Addis Ababa University

Livelihood Diversification as Coping Strategy for Climate Change Affected Pastoralist Communities in Liban Zone of Ethiopian Somali Regional State (ESRS): The Case of Filtu and Dollo-ado Districts.

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Livelihood Diversification as Coping Strategy for Climate Change Affected Pastoralist Communities in Liban Zone of Ethiopian Somali Regional State (ESRS): The Case of Filtu and Dollo-ado Districts.

A Thesis Submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment of the Requirement for the Degree of Master of Arts in Regional and Local Development Studies.

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This is to certify that the thesis prepared by Ali Abdulahi entitled: *"livelihood Diversification as coping strategy for Climate Change Affected Pastoralist Communities in Liban zone of Ethiopian Somali Regional state (ESRS): The case of Filtu and Dollo-ado districts" and submitted in partial fulfillment of the requirements for the Degree of Master of Arts in (Regional and Local Development Studies) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.*

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Acronyms

BoFED	Beauro of Finance and Economic Development
CRGE	Climate Resilient Green Economy
DPPO	Disaster Prevention and Preparedness office
DFID	Department for International Development
DFAP	Developmental Food Aid Program
FGD	Focus Group Discussion
FMD	Foot and Mouth Disease
GTP	Growth Transformation Plan
HC	Health Center
HS	Household Survey
IPCC	Intergovernmental Panel on Climate change
KII	Key Informant Interview
ITCZ	Inter- Tropical Convergence Zone
LS	Livelihood strategy
LO	Livelihood Outcome
MDGs	Millennium Development Goals
NMA	National Meteorological Agency
NGOs	Non Governmental Organizations
PFE	Pastoralist Forum Ethiopia
PC	Pastoralist Concern
SV-UK	Save UK
SL	Sustainable Livelihood
SLF	Sustainable Livelihood Framework
SNNPR	Southern Nations and Nationalists People's Region
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Program
WB	World Bank
WFP	World Food Program
WISP	World Initiative for Sustainable Pastoralism

Abstract

Climate change is one of the vital issues which pose unprecedented challenges mankind is facing nowadays. The impact of climate change is seen throughout Ethiopia but the degree varies from region to region. The pastoralist areas are the most vulnerable place that the impact of change-attributed problems is felt greatly. The objective of this research is to assess the effect of climate change on the pastoralist livelihood system and examine livelihood diversification as a coping strategy for pastoralist communities in Liban zone of Ethiopian Somali regional state.

The data of the research was collected from the field by using both qualitative and quantitative techniques. The qualitative techniques employed are PRA tools such as key informant interviews, focus group discussions and field observations while the quantitative tool used was household survey from 85 pastoral households from four sub-districts selected by employing appropriate sampling procedure proportionately. Besides, relevant secondary data from books, journals, scholar papers, and government and non government publications have been used to supplement the primary data. Then, the data was managed by using descriptive statistics. Frequencies, mean and cross tabulation were the methods that has been employed for the data analysis and presented in a form of graphs, tables and charts.

The findings of the research indicate that frequent droughts, low rainfall, increasing temperature, floods, livestock disease as the main climate change-related problems experienced by the pastoralist households. The study identified that there was livestock holding reduction due to the recurrent droughts, livestock diseases and high off-take in the area. It also shows that the most vulnerable segments of the community are children, women, elders and disabled people. Further, the results show that pastoralist communities use wide range of local strategies to cope with climate change. Rain-fed crop cultivation is practiced as a complementary strategy though it is not viable due to the low rainfall in the area. The results also indicate that livelihood diversification of both natural and non-natural livelihood activities are practiced in which the non-natural is promising in enhancing the adaptive capacities of the pastoralist communities. Finally, the study found out that the institutional responses are oriented towards emergency assistance through asset protection schemes. The study recommends that future intervention needs to consider the new emerging trends as new pathways and treat pastoral development as integral part of urban development rather than pure rural development in order to increase the adaptive capacity of the pastoral community through long-term livelihood diversification programs in the area.

Keywords: *Climate Change, Livelihood Diversification, Adaptive Capacity*

Chapter One

Introduction

1.1 Background

Ethiopia is a country which has more than 12-15 million pastoralists who live in approximately 62% of the country's landmass predominantly in the lowlands of the country though it seems that this figure is minority when it is compared to the rapidly growing population of the country which is close to more than 90 million (World Bank 2013, PFE 2006, Getahun 2008, Kassahun eta l 2008). Historically, Ethiopian pastoralist communities are considered to be at the margins of national economic, social, environmental and political life of the country. This is mainly due to a long political, economic and social marginalization that had exacerbated the complex nature and harsh conditions of the pastoralist societies in the country.

Halderman (2004) documented that pastoralist communities in Ethiopia have low access to health and education services where the places they live are regarded or listed to be as one of the least developed infrastructural areas of the country and this has caused to exclude them in the mainstream development of the nation. He also asserts that pastoralist community's livelihood system is extremely pressured by drought and animal disease throughout the history of the country.

In recent times, the country has recorded a remarkable economic growth for the past several years thus becoming one of the fastest growing non-oil economies in the world and Africa though historically the country has witnessed extreme and harsh environmental conditions such as drought which is directly or indirectly attributed to climate change and weakens the pastoralist livelihood system in the country (World Bank 2013).

Furthermore, there are also recent positive development policy on pastoralism and its contribution to the country's economic development. For instance, the Growth and Transformation Plan (GTP) recognizes the role of the livestock to the GDP and its potential future contribution by putting ambitious targets to increase export earnings from the sector mainly from live animals and meat exports from 125 million USD in 2009/2010 to 1 billion USD in 2014/15 (GTP 2011).

The increased livestock export is expected to serve as one of the entry points for improving the livelihood of pastoralists and enhance their economic diversification and resilience to climate change in the long run (Ibid).

Similarly, regional development plans of Ethiopian regional states particularly those regions that have large pastoral populations such as Afar, Oromiya, SNNPR and Somali have reflected their plans into two broad strategies which are "enhancing pastoral livelihoods" and building their "reliance through natural resource management" as aligned with GTP (Regional Development Plan Afar, Somali, Oromiya and SNNPR 2010 cited in Daniel 2014).

It seems that these are one of tailored and inter-related development policies which have been introduced in pastoral areas in the country that is designed to improve the livelihoods of the climate change affected pastoralist communities and address the inadequacies of basic social services, institutional capacity shortfalls to tackle vulnerabilities in these areas.

Nevertheless, the aforementioned measures taken by the government and other stakeholders, Ethiopian pastoralist communities and their livelihood system are increasingly becoming susceptible and vulnerable to climate change (droughts), land degradation, conflict over scarce resources, population pressure, limited access to information, education to acquire skills, access to financial services, markets to diversify their livelihoods (Riche et al 2009).

According to Devereux (2006), Ethiopian Somali Regional State in general and Liban zone in particular is characterized as extreme weather of harsh environment with frequent droughts that severely affect the livelihood of the pastoralist communities that depend mostly on rain falls for their livelihoods. Likewise, he narrated that long and regular failure of rains in the area results in recurrent droughts with increased temperature that is directly attributed to climate change and poses direct threat of reduced water and pasture which is a vital and critical livestock production factors for the pastoralist communities in the area.

Besides, as studies conducted by other scholars in the field indicate that the shocks and trends that affect the pastoral communities in the country touch on men and women differently where women are more vulnerable during drought times. They reported that women has heavily felt the burden of climate change pointing out that women engage in additional activities such as long distance of travel for fetching water, collecting woods to be used as fuel for their families and

fodder for the livestock and presenting that "the impacts of climate change is not equally distributed among the different segments of the community" and in the same time concluded that "climate change has also a gendered dimension and women tend to be highly vulnerable to climate change related disasters and food insecurities"(Nelson et al. 2002; UNDP-GEF 2010 cited in Aklilu et al 2013).

Hence, this paper is going to describe and dwell on the assumption that livelihood diversification can be one of coping strategies for the climate change that affecting pastoralist communities in Liban zone of Ethiopian Somali Regional State and to address the challenges that emanate from commonly occurring shocks encountered by pastoralists.

1.2 Statement of the problem

The world's poor people are subjected to loss of livelihood and assets disproportionately due to several factors that are natural and manmade such as famine, hunger, and harsh climate (i.e. climate change) which has been constantly changing. Pastoralist communities in Ethiopia are no exception to this trend but are going to be more affected as they lost their resilience due to a prolonged marginalization in terms of social, economic, environmental and political ways (Hogg 1997).

Pastoralist communities in Ethiopia are residing dominantly in four major regions namely Afar, Somali, Oramia and Southern Nations, Nationalities and Peoples Region though some other regions like Gambela and Binishangul have also significant pastoralist population (CORE group 2008). It is necessary to reaffirm that climate change is a phenomena that cannot be escaped in this era of interconnectedness. It is also obvious that climate change is occurring in unprecedented way in most of the developing countries including Ethiopia. It is also clear that climate change is bringing very serious effect with its multifaceted challenges on human society, the environment and the livelihoods of the pastoralist communities (IPCC 2007, Macchi 2008).

The arid and semi-arid areas of the lowland regions of the country are believed to be among the most vulnerable regions for climate change where frequent droughts, floods, and diseases are witnessed to be widespread disasters related to climate change making the pastoralist communities in these areas the pronounced victims of climate change in Ethiopia. It is also common that these areas have low rainfall even during the raining season and abnormally

becoming low every few years resulting in severe and prolonged droughts in the area. The climate predictions of Ethiopia show that there is a substantial increase in the mean temperatures and raise rainfall variability which results in recurrent droughts and floods in the country (National Meteorological Service Agency 2007).

There is also strong evidence that Ethiopia is experiencing more frequent droughts in the past two decades compared to earlier decades. The frequent drought will definitely put a threat to scarce resource of pastoral production factors such as water and pasture. Studies conducted by many scholars indicated that there were at least 15 droughts that happened since 1978 though there were also other more localized ones since then (Sanford and Habtu 2000; Lautze et al 2003;Brown and Teshome 2007).

Aklilu and Alebachew (2009) also complement that frequency and magnitude of droughts in the lowland regions of the country and thus came to conclude that the cycle of the drought has accelerated in recent times by causing poverty traps for many pastoralist households as well as preventing them to build up assets that would generate economic income to shield them from the shocks of the droughts in these areas. In the same token, studies conducted in Ethiopian Somali regional state documented that the trend of animal mortality rate resulted from drought is estimated about 80% of the livestock for the past three decades (SERDP 1990; SoRPARI 2005). In addition, different research done in the Somali regional state revealed that recurrent of droughts in the region expose children to malnutrition and increased number of school dropouts(UNICEF report of 2009, SC UK 2008; CARE international 2010).

Moreover, there is strong argument that there is a link between climate change and conflict as well as security problems. For instance, Regassa et al (2010) argued that the decrease in access to water and grazing to pasture during drought seasons led conflict among many clans by competing to take over the two vital and critical scarce resources of pastoralist communities-water and pasture. Besides, there is also a widespread perception that climate change has direct or indirect impact on the spread of diseases and pests.

As many researchers (Bouma et al 1997; Haines et al 2006, McMichael 2006) reported, there is also causal linkage between climate change and outbreak of human diseases such as cholera, meningitis, malaria and Rift Valley Fever.

All the aforementioned elements of climate change pose a serious threat throughout the country in general and that of pastoralist areas in particular. Thus, the aim of this paper is not only to describe that droughts (i.e. climate change) have become a norm that is accepted to be appealed to the outside world but to seek for other coping strategies for the climate change affected pastoralist communities and livelihood diversification can be an option that lays ahead of us which will be assessed throughout this research paper.

