of Agriculture, Government Printers, Nairobi.

RoK. (2005) Arid Lands Resource Management Project II Strategic Plan (2005–2009), Office of the President, Nairobi, Kenya.

RoK. (2008a) Review and analysis of existing drought risk reduction policies and programmes in Kenya Ministry of Special Programmes, Republic of Kenya, Nairobi.

RoK. (2008b) National Livestock Policy, Government Printers, Nairobi.

RoK. (2008c) Analysis of drought management at District level, Government Printers, Nairobi

RoK. (2009) National Disaster Management Policy of Kenya (Final Draft) Government Printers, Nairobi.

RoK. (2010) National Policy for the Sustainable Development of Arid and Semi Arid Lands of Kenya, draft, Government Printers, Nairobi.

RoK. (2011a) Food Security and Nutrition Policy, Government Printers, Nairobi

RoK. (2011b) Cabinet memorandum on the establishment of a National Drought Management Authority, Government Printers: Nairobi.

RoK. (2011c) Kenya Post-Disaster Needs Assessment of 2008-2011 Drought, Government Printers, Nairobi.

Roossi, G. (2003) Requisite for drought watch system: Tools for drought mitigation in Mediterranean Region, Kluwer Academic Publishers Netherlands.

Scoones, I. (1998). Sustainable rural livelihoods: A framework for analysis, Bringhton: IDS working paper: 72, London.

Scoones, I. (1994) Living with uncertainty: New directions in pastoral development in Africa, London: Intermediate Technology Publications.

Sommer, F. (1998) Pastoralism, drought early warning and response. Available: http://www.odi.org.uk/pdn/drought/sommer.pdf (Accessed in July, 2011)

Swift, J. (2001) District-level drought contingency planning in arid districts of Kenya. pp. 40–84. In: Pastoralism, Drought and Planning: Lessons from Northern Kenya and Elsewhere. Chatham, UK: Natural Resources Institute.

Toulmin, C. (1995) Tracking through drought: options for destocking: In Scoones, I. (Ed.) Living with uncertainty. London: IIED.

Toulmin, C. (1983) Herders and farmers or farmer-herders and herder-farmers, ODI Pastoral Development Network Paper 15d, ODI, London.

UNDP. (2011) Situation analysis of drought-related conflicts in Northern Kenya, Nairobi, Kenya.

UNDP. (2012) Drought risk management: practitioner's perspectives from Africa and Asia, UNDP. NY. USA.

VSF. (2011) Rapid assessment in communities of Marsabit County on impacts of 2011 drought, Nairobi, Kenya

Wilhite, D.A (1997) Improving drought management in the West: The Role of Mitigation and Preparedness, National drought Mitigation Center, University of Nebraska, Lincoln.

Wilhite, D. A. (2002) Drought preparedness in the sub-Saharan Africa context. *Journal of Contingency and Crisis Management.*

Wilhite D.A. & Glantz, M.H., (1985) Understanding the drought phenomenon: The role of definition. *Water International*.

Wilhite D.A. (2000) Drought: A global assessment, natural hazards and disasters series, Routledge Publishers, U.K.

Wilhite, D. A. & Svoboda, M. (2000) Drought early warning systems in the context of preparedness and mitigation. Lincoln, Nebraska, National Drought Mitigation Center.

Williams, T. (2002) Livestock market dynamics and local vulnerabilities in the Sahel. *World Development Volume 30: Pages 683-705.*

WMO. (2006) Drought Monitoring and Early Warning: Concepts, Progress and Future Challenges. WMO- No. 1006 ISBN 92-63-11006-9

WCED. (1987) *Our common future,* Oxford: Oxford University Press.

Zwaagstra, L., Sharif, Z., Wambile, A., de Leeuw, J., Said, M.Y., Johnson, N., Njuki, J., Ericksen, P. and Herrero, M. (2010) An assessment of the response to the 2008/2009 drought in Kenya. A report to the European Union delegation to the Republic of Kenya. ILRI, Nairobi, Kenya.