Besides, there are several studies that have been conducted in the area of thematic area of the study in Africa in general but it is worth to point out the ones that have been particularly conducted in the country. For instance, the Annily 2009 study had addressed directly about livelihood diversification in Afar region focusing on livelihood diversification and the missing link between climate change and the livelihood diversification. In other words, the study that was conducted by Getachew 2010 in ESRS in Jigjiga district had emphasized on climate variability completely departing from livelihood diversification giving a heavy weight on agro-pastoralism while the majority of the population in the region are pastoralist communities. In addition, the study of Abarufa 2011 in Borena zone of Oromia region that has similar geographical pattern has only addressed about the impact of climate change and the traditional mechanism while undermining the potential livelihood diversification in the area. Hence, this study is going to fill the gap of the aforementioned studies and will address the effects climate change and the extent of the vulnerability of these pastoral communities. The study combines both climate change and livelihood diversification as a strategy that can be response to the problems of climate change without undermining the role of the traditional mechanism as adaptive and coping strategy in the Liban zone.

1.3 Objectives of the Study

General Objectives

The general objective of this research is to assess the effect of climate change on the pastoralist livelihood system in Liban zone pastoralist communities and explore existing economic opportunities and livelihood diversification used as coping strategy.

Specific Objectives

1. To investigate the patterns and the intensity of the climate change in the Liban zone.
2. To assess the effects of climate change on pastoral community's livelihoods by focusing on their assets holding.
3. To examine livelihood diversification as local strategies to cope with climate change effects at both community and household level.
4. To describe the institutional response about effects of climate change to the pastoralist livelihood system in Liban zone.

1.4 Research Questions

In order to assess livelihood diversification as coping strategy for pastoralist communities that are affected by climate change attributed hazards such as drought, this research paper will be guided by the following questions and will try to seek their answers:

1. What are the major climate change-related problems that pastoralist communities face and to what extent does it affect to their livelihoods?
2. What local coping strategies do pastoral communities employ to mitigate with the impact of climate change?

1.5 The significance of the study

This research paper is going to identify the possible livelihood diversification which can be seen as a coping strategy available to pastoralist communities that are affected by climate change related shocks who are living in Ethiopia in general and Somali Regional state in particular. It is believed that the research document will have economic and development importance since the region's dominant economic system is based on pastoralism and is the largest contributor to the economy of the region. Moreover, improving the livelihood diversification as a copping strategy for the pastoralist communities will positively add value to the development of the region and similarly it will predict the future of the pastoral development. Thus, beside the aforementioned importance, it is hoped that it will help understand policy makers and researcher who have an interest in the subject matter of this study.

1.6 The Scope and limitation of the Study

This study is limited to the livelihood diversification as a coping strategy of the climate change affected pastoralist communities as the title of the research indicates. The study is also confined and limited in terms of space or scope since the Liban zone is a vast place and with many districts but it was essential to be selective to the manageable sites. The other major limitations the research paper is time, financial resource and geographical distance of the area in which the research is conducted. All the above mentioned limitations are also seen as constraints of the research paper. Filtu district and Dollo-ado districts are assumed to be appropriate ones where droughts are frequent.

1.7 Ethical Considerations

All the essential ethical considerations have been respected and the rights of the participants will be protected. Furthermore, the willingness and the consent of the participants have been given great consideration and the research has designed to avoid any harm to the concerned stakeholders and the participants.

1.8 Organization of the paper

The paper is organized into six chapters. The first chapter deals with the introduction, objectives, statement of the problem, significance of the study, methods of the study, the scope and limitation of the paper and organization of the paper. The second chapter presents the literature review, the conceptualization of key terms and concepts and the empirical literature of climate change and livelihood diversification as a adaptive capacity to the effect of climate change as well as the analytical framework existing livelihood diversification in Ethiopian context and development policies and strategies and it's alignment with the issue under discussion. The third chapter of the paper is the methodology and methods that has been used during the process of the data collection. The fourth chapter is the background information about the study area. The fifth chapter is the results, discussions and the findings in which major issues of livelihood diversification in the context of the pastoralist communities that affected by the climate change and environment, and its structure as well as the status of the pastoral socio-economic development in the study will be analyzed. The last but not the least, the last chapter of the research is the conclusion and the recommendation which is drawn from the overall assessment of the study.

Chapter two

Literature Review

2.1 Conceptualization of Key terms and concepts

2.1.1 Climate change

Climate change is described as an adjustment of climate caused by alternation directly or indirectly related to human activity that alters the composition of global atmosphere and by natural variability observed over comparable time (UNFCCC 2007). The other concept which is closely related to climate change is vulnerability in this regard the (IPCC 2000a) defines the term as "the extent to which a natural or social system is susceptible to sustaining or tangible damage from climate change". It further adds that vulnerability does not depend on only to the sensitivity of a system but its ability to adapt to new climatic events that it frequently encounters. The concept of vulnerability has also been defined as "a human condition or process resulting from physical, social, economic, environmental factors that determine the livelihood and scale of damage from an impact of a given hazard" (UNDP 2004).Similarly,(IPCC 2001) describes that the concept of vulnerability is closely related into three key inter-related elements which are exposure, sensitivity and adaptive capacity.

2.1.2 Coping and Adaptation Strategies

The term coping strategy is referred as taking a range of actions in response of anticipated challenges such as draughts, flash floods and diseases. In most case, coping as a strategy deals an emergency problem which needs an immediate response. It shows that it attempts to overcome problems in the short term. Generally it can be observed from the literature of livelihood and climate change that the two terms of adaptation and coping are interchangeably used. Coping is regarded as an abrupt response to reduce the impact of climate change while adaption refers as to any adjustment in natural or human system in response to expected impacts of extreme events so as to moderate harm as well as exploit beneficial opportunities (Klein and Tol 1997).

There is a wide spread perception that adaptation can greatly reduce vulnerability of climate change by enabling communities to adjust to climate change challenges as well as coping the potential damage of the climate variability. In this respect, Intergovernmental Panel of Climate

Change IPCC 2001) refers adaptation as practices intended to adjust to the environmental change and its anticipated effect in the climate change by enhancing resilience so as to reduce the vulnerability to the observed changes in the climate. Furthermore, Elizabeth (2008) argued that adaptive capacity to climate change is the ability to adjust actual or expected climate shocks or to cope with the adverse consequences of the climate change. It includes adjustments in both in behavior, resources and technology so as to reduce climate change effects and enhance the capacity of system to cope with its adverse impacts.

Paavola *et al.*, (2005) also argue that adaptation activities are more local as they reflect issues of a particular district, region or nation rather than international. He further asserts that this is due to different communities are characterized by diverse degrees of exposure to vulnerability and varying adaptive capacities. Moreover, adaptive capacity to climate change varies within communities owing to various factors including economic status among social groups, age, and gender (Majule *et al.*, 2008). Different social groups develop different adaptation options due to the contextual impacts of climate change.

The IPCC 2007 documents states that the determinants of adaptive capacity as availability of resources as well as its distribution, available technologies, structure and functional institutions, human capital specially education and health, social capital mainly property rights, ability of decision makers to manage information and the perception of the public towards the source of the problem. Similarly Muthukumara 2008 forwards that adaptation measures can be classified in two broad categories namely proactive and reactive or ex-post and the typical examples of proactive measures that he explains include livelihood diversification, seasonal climate forecasting, famine early warning systems, water storages and community based disaster risk management while the reactive measures are considered as emergency response and disaster recovery.

2.1.3 Pastoralism

The term Pastoralism is considered to be a finely-honed symbolic relationship between local ecology, domesticated livestock and people in resource-scarce, climatically marginal and highly variable conditions (WISP 2010). In other words, (Elliot 1998) defines pastoralists as "people who rely on domestic animals" extending the values of livestock consumption and selling of

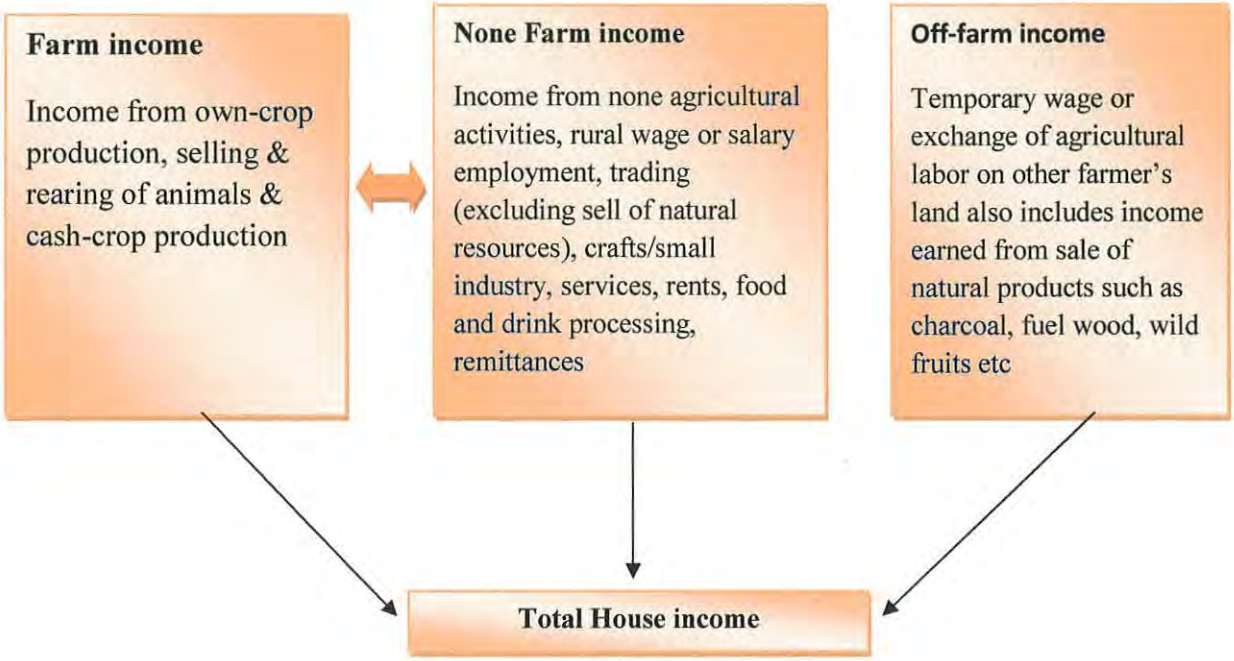
meat, milk and other valuable assets concerning about animals. In the same token, (Roger Blench 2001) explains that pastoralism as "the use of extensive grazing in rangelands for livestock production" that is practiced in the arid and semi-arid locations in the world. It is believed that Pastoralism is characterized as a complex form of natural resource management that involves in a continuous ecological balance between pasture, livestock and people (Nori and Davies 2007).

2.1.4 Livelihood Diversification

Livelihood diversification is referred as the process in which rural households engage in more diverse and range of activities to improve the standard living of these households and most of the time for survival. It one way or the other involves in maintaining of the continuous and variety of activities and occupations. (As Ellis 2000) refers diversification to the balance between different sources.

On the other hand, (Barrett et al 2001) argued also that diversification is used as income earned from different activities or sources and further explained that this income compromises both cash and in-kind of contributions to the welfare of the household. He also classified certain components such as crop, livestock sales, wages, rents, remittances, consumption of own farm, and exchange of items between households in the rural community or urban and rural areas of the country. There are two broad classifications when it comes to livelihood diversifications and they are natural resource based activities and non-natural resource based activities and this paper is going to employ the classification of Ellis since it is pertinent to the case of Ethiopian rural households (Ellis 1998).