Annex 1: Questionnaire for the Household Survey

Introduction

My name is Paul Lekapana, a graduate student with the Centre for Advanced Studies in Environmental Law and Policy (CASELAP) of the University of Nairobi in Kenya. As part of the study programme, students are expected to engage in a field research and produce a thesis covering their areas of interest. I am, therefore, conducting a study on socioeconomic impacts of drought, coping and adaptation strategies, and government intervention measures in pastoral communities of Loiyangalani Division of Marsabit 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 for your participation in this exercise.

Questionnaire Number			
Cluster Number			
Household			
Village			
SECTION 1	HOUSEHOLD CHARACTERISTICS		
Q 1.1	Sex of Respondent	Male	
		Female	
Q 1.2	Age in years	Respondent	
		Household head	
Q 1.3	Marital Status	Single	
		Married- monogamous	
		Married- polygamous	
		Divorced/Separated	
		Widowed	
Q 1.4	Are you the head of household (nuclear family)?	Yes	
		No	
Q 1.5	If not the head, what is your relation with the head of the household?	Spouse	
		Son	
		Daughter	

		Other		
Q 1.6	Level of education of household head	None		
		Primary		
		Secondary		
		Post-secondary		
Q 1.7	Household size		Male	Female
		0 – 5 Years		
		6 – 18 Years		
		19 – 55 Years		
		Over 55 Years		
Q 1.8	Number of children in school		Boys	Girls
		Primary		
		Secondary		
		Post-secondary		
Q 1.9	Number of economically active members living in household		Male	Female
		Self-employed		
		Wage employment		
		Other (specify)		
Q 1.10	Number of economically inactive members living in the household		Male	Female
		Too young		
		Too old		
		Sick		
		Disabled		
		Other (specify)		
Q 1.11	Number of members living outside the area (migrated, working etc)		Male	Female
		Within the Division		
		Within the County		

		Elsewhere in Kenya		
		Outside Kenya		
Q 1.12	Type of house	Semi-permanent		
		Temporary		
Q 1.13	Household assets (more than one answer allowed)	Radio		
		Television		
		Mobile phone		
		Water tank		
		Others (specify)		

SECTION 2	SOCIOECONOMIC CHARACTERISTICS		
Q 2.1	What is the key source of livelihood for the household? (only one answer allowed)	Pastoralism	
		Small business	
		Wage employment	
Q 2.2	What are the major constraints to your family well-being?	Drought	
		Floods	
		Human diseases	
		Livestock diseases	
		Conflicts	
		Poverty	
		Other (specify)	
Q 2.3	What types of livestock do you keep? On average (over the past 5 years),		Number
		Cattle – bulls	
		Cattle – cows	

	what is the size of your stock?	Sheep	
		Goats	
		Camels	
		Donkeys	
		Poultry	
Q 2.4	What problems do you usually encounter with regard to livestock keeping? Tick where appropriate	Livestock diseases	
		Shortage of water and pasture	
		Lack of market	
		Livestock rustling	
		Conflicts	
		Any other (specify)	
Q 2.5	What measures have you put in place to address the above mentioned problems? Tick where appropriate	Migration in search of water and pasture	
		Restocking through traditional systems	
		Use of traditional herbal treatment	
		Accessing livestock veterinary services	
		Sale of livestock during drought	
Q 2.6	What is the main source of water for the livestock? Tick where appropriate	River/spring/stream	
		Water pans or dams	
		Rock catchment	
		Piped water	
		Wells/Boreholes	
Q 2.7	Is the water source constant or seasonal?	Constant	
		Seasonal	
Q 2.8	Who manages	No management	

	the water source? Tick where appropriate	Individually owned		
		community		
		Other (specify)		
Q 2.9	How do you contribute to the maintenance of the water source? Tick where appropriate	Does not contribute anything		
		Contributes set fee		
		Contributes in case of a break down		
		Contributes manual labour when required		
		Contributes local materials when required		
Q 2.10	How many animals have you sold in the last year?		Number	
		Cattle - Bulls		
		Cattle - Cows		
		Sheep		
		Goats		
		Camel		
		Donkeys		
		Poultry		
Q 2.11	Why did you sell the animals?	Income generation		
		Sale during drought		
		Restocking		
Q 2.12	How many animals did you receive/give as gifts last year?		Receive	Give
		Cattle – bulls		
		Cattle – cows		
		Sheep		
		Goats		

		Camels			
		Donkeys			
		Poultry			
Q 2.13	How many animals did you lose due to disease last year? How about the last five and ten years?		1 year	5 years	10 years
		Cattle – bulls			
		Cattle – cows			
		Sheep			
		Goats			
		Camels			
		Donkeys			
		Poultry			
Q 2.14	How many animals did you lose due to drought last year? How about the last five and ten years?		1 year	5 years	10 years
		Cattle – bulls			
		Cattle – cows			
		Sheep			
		Goats			
		Camels			
		Donkeys			
		Poultry			

SECTION 3	PERCEPTION OF DROUGHT		
Q 3.1	What is your understanding of drought?		
Q 3.2	What causes droughts? Tick where appropriate	Amount of rainfall	
		Seasonality of rainfall	
		Duration of rainfall	
		Deforestation	

Q 3.3	What are the effects of drought? Tick where appropriate	Drying of water sources	
		Depletion of pasture	
		Famine	
		Loss of livestock	
		Poor health of humans	
		Poor health of animals	
		Increase in food prices	
		Decline in livestock prices	
		other	
Q 3.4	How does drought impact on your livelihood?		
Q 3.5	How do you get the information on weather forecasts?	Radio/TV	
		Government agents	
		Word of mouth	
		Traditional sources	
		Other (specify)	
Q 3.6	How do you establish your own weather forecast?		
Q 3.7	How do you respond to weather forecasts?		

SECTION 4	COPING AND/OR ADAPTATION MECHANISM, AND GOVERNMENT INTERVENTION		
Q 4.1	What measures do you put in place to safeguard yourself against a coming drought?	Mobility	
		livestock diversification	
		livestock management adjustments (changes in feed, water, grazing land use)	
		access to extension services for knowledge of livestock farming during droughts	
		income diversification	
		livestock insurance	
		use of savings	
		Other (specify)	
Q 4.2	Considering the source of livelihood in 2.1, do you seek additional sources of income when anticipating drought?	Yes	
		No	
	If yes, which are these additional sources of income?	Sale of assets	
		Seeking employment	
		Starting a business	
Q 4.3	Do you reserve water for use during the drought?	Yes	
		No	
Q 4.4	Do you reserve pasture for use during the drought?	Yes	
		No	
Q 4.5	What is the main source of water and pasture of the household during the drought season? (more than one answer	Permanent water source nearby grazing reserve nearby	
		Other grazing and water points within the County	
		Other grazing and water points outside the	

	allowed)	County		
		Other (specify)		
Q 4.6	In case of drought, which animals would you rather have?		Yes	No
		Cattle – bulls		
		Cattle – cows		
		Sheep		
		Goats		
		Camels		
		Donkeys		
		Poultry		
Q 4.7	During drought, what adjustments do you make in terms of food consumption? How do you cope with food shortages?	Depleting food and cash savings		
		Earning more wage income		
		Liquidating productive assets e.g. livestock		
		Liquidating other assets		
		Household food consumption adjustments		
		Relying on charity		
		Use of social network		
		Permanent or seasonal migration		
		Village-level institutions		
		Household expenditure adjustments (clothes, education and health)		
		Shift to other livelihood options e.g. fishing etc.		
		Use of social networks		
		Relying on public relief programmmes		
Q 4.8	What are the practices for using	Having drought reserve grazing		

	and conserving natural resources such as pasture, forests, water etc?	Protection of specific plant species or areas	
		Having individual or communal user rights for water/grazing points	
		Other (specify)	
Q 4.9	If the drought was severe, would you move your family out of the pastoral livelihood?	Yes	
		No	
Q 4.10	What livelihood options do you have, apart from pastoralism?	None	
		Wage employment	
		Self-employment	
		Other (specify)	
Q 4.11	Did you sell any livestock during drought period?	Yes	
		No	
	If yes, what was the main reason for selling livestock?	Buying food	
		Buying clothing	
		Paying for healthcare	
		To fund cultural ceremonies e.g. marriages	
		Other (specify)	
Q 4.12	Did you borrow any money in the last one year? If so, from which source?	Family	
		Friends	
		Other (specify)	
Q 4.13	What was the major reason for borrowing money?	Buying food	
		Buying clothing	
		Paying for healthcare	
		To fund cultural ceremonies e.g. marriages	
		Other (specify)	

Q 4.14	What type of support do you get from the government in the event of drought?	Information	
		Emergency aid	
		Development aid	
		Financial assistance	
		Development of water sources	
		Restocking	
		Other (specify)	
Q 4.15	In your opinion, do you think government intervention, if any, has been helpful?		