Figure 1: Classifications of income based Livelihood diversification



Source: adopted from Ellis (2000) with little modifications

2.3 Pastoralism and Climate Change: A Retrospective Overview

Historically, pastoralism originated as a nomadic where there was heavy reliance on concentrated management of livestock herds. Pastoralism offers a viable production system that enables the pastoral communities in the arid and semi-arid to exploit hugely in the natural environment that they were living productively. Pastoralist communities are people who depend on primarily on livestock as a livelihood system (Huho, Ngaira and Ogindo 2011).

The Horn of Africa is home to millions of pastoralists who herd their livestock in the semi-arid to arid areas of the region. Rainfall seasonality affects pasture and water availability which is vital to livestock production and ultimately the livelihoods of these people. East African rainfall is bimodal, but is characterized by uncertainty both spatially and temporally (Galvin et al. 2004).

In most cases, dry land regions are characterized by high rainfall variability and uneven resource distribution (Scoones 1995). Pastoralism as the major livelihood system in this region, particularly in arid and semi-arid regions of Africa has evolved in response to such variability

but recently the ability to cope, adapt, and live with such uncertainties is greatly affected by climate change induced hazard nowadays.

It is always common in arid and semi-arid areas where rainfall is highly variable and unpredictably, the influence of climate change on the livelihood system is very significantly pronounced and hugely felt in these areas. Pastoralism which is the major livelihood system, in most of arid and semi-arid areas of the Horn of Africa in general, and specifically in the lowland arid and semi-arid areas of Ethiopia have been encountering into such climate change variability that challenges the traditional coping and adaptation strategy to prevent and manage the risk of climate related disaster (e.g. drought flood and diseases). Moreover, it has been witnessed in the past two to three decades the vulnerability of pastoralists to drought has been increasing in sub-Saharan Africa particularly in the Horn.

In addition, recent study by Aklilu and Desalegn 2013 indicates that climate change has brought about many problems through increased frequencies of extreme weather such as draught and floods undermines the pastoral livelihood system. They further argue that climate change will destabilize the balance between pasture, water, livestock and people endangering the overall pastoral production system and pose huge loss of livelihoods of the pastoralist communities.

2.4 Patterns of Climate Change in Ethiopia

Ethiopia like many other developing countries faces various problems of climate change where the country is believed to be among the countries which are considered to be the most vulnerable nations to the impacts of climate change (CGD, 2011). Climate change is a significant threat to Ethiopia's development. Changing patterns and intensities of rainfall and increasing temperatures will have consequences for all Ethiopians, but especially for the more than 70 million poor people whose survival depends on rain-fed agriculture (farming and/or pastoralism. Reasons for Ethiopia's vulnerability are manifold. Its geographical location and topography entail high vulnerability to the impacts of climate change. The highlands are dominated by sedentary crop farming, while many lowland areas are characterized as a mobile pastoralism, with increasing numbers of agro-pastoralists in areas between the two. Highlands above 1,500m above sea level (asl) are the favored settlement areas, with around 90 percent of the population living here (Yacob Arsano et al., 2004).

In other words, the regional models predict an increase in rainfall but higher resolution analyses of Ethiopia suggest a range that has both increases and decreases in overall rainfall averages. An increase in rainfall variability is also predicted, with a rising frequency of both extreme flooding and droughts that could seriously affect the livelihoods of much of the population. Needless to say that warming of the climate has been observed across much of Ethiopia, particularly since the 1970s at a variable rate, but broadly consistent with wider African trends where data about Africa's mean annual temperature is expected to increase by 2.0 - 3.7°C. Africa is, therefore, one of the most vulnerable continents to climate change. By the 2050s, it is expected that 350–600 million Africans will be at risk from increased water stress (IPCC, 2007).

Figure 1 Rainfall and Temperature Data

Historical trend	Mean temperature increased by 1.3°C from 1960 to 2006. More hot days and nights fewer cold days and nights	Highly variable from year to year, season to season, decade to decade. No significant trend.	Regular sever flood and drought events. No evidence of changes in frequency or intensity of extremes
2020s	+1.2°C (0.7 - 2.3°C)	+0.4% increase in rainfall	Greater increases in rainfall in October to December, especially in the south and east
2050s	+2.2°C (1.4 - 2.9°C)	+1.1% increase in rainfall	Heavier rainfall events, uncertain future El Nino behaviors bring large uncertainties.
2090s	+3.3°C (1.5 - 5.1°C)	Wetter Conditions	Flood and drought events likely to increase, heat waves and higher evaporation

The data in the table shows that the Mean annual temperature has increased by 1.3°C between 1960 and 2006, an average rate of 0.28°C per decade (CRGE, 2011). Besides, the daily temperature observations show increasing frequency of both hot days and hot nights. Climate models suggest that Ethiopia will see further warming in all seasons of between 0.7°C and 2.3°C by the 2020s and of between 1.4°C and 2.9°C by the 2050s (Conway and Schipper 2010).

Furthermore, the climate of Ethiopia is tropical in the south-eastern and north-eastern lowlands, but much cooler in the central highlands. Average temperatures range from 5°C (November to

January) over the northern and central highlands to about 37°C (March to June) in the north-east (Afar) and the south-eastern lowlands (World Bank 2006).

Seasonal rainfall is driven by the migration of the Inter-Tropical Convergence Zone (ITCZ), reaching its northern-most position over northern Ethiopia around July/August, and its southern-most position over southern Kenya in January and February. This fluctuation of the ITCZ characterizes the rainy seasons over Ethiopia, with a main wet season (Kiremt) from mid-June to end-September. Northern and north-eastern regions, including the eastern escarpment and parts of the south-eastern highlands, have a secondary wet season with sporadic, and much less abundant, rainfall from mid-February to May (Belg). Southern parts of Ethiopia have two distinct wet seasons in April to June (Gu/Genna/Sugum season) and October–December/January (Deyr/Sapie/Dadaa season).

The ITCZ's movement is influenced by variations in Indian Ocean surface temperatures and varies from year to year, leading to variations in the onset and duration of the rainfall season from year to year, including the occurrence of drought. Warming sea surface temperatures, particularly in the south-western Indian Ocean, may be linked to decreasing rains in equatorial and subtropical eastern Africa, including Ethiopia (Funk et al., 2005).

The other major driver of rainfall is related to the El Niño Southern Oscillation (ENSO), with warm phases associated with reduced rainfall during the main rainy season from July to September (JAS) in northern and central Ethiopia, causing severe drought (Mc Sweeney et al., 2007).

Mean annual rainfall in Ethiopia is projected to increase, mainly as a result of increasing rainfall in the short rainy season (October to December) in southern Ethiopia. Projected changes in the April to June and July to September rainy seasons, which affect large portions of Ethiopia, are mixed but tend towards small increases in the south (especially in the south-west) and decreases in the north-east. It is also projected that the proportion of rainfall that falls in heavy precipitation events will increase throughout the country, especially during the July to September and October to December rainfall periods (McSweeney et al., 2008; World Bank, 2010).

2.5 The Effect of Climate Change to Pastoral Livelihood System

Climate change and its consequences are receiving much attention in the public debate of development studies in the world (Orindi and Murray 2005). It is believed that weather extreme events such as drought, flood and storms will frequently occur in the foreseeable future. It is also thought that rising temperatures will create tropical diseases which will speed up their prevalence and impact the rural communities (Henson 2006).

It is known that tropical countries are highly depending on primarily rain fed on either farm or pastoralism. It seems that these tropical communities are becoming the most vulnerable ones to the effects of Climate change. Climate change is one of the major prominent constraints that affect the pastoral livelihood system in semi-arid and arid lowlands of Ethiopia. There is strong evidence that the pastoral livelihood system has been increasingly facing several climate change attributed hazards such as drought, floods and disease pets respectively.

There is a widely consensus that drought is posing great threat to pastoral communities in the lowland that are living in the peripheries of the country such as Borena, Afar and Somalis in the country. Droughts are common phenomena in these areas in general and in Somali region in particular where this study is going to be conducted threatening on the bases of the pastoral livelihood system which is based on livestock raring that highly depends on availability of pasture and water for production and regeneration. The population of Filtu and Dollo-ado districts of Ethiopian Somali region is the most vulnerable pastoral communities in Liban zone for they are strongly attached to natural resources that climate change attributed hazards like drought affect their livelihood seriously. Drought has particularly decreased water availability for the community and livestock in Filtu and Dollo districts with negative impacts on all livelihood activities and financial resources that these pastoralist communities are engaging on daily basis. Extreme heat affects most natural resources, having a negative impact on the livelihoods system. For instance it affects the livestock which is one of the main resources for household subsistence as animal traction and for selling, and then it will enhance the community vulnerability consequently. Historically, studies conducted in Ethiopian pastoral areas indicate that droughts used to occur in every 5-10, 5-8 years but now it become up every 3 to 2 years. Longer and more frequent droughts make a significant effect on the pastoralist livelihood system putting more

families below poverty line in the country and loss of many livestock which is the main base of the pastoral livelihood system(Aklilu and Alebachew 2009; Tiki Oba and Tvedt 2011).

In most of the time, when droughts prolong pastoralist communities are forced to migrate to very faraway places exposing their livestock to new environment and this in turn causes a health risks to their livestock. Livestock diseases cause loss of significant livestock which is vital part and parcel of the pastoralist livelihood system. For instance, a Deyr Need Assessment report 2014 conducted in Liban zone by respective Woreda line offices and it's donors documents that various livestock diseases in all species of livestock that have resulted to livestock mortality, namely, FMD, blackleg, PPR, cpp, camel pox, sheep and goat pox, ovine and bovine pasturollosis, septic infection etc. likewise, the report indicated that the number of livestock death caused by drought, disease and floods were 5,156 in Liban zone at onset of 2014.

Other effects of drought are low productivity of livestock, death of lactating animals and calves, reduction of milk and meat yield, lower prices of livestock and increase in grain prices and failure of crop production (Fassil 2001).It has been observed that rangeland is declining in the area though the area has been rich with rangeland resources previously. Rangeland is the most important natural resource base for pastoralist livelihood system. Increased bush encroachment, reduced rainfall, termite infestation and expansion of cropland are major factors for decline of pasture production over the years. It shows that the impact of reduced range land productivity has direct implication on the pastoralist household and the wider pastoral livelihood system as it affects the supply of milk and other livestock product (Nardone et al 2010).

According (Fassil 2001) Bush encroachment and unwanted plant species has been considered as a sever danger that exacerbates the decline of the rangeland pasture and causes the disappearance of most important grass and replacement of aggressive bushes that are not necessary for the livestock of the pastoralist communities in the area.

The pastoral areas of Ethiopian Somali regional state face complex human and natural hazards, such as droughts, floods, conflicts, and human and livestock diseases. The high rate and amount of these shocks make pastoral communities more vulnerable to disaster risks, reducing their recovery time and prolonging asset rebuilding endeavors. Due to such climate change hazards, pastoral communities are vulnerable to loss of livelihood and suffer from the effects of floods in

their livelihoods. Floods cause a tangible and widespread damage to the pastoralist communities in Filtu and Dollo districts affecting their basic household assets. Recently in Liban zone of Ethiopian Somali regional state during rainy season recurrent flood has occurred in some parts of Dolo ado, Hudet and Filtu districts due to heavy rain received in highlands areas of the country reinforced by locally received rain and this hazard has been adversely damaged massive farm lands, residential houses, irrigation motors and killed a large number of livestock. Incidentally, Filtu and some localities of Dekasuftu were damaged by a number of traditional water sources due to continuous rains that recharge over capacity of the source (Multi Agency Deyr Report of Liban 2014).Similar cases have been reported in other zones such as Borena and South Omo where flash floods hit in the areas had caused considerable damage and "loss of property" and "basic infrastructure" in the zonal capital seats of Yabello and Jinka respectively (Aklilu and Alebachew 2009).