Thank you very much for your cooperation.

Annex 2: Interview Guide for Interviews with Community Key Informants

Introduction

My name is Paul Lekapana, a graduate student with the Centre of Advanced Studies in Environmental Law and Policy of University of Nairobi in Kenya. As part of the study programme, students are expected to engage in a field research and produce a thesis covering their areas of interest. I am, therefore, conducting a study on socioeconomic impacts of drought, coping and adaptation strategies, and government intervention measures in pastoral communities of Loiyangalani Division of Marsabit 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 for 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 50 years.
4. In the last ten years, how often has drought occurred in this area?
5. What are the impacts of drought on:
    I. People's livestock?
    II. People's health?
    III. Food security?
    IV. Livestock trade?
    V. Purchasing power of people?
    VI. Social integration at family, clan and community levels?
    VII. Indigenous knowledge system?
    VIII. Formal education?

6. Does drought result in conflicts between your community and neighbouring communities? What are the reasons?
7. How did the community of this area cope with drought in the past?
8. How did the community of this area cope with recent droughts?
9. What other livelihood options do people have in the event of severe drought?
10. How do you get information about an impending drought?
11. How do you prepare after getting such information?
12. What has the government done to help reduce the impacts of drought?
13. Is the government response helpful?

Annex 3: Interview Guide for Interviews with Government Departments

Interview Guide for Interviews with Provincial Administration (Area Chief)

1. What are the impacts of recent drought events on the livelihoods of the pastoral communities in this Division?
2. What has the government done to address these impacts?
3. Has there been an escalation of armed conflict among the pastoralists attributed to recent drought? If that is the case, why?
4. What action has the government through the provincial administration taken to address armed conflict?
5. In addressing socioeconomic issues attributed to drought, what challenges have the local provincial administration faced?

Interview Guide for Interviews with Government Health Practitioners

1. What are the drought-related health challenges that affected the pastoralists group in the Division in the last one year?
2. Which are the most vulnerable groups in terms of gender and age that were affected by these health challenges?
3. Why are they so much vulnerable?
4. How did you intervene in such circumstances?
5. Do you have any suggestion or additional remarks?

Interview Guide for Interviews with Primary School Heads

1. What has been the enrolment rate of the Division's pastoral communities' children in this school generally in the last five years?
2. How has the recent drought affected the enrolment rate of children from pastoral group in the Division?
3. Are there incidences where drought is attributed to dropping-out of children from school? If there are incidences why is that so?
4. What measures is the school putting in place to keep children in school and avoid escalation of drop-out rates attributable to drought?

Interview Guide for Interview with District Livestock Development and Marketing Officer

1. What are the impacts of recent drought on livestock development and marketing in Loiyangalani Division?
2. What has the government done to improve socioeconomic situation of pastoralists of Loiyangalani Division through livestock development and marketing?
3. Has the government developed a marketing infrastructure in Loiyangalani Division? If yes, how effective is that infrastructure? And if no, why has it not been developed?

Annex 4: Rainfall Data

Yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1970	74.4	0.0	10.1	54.5	41.6	0.0	0.9	0.4	0.0	0.0	0.8	0.0	182.7
1971	0.0	0.0	0.0	97.3	65.5	2.0	0.0	22.9	0.0	0.0	11.0	33.2	231.9
1972	0.0	5.6	2.5	33.7	0.0	32.8	0.0	0.0	2.5	46.5	120.6	1.0	245.2
1973	2.8	0.0	0.8	35.2	67.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	106.4
1974	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
1975	0.2	0.0	17.4	75.3	38.6	40.7	108.2	1.7	0.2	4.3	0.0	0.0	286.6
1976	7.3	2.7	4.6	17.4	14.6	26.3	76.3	0.0	1.6	0.0	1.9	4.0	156.7
1977	43.3	11.7	0.8	161.5	17.2	0.0	8.2	0.5	0.3	67.9	149.7	11.2	472.3
1978	1.5	30.6	39.5	45.5	1.9	0.0	12.5	0.0	7.2	4.4	3.3	1.4	147.8
1979	11.2	8.3	32.5	61.3	76.5	5.6	0.0	4.4	1.4	0.0	34.5	4.1	239.8
1980	0.0	0.0	0.0	24.0	99.8	0.0	0.0	0.0	0.0	16.0	19.1	0.0	158.9
1981	0.0	0.0	120.4	9.9	10.4	0.0	0.0	1.0	0.0	3.5	1.0	0.0	146.2
1982	0.0	11.0	17.0	13.1	16.1	0.0	0.0	0.0	0.0	3.9	131.0	0.0	192.1
1983	1.4	33.9	0.0	61.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	96.8
1984	0.0	0.0	1.2	5.0	0.0	0.0	0.0	0.0	24.0	1.5	0.0	0.0	31.7
1985	0.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9
1986	0.0	0.0	4.2	74.5	0.5	38.5	0.0	0.0	0.0	0.0	0.0	0.0	117.7
1987	0.0	0.0	0.0	135.4	0.0	112.2	0.0	0.0	0.0	0.0	30.2	0.0	277.8
1988	15.9	0.0	2.2	36.1	11.2	0.7	34.8	0.0	18.8	0.0	0.0	0.9	120.6
1989	0.0	23.6	0.0	75.6	64.2	0.0	4.0	0.0	5.7	0.0	2.1	26.0	201.2
1990	3.5	35.9	28.5	8.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	77.4
1991	12.4	17.3	15.9	7.5	15.0	0.0	0.0	0.0	0.0	6.8	23.4	20.4	118.7
1992	0	1.7	0.5	1.4	2.2	0.5	0	0	0	0	0.8	0	7.1
1993	29.0	33.6	0.3	0.0	23.3	0.0	0.0	0.0	0.0	0.0	21.9	0.0	108.1
1994	0.0	2.1	29.8	51.2	20.6	0.0	1.5	14.0	0.0	0.0	25.2	3.8	148.2
1995	0.0	13.0	16.2	16.5	25.4	0.0	0.0	0.0	0.0	1.2	1.0	0.0	73.3
1996	0.0	7.0	0.0	4.1	1.4	0.0	0.0	0.0	0.0	4.0	22.9	1.7	41.1
1997	0.0	0.0	22.0	69.4	0.6	0.0	22.7	0.0	0.0	9.1	109.5	7.4	240.7
1998	13.1	5.3	2.3	13.4	20.8	41.6	1.2	26.6	0.0	0.0	0.6	0.0	124.9
1999	0.0	0.0	25.1	0.0	0.0	0.0	15.0	0.0	0.0	0.0	10.1	0.0	50.2
2000	0.0	0.0	0.0	6.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	6.8
2001	17.1	0.0	52.6	159.3	0.0	0.0	14.8	0.0	5.6	3.0	0.0	0.0	252.4
2002	10.0	0.0	87.8	56.6	130.6	1.6	0.0	0.0	0.0	19.4	5.4	20.2	331.6
2003	0.0	0.0	79.5	61.8	38.6	0.0	0.0	13.4	0.0	0.0	0.0	4.8	198.1
2004	58.9	0.0	4.0	66.2	13.2	0.0	0.0	0.0	26.2	1.2	39.8	4.4	213.9
2005	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
2006	0.0	0.0	53.1	72.3	0.0	0.0	0.0	20.9	0.0	0.0	0.0	0.0	146.3
2007	6	22	15.6	104.6	2.5	7.0	39.0	20	0.0	0.0	0.0	0.0	216.7
2008	1.0	0.0	39.0	9.8	0.8	0.0	0.0	0.0	5.1	42.2	31.2	0.0	129.1