The other problems that floods cause a part from damage of infrastructure and loss of property and human life, floods also cause outbreak of disease particularly water borne diseases such as cholera, malaria and sever fever as well as pests that threats to the lives of human and livestock in area has been expanding increasingly due to climate change effects (ibid).

2.6 Livelihood

The notion of livelihood has been gaining great attention in the development discourse for the past two decades. It can be observed and drawn from the literature of development studies that it is widely applied in rural development and poverty literatures. The emergence of livelihood approach has led new comprehending about the problems of the rural communities since it reflects the lacking of capabilities and assets which is available to these communities. In simple terms, a livelihood is the way people earn a living.

In other words, according to Chambers and Conway (1992) a livelihood "compromises capabilities, assets and activities required for a means of living". The aforementioned definition of livelihood, assets refer to five main categories of capitals which are natural, physical, human, financial and social. Natural capital refers to the natural resource stocks such as land, water, pasture, and forest which are useful resources to the livelihoods of the people. It is obvious that these natural resources have significant role in pastoral economy since livestock production

greatly depends on access and availability of water and pasture. Physical capital is regarded as assets which are brought into the existence by economic production processes. Human capital refers to the education level and the health status of the people. Financial capital is referred as assets in cash that can be accessed so as to purchase production and consumption goods and services. Social capital refers to the social networks and associations and institutions that people derive support, participate and contribute their livelihoods deeply.

Carney (1998) argues that climate-induced changes to resource flows (whether temporary, reflecting variability or structural, reflecting change) can fundamentally affect the viability of the livelihoods of the poor pastoral communities. Indeed, in many ways this is what climate change impacts are all about meaning changes to resource flows that are critical for livelihoods of these people.

2.6.1 Livelihood Diversification in Ethiopian Context

It is believed that agriculture is the dominant or the main source of income and employment in most of the developing countries particularly Africa. However, none-farm rural income is gaining its momentum in many developing countries where 35-50% of rural income had been attributed to non-farm economy at beginning of the millennium (Haggbadle 2010).

In the Ethiopian context, studies made by (Degefe 2005, World Bank 2009) have frequently revealed that 25-36% of the rural households engage in the non-farm livelihood activities. Nevertheless, the engagement of non-farm activities in the country differs from region to region and livelihood zones. For instance cash income for the cropping livelihood zones is crop sales while the pastoral and agro-pastoral zones are livestock sales corresponding exactly where this study is going to be conducted.

The regions of Amhara and Tigray is where migrant labour is hugely practiced in which the income of the migrants encompasses from a range between 31% and 54% of the total household income while income non-farm and off-farm activities like petty trading and self-entrepreneurial employment is estimated up to 60% of the households in the country and the typical example is SNNPR region where petty trade plays an important role as well as the lowlands or pastoral areas of the country where collection of firewood and grass for fodder sales is commonly practiced livelihood diversification as an income for many rural households in the country (Carswell 2002 and LIU 2011).

2.6.2 Livelihood Diversification as Adaptive Capacity to Climate Change

It can be grasped that livelihood diversification is not one time activity but rather it is a continuous process overtime influenced by different factors. There is a common consensus among the livelihood diversification scholars that diversification can have both positive and negative effects. For instance, livelihood diversification can be positive when it can promote more secure and can cope with adverse impacts of seasonality and reduce shocks, stress and vulnerability through smoothing of consumption, risk reduction, using available labor in the household as well as using cash generation for investment. In other words, diversification can result in negative when it increases vulnerability of the household (Ellis 1998). When it comes to adaptation, a common argument is that diversifying into none-farm activities or none-livestock activities in pastoral areas is the most preferable activities as these activities (trade, labor remittance) can improve the livelihood status of the household and provide income during shock and reduce vulnerability during the dry seasons resulted from climate change (Sabates-Wheeler et al 2008, World bank 2009). Another study conducted by Bryan et al 2009 on the determinants of adaptation to climate change in Ethiopia and South Africa reveals that non-farm activities have the most effect and encourage adaptation as a coping strategy for agricultural livelihoods as well as livestock livelihoods.

Furthermore, reasons that households diversify or pursue for livelihood diversification are divided in to two overarching considerations, which are necessity and choice (Ellis, 2000). This is also termed as a contrast between survival and choice (Davies, 1996) or between survival and accumulation (Hart, 1994).Necessity refers to involuntarily and distress reasons for diversifying (Ellis, 2000) and examples of such type might be environmental deterioration leading to declining crop yield, natural or civil disasters such as drought, floods that are attributed to climate change. On the other hand, choice refers to voluntary and proactive reasons for diversifying (Ellis, 2000). Seeking out seasonal wage earning opportunities, traveling to find work in remote localities, educating children to improve their prospects of obtaining non-farm jobs, saving money to invest in non-farm business such as trading are the commonly cited examples similarly. In this regard, it can be observed that there is intertwined relationship between diversification and climate adaption that can be an effective coping strategy for climate change attributed hazards such as drought by taking the positive impact of none-farm income generating activities to reduce the

household's vulnerability to climate change proactively in both short and long term climatic conditions (Betts et al 2011).

2.7 Measurement of Diversification

There are three main methods of measuring diversification which are the number of productive assets or activities, a percentage of income from various activities from the total income and the Thiel's diversity index (Crole-Rees 2002).

The first method is number productive activities are disaggregated in to crop production, non-crops, farm or non-farm and off-farm activities. In the pastoral areas, this can be livestock keeping, farming, petty trade, etc. However, this measurement has its own weakness. Participation in one activity does not ensure the income obtained from that sector and it does not give any indication on the relevance of each income source and does not allow causality analysis (Ibid).The second method uses the percentage of income from the various activities in total income. The share of non-livestock income expresses the importance of income generated by non-livestock activities in the area. This index is simple in its computation and also shows the asset allocation of the Household over different activities.

The third method is Theil's diversity index. This is based on the distribution of the system i.e. based on the concept of entropy. Minimum diversity is the practice of a single system over the universe, and maximum diversity is an equal distribution of all enterprises (Crole-Rees, 2002). For that reason, in the case of income diversification, labor allocation over different activities may be used as the unit of measurement. However, as Zandstra (1992) quoted in (Crole-Rees 2002) argued, this measure is more difficult to apply when treating complex production systems especially in pastoral areas where household's labor allocation over different activities is complex and hard to get the data respectively. Consequently, in this study the second method will be used since it is pertinent to the context of the study and research subjects.

2.8 Empirical studies

There are various studies that had been conducted on livelihood diversification in Africa in general and Ethiopia in particular. For instance, a study by (Smith *et al*2001) in two districts of Uganda showing that determinant of livelihood diversification was associated with history, social

context and agro ecology, and the influence of ongoing social change linked with external interventions, such as infrastructural and service provision. He found that social capital had much more influence in the process of livelihood diversification where small informal groups or associations which rely upon norms, obligations, reciprocity and trust to survive.

Similarly, Block and Webb (2001) studied dynamics of livelihood diversification in post famine Ethiopia. The authors tried to investigate whether higher income diversification was associated with higher consumption levels. Accordingly, they found that wealthier households tended to have more diversified income streams. They concluded that increased diversification is positively associated with changes in well-being over time.

A study by Mulugeta (2002) in Boke Wereda of west Harerghe zone showed that off-farm income has significant and positive effect on improving the household's food security status. He used logistic regression model with fourteen explanatory variables including off-income. The significant variables include family size, number of oxen owned, and use of fertilizer, food expenditure pattern, and number of livestock owned, size of cultivated land, off-farm income and income per adult equivalent.

Similar study by IIRR (2004) in Afar, Borana, and Somali regions indicated that pastoralists are diversifying their income through utilization of their own asset. According to this study, ways of income diversification include camel renting and handicrafts for tourists in Afar; cattle fattening in Jijiga and Gursum area; dry land farming in Somali and Borana regions; petty trading in Afar, Borana and Somali regions; salt production and transport in Afar, Somali and Borana areas.

Another study on the effect of non-livestock income on the household poverty status in pastoral areas was undertaken by Hillina (2005). Accordingly, he studied dimensions and determinants of poverty in pastoral areas of Shinile zone of Somali regional state. He used logistic regression with 14 explanatory variables. From these variables, ten explanatory variables were significant and they are age of household head, total family size, dependency ratio, animal disease incidences, and non-farm income per Adult Equivalent. Recent studies that has been conducted include Annilay 2009 on pastoral livelihood diversification from Middle Awash Valley indicating that Afar pastoralists are diversifying engaging both on-farm and off-farm reporting on the challenges that pastoralist encounter during diversification process such as lack of access

credit services, infrastructure and market information while similarly Getachew 2010 has also conducted a study on the adaptation of climate variability among the Somali agro-pastoralists and pastoralist communities in Jigjiga showing how climate variability increases the vulnerability of the Ethiopian Somali communities reaching the conclusion agro-pastoralism is the way out despite the impact of climate change in the region. In the same token, Abarufa 2011 conducted in study on Borena zone about the impact of climate variability on the pastoralist livelihoods showing the problem of climate change on the pastoral communities disproportionately by arguing that diversification of livestock and traditional mechanisms can tackle the challenges of the pastoralist in the area.

It can be clearly read between the lines of the aforementioned studies of livelihood diversification and climate change impacts in Africa and the country had made contribution to the challenges that vulnerable communities face regularly. It also can be observed that most studies had been conducted in the highland of the country where agricultural production is the livelihood system while less study has been conducted in the arid and semi-arid areas that pastoral livelihood system is practiced. Likewise, it is worth mentioning that the Annily 2009 study had addressed directly about livelihood diversification in Afar region focusing on livelihood diversification and the missing link between climate change and the livelihood diversification. In other words, the study that was conducted by Getachew 2010 in ESRS in Jigjiga district had emphasized on climate variability completely departing from livelihood diversification giving a heavy weight on agro-pastoralism while the majority of the population in the region are pastoralist communities. In addition, the study of Abarufa 2011 in Borena zone of Oromia region that has similar geographical pattern has only addressed about the impact of climate change and the traditional mechanism while undermining the potential livelihood diversification in the area. Hence, this study is going to fill the gap of the above discussed studies and will address the effects climate change and the extent of the vulnerability of these pastoral communities. The study combines both climate change and livelihood diversification as a strategy that can be response to the problems of climate change without undermining the role of the traditional mechanism as adaptive and coping strategy in the Liban zone.

2.9 Analytical Framework

There are various analytical frameworks in literature of climate change and livelihood diversification but this study is going to employ the two inter-related analytical frameworks which are Climate Change Vulnerability framework and Sustainable Livelihood framework. It is hoped that these approaches will complement each other and address both for climate change and livelihood diversification as a coping strategy for the vulnerable pastoral communities that are living in Liban zone of Ethiopian Somali Regional State respectively. The climate change vulnerability framework has four main lenses that analyze the problems of climate change interchangeably.

These four lenses are exposure, impact, vulnerability and adaptive capacity. The exposure is related to the magnitude and character as well as the rate of climate change hazard in the Liban zone area while vulnerability is mainly on the livelihoods that the pastoralist communities of Liban zone practice and their dependence on livestock and other natural, physical, financial, human and social resources needed to carry out these livelihood activities and effects of climate hazards on these key livelihood resources. In the same token, the adaptive capacity is directly related with the ability of the pastoralist communities in Liban zone in adjusting the problems of the climate change conditions. There is also analytical questions touch upon the each of the main areas that has been mentioned in the above paragraphs and it is believed that this analytical framework is pertinent to the study where all the important information will be analyzed by using the climate change vulnerability framework thoroughly. The following table describes more detail about the climate change vulnerability framework where there typical question that will guide during the analysis of the research paper effectively.

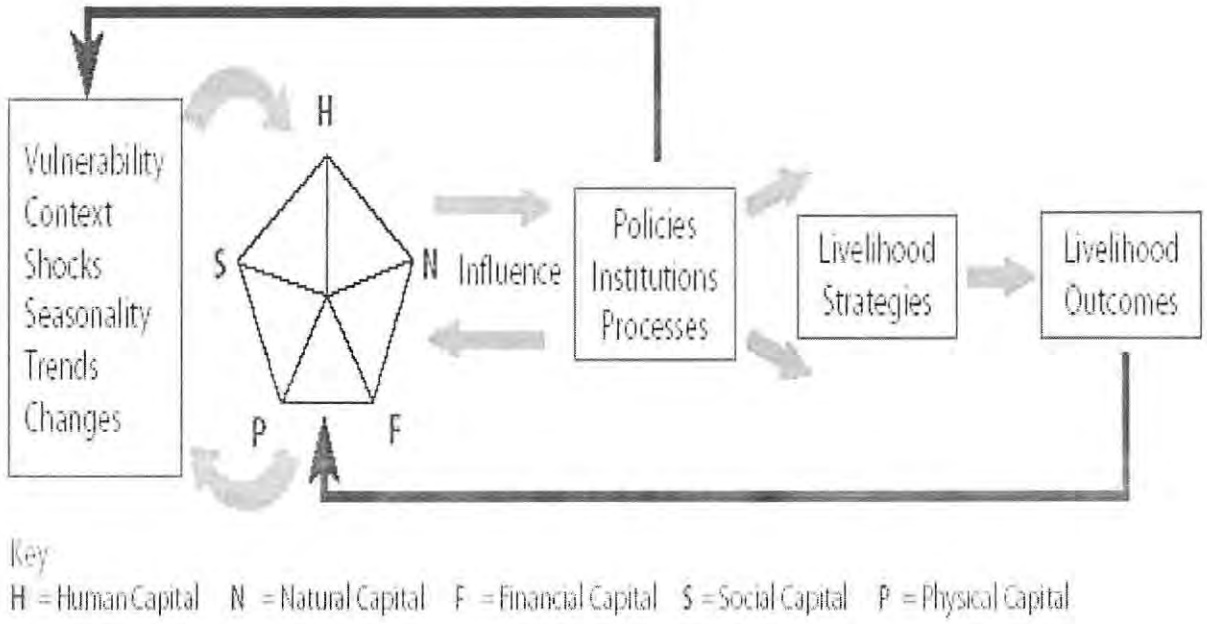
Table 1 Climate Change Vulnerability Framework

Exposure	Impact	Vulnerability	Adaptive Capacity
1. Which climate-related hazards affect livelihoods? Changes in timing, frequency, and intensity of climate hazards?	**What are the impacts of these hazards on education, livestock, infrastructure and socio-economic livelihood of the pastoralist communities in Liban zone**	1. **How vulnerable are livelihood activities to climate change?**	1. **What are socio-economic factors determining adaptive capacity?** **Experiences with risk management and coping**
		2. Indicators of vulnerability include: - Dependence on livestock Livestock type (are they resilient species?) Dependence on rain-fed grazing land Crop mix/types (are they resilient species?) Environmental conditions (type, level, rate of degradation)	What activities are currently undertaken to cope with climate hazards? Are these strategies effective and sustainable with future climate change?
3. How do non-climate hazards interact with climate-related hazards?			2. **Reactions to scenarios?** Which activities could be undertaken to prepare for anticipated climate change impacts? Which resources are key ones?
3. What is the 'science' saying about recent climate trends? Projections?		**2. Which livelihood resources are most affected by climate hazards?**	3. **Enabling conditions and barriers to adapting** Questions at local, district and zonal levels Determinants of adaptive capacity include: economic wealth, literacy rate, access to information, markets, technology, services, and formal and informal assistance, and institutional capacity
- How does it compare to community observations?			

Adapted from UNDP Assessment report of Excellent Hachileka 2009 with little modification

In the same way, the sustainable livelihood approach as analytical framework focuses on the assets that pastoralist communities hold and the strategies that they employ to in order to make a living. The SL approach provides a framework to assess resources and assets that are available to the pastoralist households and how they are linked to the strategy in order to reach the desired outcome. According to the framework, households pursue and decide to mobilize as well as allocate their resources meaning assets and capabilities in which it results from direct income earning activities and coping strategies. The income earning activities are again subjected to be allocated into cycle of competing demands such as consumption, investment and saving so as to attain the desired outcome which includes basic needs of the household such as health, water, food and shelter. There is common consensus among the livelihood scholars Ellis 2000, Chamber 1995, Carney 1998, and Degefa 2005 that assets, strategies and outcomes are seen in a context meaning the political, social and institutional context in which households are situated where the context decreases or increases the vulnerability. At the same time, vulnerability is also related to resources that households possess in a certain context.

Figure 2 Sustainable Livelihood Framework



Sources: Adopted from DFID Livelihood documents

Vulnerable context

It would be good to use this livelihood strategy or framework to see how this analytical framework can enable us to assess the Liban zone pastoralist community's assets and the access to these assets as a livelihood services.

Thus, vulnerability context is the part of the DFID Sustainable livelihood framework that helps us think through those external factors that often make the hard to reach people in general and pastoralist communities in Liban zone in particular. This is the place for analyzing the shocks, trends and seasonality issues that can have a great impact on pastoralist community's livelihoods. The livelihood framework emphasize that the overall livelihood of pastoral communities depend on both access to assests-livestock, water, finance, animal health services, markets and credits, pasture, water and the enviroments such as, institutions, policies, and process. Furthermore, the livelihood framework sets the welfare of pastoralist in the dynamic context of risk, seasonal and trends which affect assets and livelihood startegies.

Livelihood Assets (Asset Pentagon)

As discussed above, the five core asset categories, or type of capital, on which livelihoods are built which are: human capital, social capital, natural capital, physical capital and financial capital. People's choice of livelihood strategies depend partly upon which assets they have available to them. Some combination of these assets is required by people to achieve positive livelihood outcomes- that is, to improve their quality of life significantly on a sustainable basis and recover from climate change related hazards or shocks such as drought, floods and diseases on both human and livestock. It is believed that no single category of assets on its own is sufficient to achieve this, but all assets may not be required in equal measure. Based on the study by Farouk and kiama 2008, it is important to note that a single asset can generate multiple benefits. For example, if pastoralists communities that were affected by climate change attributed hazards have secure access to working capital (financial capital) they may also be able to get better access to the other assets.

Policy, Institutions and Processes:

This is the name given in the DFID sustainable Livelihoods (SL) framework that ranges of contextual factors that have a great effect on all aspects of livelihoods. At least in principle and to a certain extent they can be influenced by people themselves (unlike most of the factors within the vulnerability context.)When thinking about policy, institutions and processes it is important to know about the following:

- What policies and institutions exist, how they are structured and how they have been changing over time (processes)
- What roles they fulfill (in the case of institutions) or what impact they have (in the case of policies)
- What impact they have on the livelihoods of the pastoralist communities
- What ability-if any-the pastoralist communities have to alter or influence these factors.

Livelihood Strategies (LS):

It is the term used to denote the range and combination of activities and choices that pastoralist people undertake in order to achieve their livelihood objectives. One of the goals of Sustainable Livelihood approach is to help people build up their core resources (assets) so that they have the ability and flexibility to alter their Livelihood Strategies over time. The multiple livelihood choices that pastoralist people have in their Livelihood Strategies, the better incomes and other assets they could get and have more withstand-or adapt to-shocks and stresses.

Livelihood Outcomes (LO):

Livelihood outcomes are the achievements- the outputs- of livelihood strategies. LOs are important because they help us to understand and analyze the following:

- The joint result of all the factors that we are looking at when thinking about livelihoods (what is actually happening in a given area)
- What motivates people to behave as they do and what their priorities are (as a basis for planning support and developing indicators to assess that support)
- How people are likely to respond to new opportunities.

For the aim of analyzing the two analytical frameworks will enable us to describe in-depth about the information that has been collected through the research paper. It is also believed that these two analytical frameworks are complementing tools that will add a great value to the research since they are pertinent to the subject of the research directly.

Chapter three

3.1 Methodology

The following sections are to explain the research methods and the procedures that are applied in this research.

3.1.1 Research Design

Since most of the literature on pastoralists stress on the issue of vulnerability of pastoralist communities as the result of their susceptibility to such factors as natural and manmade obstacles which directly or indirectly related to climate change, it is imperative to address the livelihood diversification as a way out mechanism for the pastoralist communities in the face of climate change which create havoc in their livelihood system.

It is also important to promote livelihood diversification as a coping strategy to mitigate the challenges that these communities encounter time and again. Consequently, the research is descriptive, exploratory and analytic in nature where the mixed approach has been employed.

3.1.2 Justification for the Selection of the Study area

The research is conducted in two Woredas of Liban zone in the Ethiopian Somali Regional State where two kebeles of each district are taken that are prone to climate change mainly recurrent droughts and floods for the past several decades. The rationale behind the selection of the zone and two districts are as the following. First, the Liban zone pastoralist communities are people who depend on livestock for their livelihood and livestock related production. The Liban zone livelihood system is highly sensitive to the effects of climate change mainly due to the geographical area of arid and semi-arid climatic circumstances in this area. Second, the Liban zone in general and the two districts of Filtu and Dollo-ado are frequently affected by drought and flood which are directly or indirectly attributed to climate change. This makes the pastoralist communities in the area the victims of the climate change and vulnerable to the shocks, stress and the problems of climate change by threatening to endanger the overall livelihood system that these communities are engaging regularly. Third, the researcher has extensive knowledge about the place and the people and has worked in the area for several years. The researcher has also experience about the problems of the pastoralist communities and pastoral development issues in the area. Eventually, all the aforementioned elements made the researcher to study the effects of

climate change to the pastoralist communities and assess livelihood diversification as a coping strategy for these communities since traditional coping has been overwhelmed by the recurrent droughts and floods that hit these pastoral communities repeatedly.

3.1.3 Sampling technique

Selection of the Kebeles and Sample Households

There are 31 Kebeles in Filtu district and 28 Kebeles in Dollo-ado district respectively. In this respect, four Kebeles were selected two from each Woreda on the following reasons. One of the underlying factors is the accessibility of the Kebeles in terms of road and distance, pure pastoralism, mobility, vulnerability and exposure of climate change effects mainly drought and flood and past experiences.

It appears that identification and determination of a study sample size is considered to be one of the main tasks of research design thoroughly whereby the main aim is to draw a sample size from all the target population. Considering time and resource, it is hard to take all the households of sampled communities. Therefore, sample households are taken from the total population of the study where 85 households are conceived as the direct subjects of this research from the total households of 849 constituting the whole population of the study sub-districts respectively.

In fact, there are about 849 households in the study Kebeles among these, 300 households are in Ayinle, 116 are in Jayga'ad, 100 are in Adad and 333 are in Boqolmayo respectively. Having considered constraints of time and resources into mind, only 10% of the households from the total target population are regarded as a research subject for household survey. By distributing the 10% for the four study Kebeles using probability proportionate to size method, there are about 30 sampled households from Ayinle, 12 households from Jayga'ad, 10 households from Adad while the remaining 33 households are directly taken from Boqolmayo respectively making a total 85 sampled households for the household survey. Thus, a total of 85 sample household are selected from the four Kebeles proportionately by using lottery form none randomly.

Table 2 Kebeles and Households included in the Study

Name of the Woreda	Name of the Kebele	No of Household	No of Sampled Households	Percentage
Filtu	Ayinle	300	30	10.00
Filtu	Jeyga'ad	116	12	9.67
Dollo-ado	Adad	100	10	10.00
Dollo-ado	Boqolmayo	333	33	10.09
Total		**849**	**85**	**9.99**

3.1.4 Sources of the Data

The research employed both primary and secondary sources in order to find the appropriate and relevant information for the research. The secondary sources will be used from variety of books, articles, internet, journals, government and none government publications as the related references. While the primary sources of the research paper will be drawn from Household survey, the pastoralist communities, and officials of the city and the kebeles as well as the other development agents around the area of study.

3.1.5 Methods of Data Collection

The data collection of the research applied mixed techniques where the research has applied both primary and secondary data collection methods so as to get a clear, comprehensive, quantitative and qualitative data that is relevant to the study. The following are qualitative and quantitative methods that are complementary in nature. The qualitative methods are used on focus group, key informant interviews and observations while the quantitative method is Household survey that will be used throughout the process of the data collection of the study is questionnaire which will be pre-tested before applying it directly.

Primary Data Collection

Quantitative method of data collection is referred as to the measurable and countable demographic and economic characteristics of households under the study. In most of the cases, this kind of data can be drawn from household survey method and secondary documents that has been recorded and found in the archives.

Therefore, household survey is conducted into the four sampled Kebeles that pastoralist communities live so as to generate quantitative data for the study. In this respect, prior to the data

collection process, structured household survey questionnaire is designed to gather data on demographic characteristics, access status of household assets and social network, livelihood activities and household asset holdings. It is hoped that the selection of these Kebeles will help to focus on the pastoralist communities and enable us to find adequate evidence of the climate change challenges that affect these pastoralist communities.

Household Survey

In research most of the times, household survey is considered to be very essential in gathering first-hand information about the subjects of the study directly. Thus, household survey is conducted in order to dig deeply down and come up with the necessary information. The households are examined to secure the livelihood and household assets, source of livelihood and the available services in their area as well as their adaptive capacity to the effects of climate change and the driving forces of livelihood diversification in their locality. None Structured questionnaire was developed that encompasses of both open-ended and closed questions so as to find the pertinent information from the respondents of the research.

In most cases qualitative data usually describes about the a range of behavioral characteristics such as beliefs, customs, values, views, knowledge and experiences that certain communities encompass for centuries that always considered as none numerical terms (Degefa, 2005). In this regard, qualitative data are collected through participatory methodologies such as Participatory Rural Appraisal (PRA) tools. The PRA tools encourage for all the stakeholders to participate openly through discussions on issues that matter mostly in the study .The PRA tools that were employed in this study in order to get the pertinent information which is necessary for this study are described as follows:

Focus Group Discuss (FDG*):* The objective is to explicitly make use of the group interaction so as to generate data and insights that would be unlikely to emerge without the interaction that is found in a group. As the technique inherently allows observation of group dynamics, discussion, and firsthand insights into the respondents' behaviors, attitudes, etc. Respondents' level of knowledge/proficiency, age, cultural background, and sex will be considered. With the idea that women provide valid data on the issue, separate focus group discussions are to be conducted with the women group respondents. It is hoped that this will allow to have comprehensive picture

of the issue in view of that women have additional burden and responsibility of the family. As a result of this, about 8 to 12 carefully selected homogeneous community members has been made to freely discuss issues, ideas, experiences, perceptions and recommendations in relation to Livelihood diversification as coping strategy and the effect of climate change and household assets among themselves. Therefore, there were two focus groups conducted for each Kebele, that is, one from the men groups residing in the Kebele and one for the women to make a balance among female and male in the study. The researcher has introduced the subject and kept the discussion going while preventing domination of the discussion by a few participants.

Key informant interviews (KII): It is believed that key informants would help the researcher understand the livelihood diversification as coping strategy issues, provide flexibility to explore new ideas and issues not anticipated during planning. Individuals or groups of individuals were selected for their knowledge and experience in the issue under discussion and related topics of climate change and livelihood diversification as coping strategy. Interviews were qualitative, in-depth, and semi-structured relying on interview guides that list topics or open-ended questions about livelihood strategies, nature of shocks and the kind of livelihood outcomes and strategies. The researcher carefully probed the informant to elicit information, opinions, and experiences. Key informants will be interviewed either individually or through focus groups.

Observation: it is import to make observations during all the aforementioned activities to back the funding of the study practically. Hence, observation method has been employed during field work of the study since the method enables us to see things from different perspective and interpret the first hand information that one collects from the subjects of the study both human and the environment physically.

Secondary Data

The secondary sources that has been used in this study were from variety of books, articles, internet, journals, government and none government publications as the related references to the study. Besides, regional and zonal documents which were pertinent for the research study has also been applied as secondary sources of the study effectively.

3.1. 6 Methods of Data Analysis

When the data collection was finalized, the result of the research was analysed using descriptive statistics. SPSS was also used to analyse the data and eventually interpretation has been made from the results of the study.

Chapter Four

4.1 General Background of Filtu, Dollo-ado and Socio-economic Characteristics of the Respondents

4.2.1 The Liban zone

Liban zone of Ethiopian Somali Regional State is among the nine administrative zones in the region. The zone is structured into six districts, namely Filtu, Dollo-ado, Moyale, Mubarak, Hudet and the recently established Deka-suftu. The zone is bounded in the east by Afdhere zone (Gannale river demarcating their boundaries), and in the west by Borana, north and northwest by Guji zones and in its southern flank sharing international boundary with Kenya and Somalia.

The zonal headquarter - Filtu town (is also the seat for Filtu district) is about 720 Kms away from Addis Ababa in the south. Dollo town, the seat of Dollo-ado district, is situated at about 960Km from Addis Ababa on the southern margin of the country positioned at the triangular borders of three nations – Ethiopia, Kenya and Somalia. Similar to the other adjacent areas, Dollo is also one of the pastoral predominant areas in the region which share international border with the neighboring countries.

According to the latest figure by CSA (2007), the total population of the Liban zone is estimated at about 539048, of which 492,414 (91.35%) are rural and 66, 864 (8.65%) are urban. From the total population of the zone about 296832 (55.066%) are males and 242216 (44.934%) are females. The livelihoods of communities in this area depend predominantly on extensive livestock production where the major portion of their annual incomes obtained from sale of livestock and livestock products, and the inhabitants engaged in mobile and semi mobile pastoral mode of production. In few valley bottoms, they began to practice small-scale farming plots, which usually fail due to erratic nature of rainfall and unpredictable weather condition. The two adjacent districts, like other lowland and pastoral areas in the country, are drought prone areas.

The area is categorized by arid and semi-arid lowland weather conditions, and weather data from the areas show that the annual temperature ranges from 30^0c to 42^0c and average annual rainfall estimate is ranging from 300-400mm. The area is bimodal in rainy season, two rainy seasons occurring in a year: the long rainy season happens between mid March and early May, and the short rain commences between mid Septembers to mid-October.

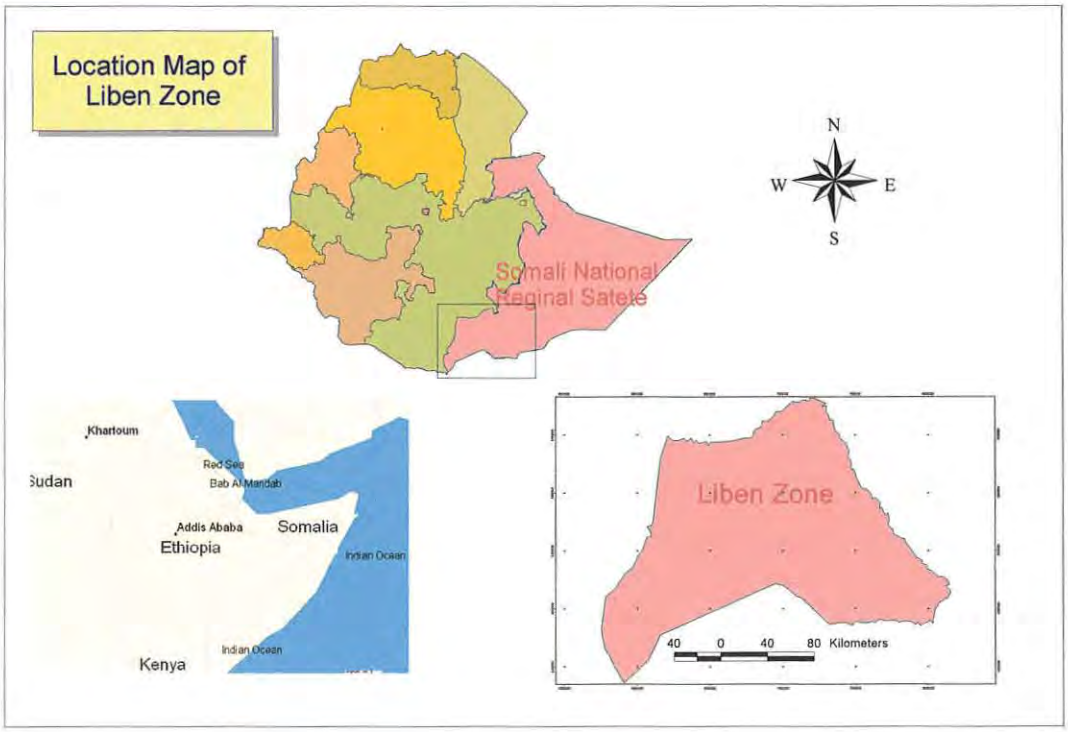
4.2.2 Production system in Liban Zone

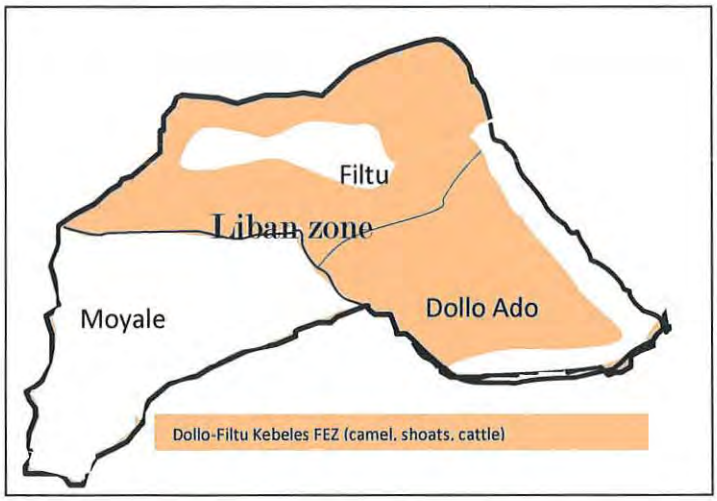
Dollo Ado and Filtu districts are among the important pastoral districts of Ethiopian Somali regional state where there is a considerable proportion of the population who are pastoralists. These pastoral communities heavily depend on pastoralism as livelihood systems defining the rural economy in the area. The pastoralists typically depend on mainly camels and cattle, but also on shoats for household food security and a few equines for transportation. Pastoralist and agro-pastoral communities in the areas have over the years developed highly resilient production systems that are well adapted to the hostile climatic environment. However, due to various external and internal factors the communities are currently facing food and livelihood insecurity problems.

One of the main external factors that affect the production system of the area is the climate change. Climate has been in a state of flux in recent years. Droughts are following each other in shorter cycles; normally, the pastoralists experienced a wide spread and prolonged drought once every 4-5 years. One can fairly say that every time one of three conditions is happening in the area: Pastoralists are preparing for a drought, mitigating a drought, or recovering from a drought. As a result, both livestock and rangeland have half the time to recover until the next drought. Similarly, when the next wave of drought comes before the pastoralists recovered from the past shock, it consumes the remaining meager assets.

Over time, the accumulated shocks the pastoralist and agro-pastoral communities face mean that the resilience of the households' decreases and their coping mechanisms weakened significantly. Growing severity of population pressure, rangeland resources (flora, fauna and supporting resources) degradation and loss of resource access, reduced herd/flock mobility, weakening of traditional institution, poor social and economic services, conflict and lack of good governance are among the major factors feeding into a downward spiral of food and livelihood insecurity and poverty in the area.

Figure 3 Location of Filtu and Dollo Districts





4.2.3 Land, range management and soil

Most of the land is lowland plain (ranging from 1300m in the higher altitude around Filtu and decreasing to around 200m above sea level at Dollo. Soils are brown-grey desert soils (Yermosols and Xerosols). Towards the north of Filtu the altitude increases. In this area rainfall

is considerably higher than around Dollo. The pastoral area has three types of vegetation: scattered tall trees; shrubs; grassland with browse dominant over grassland. The area is rich in trees producing gums and resins ((*Acacia, Commiphora spp* in the higher areas and *Boswellia* spp family in the lower areas) but the resource is very much under-exploited. Camels and goats are concentrated in the areas with thorny tall trees and shrubs, while cattle and sheep graze in the grasslands. Dry season grazing areas are located along the rivers and in grazing areas either side of the Filtu-Dollo-Negele Borena road, near boreholes and permanent water points. During the study period most of the livestock of Dolo area has moved to Filtu area in search of pasture and water.

4.3 Basic Public Infrastructure and Services

Water Supply

Water sources are limited in the area. Filtu, the Zonal capital has no boreholes or pipelines so far. However, there is a big scheme from the government to bring water to the Zonal capital and those found in the middle of the road from Genale River which is located 70km away from Filtu. The other water sources for the both districts are two hapher dams built for both Woredas, large ponds, shallow wells ,berkads and two boreholes one serving the livestock in Filtu and the other serving the urban dwellers in Sade of Dollo Ado.

During the dry season local pasture becomes depleted and browse becomes dry, so the herd is split and the strong animals migrate to far distances. Camels visit water points every ten to twelve days taking one to two days to reach water points. While goats are watered every 3 days or less, depending on water and pasture quality: the more salty the water, the more frequent the watering. For cattle the maximum time possible between watering is two days. Migration outside Liben zone is rare – pasture is plentiful around Filtu even in a below normal *jilaal* season; water is less plentiful but is available in a one borehole in Filtu and one dam in Aynle of Filtu and another dam in Ber reren of Dollo districts.

Access to Education and Health Services

Qoranic education is very important for the pastoral people. Those who have not gone through the system are known as *caamo* (the illiterate) and are less respected in the community.
Those who have learned the Koranic school and memorized the Qoran acquire and get additional knowledge are referred as *Culumo*(the knowledgeable) and are well respected in the community. Most families have young children who attend Qoranic School *(dugsi)* mainly during the wet season; in dry seasons children move with their families to dry season grazing areas.
Throughout both districts there are only two preparatory schools and few primary schools as well as one high school for each district. Even if there is a school, finding a teacher is another problem. Those who are learning in Dollo and Filtu after they finish Grade 12 they either have to go to Jijiga the capital of the region and this require higher level education having a close relative living in those places to rely upon is necessary at this time. Thus, many young people will drop out from continuing their education. School enrolment is very small and mostly consists of boys with very few girls attending formal schools. The number of enrolment decreases as one move to the pastoralist settlement area where the school calendar year does not consider the pastoralist need and this contribute to school dropout.

schools are only opened during the days when water is available, most of the villages water source is ***birka(*** underground rain water harvesting structure),on the other hand there is no boarding school that could support the pastoralist school children to avoid drop out. Furthermore, schools at rural pastoral communities are limited to grade 5, and there after the child has to come to the nearest town where he has relatives to stay with so as to continue his studies, thus many dropout having the ambition to lead better life in education.
There is no question that human health is another key component of human capital in sustainable livelihoods. Human health determines the potential and capacity to engage in the production economy and consumption of food. Similar to educational facilities, the health facilities in the communities are poorly developed. There is one health post with two health extension workers in each Kebele rendering health prevention services where if one goes out to leave it is hard to find replacement.

There is one HC (health center) in Ayinle Kebele that provides service to the community. The community in Jayga'ad Kebele have a health post which is under equipped though, there is only

one HEW and the health facility gets closed when the staff goes to look for drugs of materials where access to health services deliverables are at Filtu hospital at 45 kms distance is hindered by the poor transport service availability. In contrast, the Boqolmayo has better opportunities to HC or HP services due to the concentration of NGOs and government agencies to the Refugees that came from Somalia Republic proximate location at 90 kms distance from the Dollo-ado district Health center/hospital and the possibility to have transportation service owning to its location while Adad has relatively poor Health Post due to its distance from the seat of the district Dollo-ado. As a result of this, the health condition of the pastoralist communities is characterized as poor sanitation and hygiene. The pastoralist communities which move from one place to another in search of water and pasture for their livestock do not achieve tangible level in the prevention aspect since few persons get a chance to get the health information.

The Livestock Market in Dollo and Filtu

Dollo-Ado and Filtu districts are known for their livestock populations and thus largely depends on animal husbandry namely cattle, camel, sheep and goats. In Filtu there is one big livestock market while the Dollo one is relatively small as when it is compared to the livestock market of Filtu. Both livestock markets act as a gateway for different markets in Ethiopia and abroad. While most of the cattle were sent to the interior part of Ethiopia through the Negele Borena livestock markets the camel and shoats directly went to Somalia and mainly shoats to Kenya. In doing livestock business there is a chain of marketing links. There are: the village collector, the middle market collector (e.g. Dollo market where SC/US established a group) and the exporter who comes from the main market – Baidoa, Bossaso, Garissa , Mandera and Negele.

Currencies used in the area

In the past three currencies were used in this study area particularly in Dollo Ado district. They are the Ethiopian Birr, the Kenyan Shilling and Somali shilling. However, after the fake money of Somalia injected into the market the people of Dollo Ado town and its surrounding staved off using the Somali Shilling. However, the use of Somali shilling has now changed into the use of US Dollar in the trade relation between Somalia and Ethiopia which resulted in high inflation as birr gets devalued while the commodity coming from Somalia soaring in price . Pastoralists

around Filtu-Kole area near the Ganale River, use the Ethiopian birr (ETB). Closer to the Kenyan border/along the Dawa river, (suftu,Biyoley,Ba'adweyn,Jarso, Rama,Sede, Biolay, Berrerran, Dafobulale, El Dher) use the Kenyan shillings (KSh) .During the study period ,due to the devaluation of Ethiopian Birr the government salaried personnel were suffering in the exchange rate (1ETB=5shilling the lowest in long times).The currency is used since their economy is more closely linked to Kenyan markets (milk sales, labour, livestock sales etc.).
While most livestock are sold to the Kenyan market they are sold first in the Dollo-ado market.

Security

The situation in Liban Zone is quite calm. Rarely do inter-clan disputes (mainly over pasture resources) occur. The major risk to security in Liban administrative Zone is the occasional clashes with the Borena in Oromia Region to the west. Clan disputes are usually resolved through negotiations between Elders.

4.4 Social Structure in Liban zone

4.4.1 Clans as social structure

The Districts inhabitants are the indigenous Somali pastoralist group namely Degodii and Riverine Agro-Pastoral community known as Garremaro. The Degodii speak Somali and Rahweyn Somali related dialect known as the 'Dograhwein', similar to that of the Digil and Rah way in the province of Baay-Baydawa of Somali Republic. Indigenous to Southern Ethiopia, they now live on both sides of Ethiopia and Kenya i.e. northern Kenya, Wajer district. They are believed to belong to the 'Saransor' bloc lineage of Somali ethnic group. They also share strong genealogical relation with the Hawadle in Hiran and Rahweyn of Baay provinces in Somali Republic and Murale of northern Kenya. Beside this, the Degodii is a Hawiya affiliated clan that share strong social and political relations with the Hawiyas elsewhere. The GarreMaro is heterogeneous community that clearly looks like Somali Bantu and yet predominantly associates themselves to the Garre clan in which they have political alliance with in the zonal politics. Numbers of GarreMaro sub-clans are identical to the Garre and that is why in Dollo the two are identified as GarreMaro meaning Garre Riverine and Garre Badia meaning Garre nomadic. Degodii is dominant in the district and still there are minority Somali clans living in small pocket areas. Most of these smaller groups do have alliance with various Degodii sub-clans.

4.4.2 Division of Labor in pastoral households

Roles and responsibilities in pastoral households are clearly defined. Men are responsible for activities relating to the productivity and survival of the herd. This includes milking camels, managing the herd reproduction, watering the livestock, pasture and water observation in advance of the dry season, gathering information on where to go next *(sahan),* making enclosures for livestock, searching for lost livestock, taking animals to the market and buying sugar, tea, grain etc in return. In a bad year they will resort to cutting firewood to earn extra cash, and will shake the acacia tree for pods for goats. In addition men have an important social/political role in reconciliation processes *(gar)* with other elders.

The woman is responsible mainly for domestic tasks (cooking, firewood collection, looking after children, looking after small stocks and milk animals, making house materials (mats for the hut *(aqal)),* milking goats and cattle (and milk sales) in the morning and evening, and ghee preparation.

Children look after kids of the small ruminants *(maqasha)* when they are not attending Qoranic School *(dugsi)*. Children from poorer households also collect bush products.

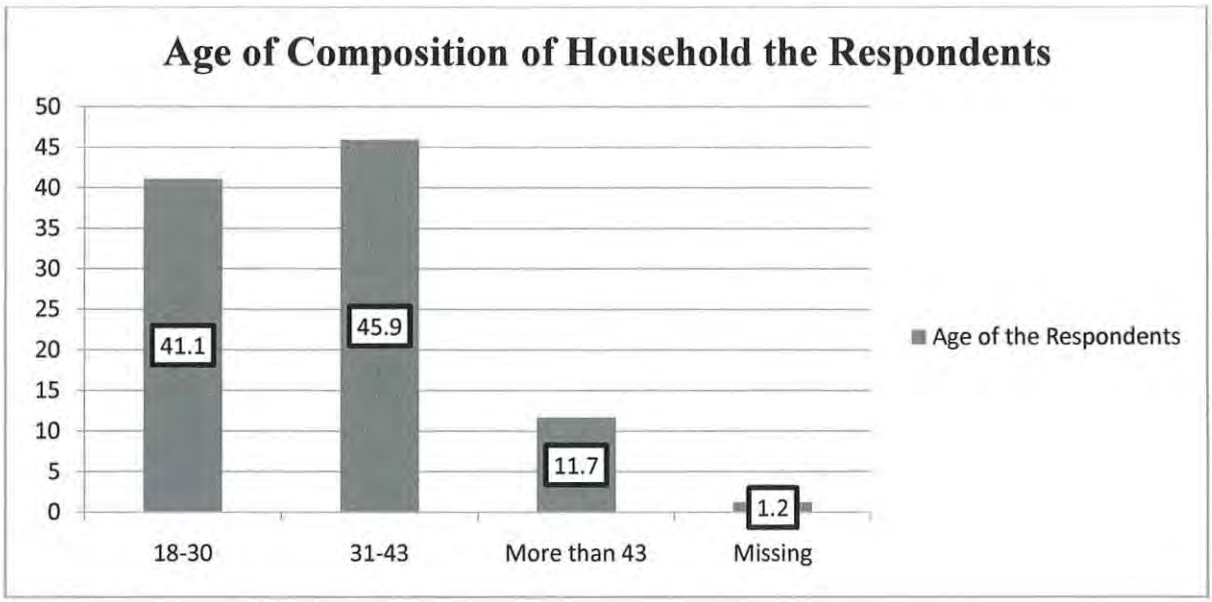
4.4.3 Brief Profile of the Sample Households

It shows that the 85 respondent households have 552 family members. The data indicates minimum family members of the household of the respondent are 2 people while maximum number is encompass of 12. On average each respondent household has 6.5 family members including husband, wife and children. Almost all of the respondent households of the study area are ethnic Somalis who are living in the study area.

I. Age, Sex and the Marital Status

As it can be seen from the below figure two elaborates about the age composition of the household of the respondents in the study area. The 87 percent of the respondent's age are in range of 18-43 which indicates that almost the respondents of the household survey are in the middle of their reproductive age whereby there is an abundant labor in area. At same time, if they are given the appropriate skills and knowledge they can contribute to the zone and the wider area of the region in which human capital is very essential for the enhancement of their livelihoods respectively.

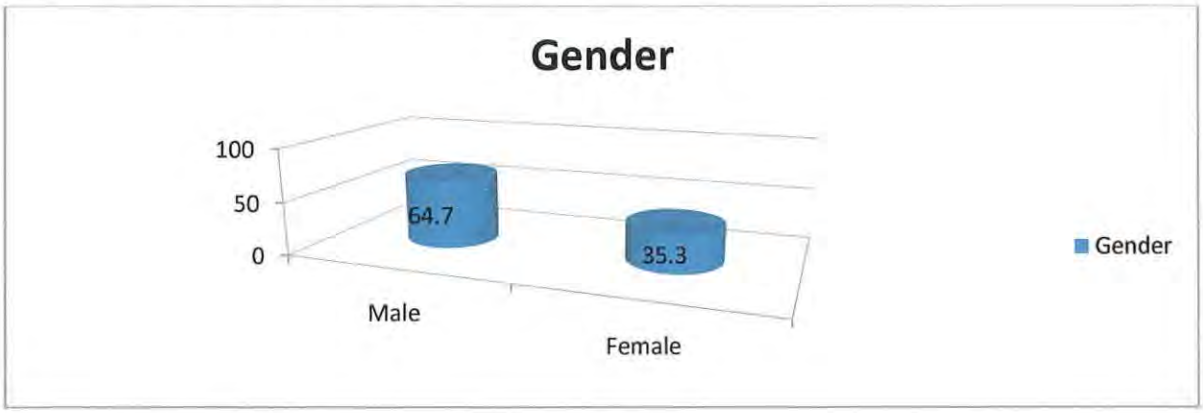
Figure 4 Age Composition of the Household respondents



Source: Own Survey, 2015

The sex composition of the household survey seems that it is dominated by male where it constitutes for about (64.7 percent) while (35.3 percent) is occupied by the females in which (20 percent out of the 35.3 percent) are household heads though it was tried to make a balance between the genders. However due to cultural norms in the pastoral communities, it was not possible to increase the female participants of the household survey from this and the following figure demonstrates about gender of the study respondents in detail.

Figure 5 Gender Representation of the Study



Source: Own Survey, 2015

When it comes to the marital status, most of the respondents are married putting 69.4 percent and this can be attributed to age of most respondents since they are in the middle age 18-43 range. While 12.9 percent are polygamy where man marries more than one women and it shows that this practice is deeply rooted in the pastoralist communities generally. At same time, divorced and widowed status showed 7.1 percent similar status while there was only one single among all the respective 85 sampled households in this regard. The below table clearly states about marital status of the household survey numerically in detail.

Table 3 Marital Status of the Household Respondents

Marital Status	Frequency	Percent	Valid Percent	Cumulative Percent
Single	1	1.2	1.2	1.2
Married	59	69.4	69.4	70.6
Divorced	6	7.1	7.1	77.6
Widowed	6	7.1	7.1	84.7
Polygamy	11	12.9	12.9	97.6
Missing	2	2.4	2.4	100.0
Total	85	100.0	100.0	

Source: Own Survey, 2015

II. Education level

Education is one key component of human capital that can help to equip and empower the pastoral households to contribute their resilience and increase their productivity in changing climatic conditions. It also helps to guide the day to day activities of each household individual to undertake livelihood activities such as livestock rearing, crop production, marketing and the like effectively and proactively. Above and beyond, it assists individual to be acquaint with the knowledge about health and nutrition and food intake or consumption in achieving the food security. Despite this fact, due to the poor educational facilities and the low awareness in demand creation about education the educational status of households is very low. The survey result

shows that the educational status of the majority of households is illiterate. Similarly, those household heads that didn't attend formal schools but can read and write are very few.

But it can be observed from the survey that majority of households sell their asset livestock to send many children to school as much as possible where 49.2 percent of the respondents of the survey reported. This indicates that the current and coming pastoral generations will have plenty of opportunities in getting educated whereby the spread effect will contribute to the development in the area in particular and that of the country in general. The below table indicates about the current educational level of the households in which (42.4 percent) are illiterate, (34.1 percent) have no formal education but can at least read and write while (20.0 percent) have different formal grades, certificates and diplomas and the remaining 3.5 percent are missing as they didn't report their educational level accurately.

Table 4 Educational Level of the Household Respondents

Educational Level of the House hold respondents	Frequency	Percent	Valid Percent	Cumulative Percent
Illiterate	36	42.4	42.4	42.4
No formal education but reads and writes	29	34.1	34.1	76.5
Grade	17	20.0	20.0	96.5
Missing	3	3.5	3.5	100.0
Total	85	100.0	100.0	

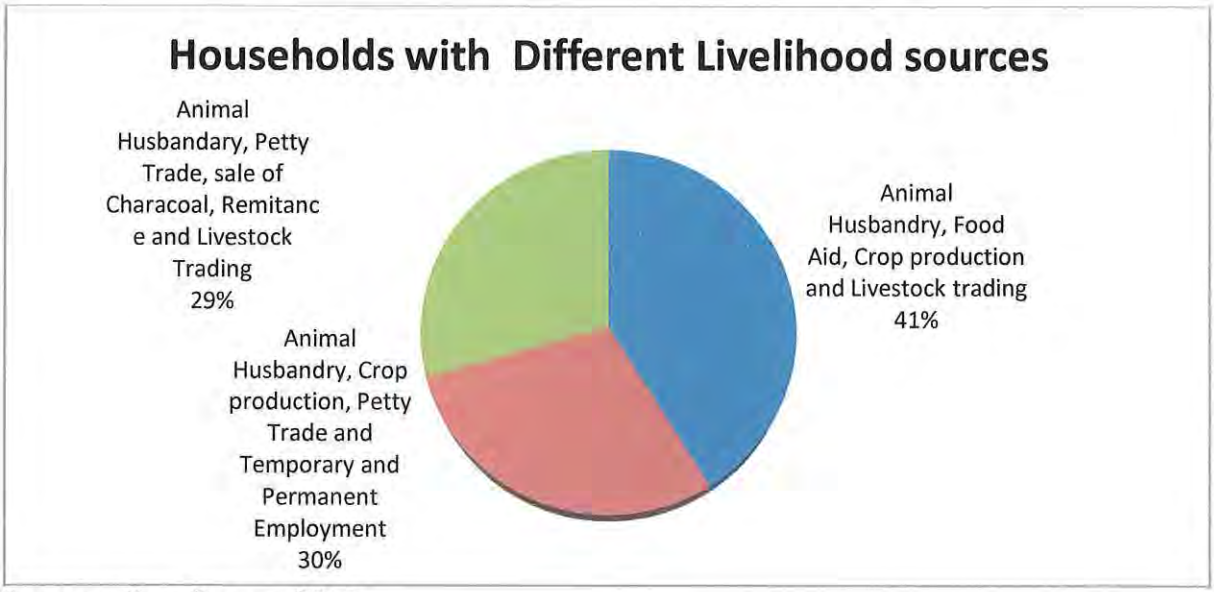
Sources: Own Survey, 2015

4.4.4 The Livelihoods of the Sample Households and their Asset holdings

It is really apparent that there is no pastoral communities who are subsisting themselves from a single livelihood activity nowadays. Ellis, (2000) argued that the livelihood of rural households is based on diverse portfolios of activities with the aim of maximizing benefits and minimizing risks under the scenario of ecological degradation and depletion of pastoral economy posed by

drought. It is known that relying on only livestock production is not advisable as secure livelihood, food and other increasing demand of the pastoral households. Thus, pastoralists in the study area attempted to have diverse livelihood activities. Besides, the household survey indicates that livestock as a sources of livelihood is the major livelihood activity that the pastoralist communities are engaging whereby it is followed by crop farming. Crop production is a very recent endeavor in the area. Non-farm activities also become important to supplement the income portfolio of pastoral households.

Figure 6 Households with Different Livelihood Sources



Sources: Own Survey, 2015

The above chart shows about households that have more than one livelihood sources where (35 HHs about 41% have 4 different livelihood sources, (25 HHs about 30% also 4 different livelihood sources) while (25 HHs about 29% have 5 different livelihood sources respectively.

Besides, the below table demonstrates about the main livelihood sources of the households in the study area for further detail accumulatively.

Table 5 Household Sources of Livelihoods

Household sources of livelihood	Sources of Livelihoods	
	Number	Percent
Animal Husbandry		
Yes	72	84.7
No	13	15.3
Relief Food Aid		
Yes	54	63.5
No	31	36.5
Crop Production		
Yes	37	43.5
No	48	56.5
Livestock Trade		
Yes	41	41.1
No	44	58.9
Petty trade		
Yes	22	22.3
No	63	77.7
Permanent and Temporary Employment		
Yes	21	21.1
No	64	78.9
Sale of Firewood and Charcoal		
Yes	3	
No	82	3.5
		96.5
Remittance		
Yes	3	3.5
No	82	96.5

Source: Own Survey, 2015

Chapter Five

5.1 Results and Discussions

This section of the paper ties to illustrate about the main findings and discussions of the study. It presents that there is evidence which indicates that climate change is affecting the livelihoods of the pastoralist communities in the southern lowlands of Ethiopia in general and Liban zone of Ethiopian Somali regional state in particular. It emphasizes that the area is among the most vulnerable places to the effects of climate change in the country. The empirical studies about the climate data of the area indicate unpredictable and erratic rainfall and rising temperature where extreme drier weather conditions are frequently experienced by the pastoral inhabitants of the area. The discussion focuses on climate change-attributed problems, the impact and threats that these problems pose to the livelihood of the pastoralist communities, livelihood diversification as local coping strategies and the institutional responses to the effects of climate change.

5.2 Low Precipitation or rainfall in the area

The pastoralist communities have observed changes in the atmosphere as well as the different attributes associated with the local rainfall in the study area. The changes in the climate primarily precipitation are noticeable and have been rapid mainly over the last ten years. In this regard, the pastoralists observed that the rainfall has deviated from its ordinary in terms of amount, distribution, pattern, frequency, timing and duration. The most important change is extensive reduction in rainfall amount. Moreover, the rain fall has become more erratic and poor in distribution. It was noticed that there is a significant delay in time of the rain onset and the considerable decrease in number of rainy days (Discussion with DPP Expert, 2015).

Commonly, there is a decrease in total annual rainfall of the area, as noted by the participants of the FGD unfortunately there was no available data from the Ethiopian Meteorological Agency specific into the study area to compare as well as analyze from the findings of the study area. However, the number of rainy days has reduced where sometimes there is a heavy rainfall within very short period of time. Pastoralist communities say that this kind of rain is not appropriate for the environment since it does not generate grasses to restore rangelands since most of the water become runoff. The household survey result shows that (89 percent) of the respondents

admittedly said that the pattern and the intensity of the rainfall has been decreasing for the last ten years in the area.

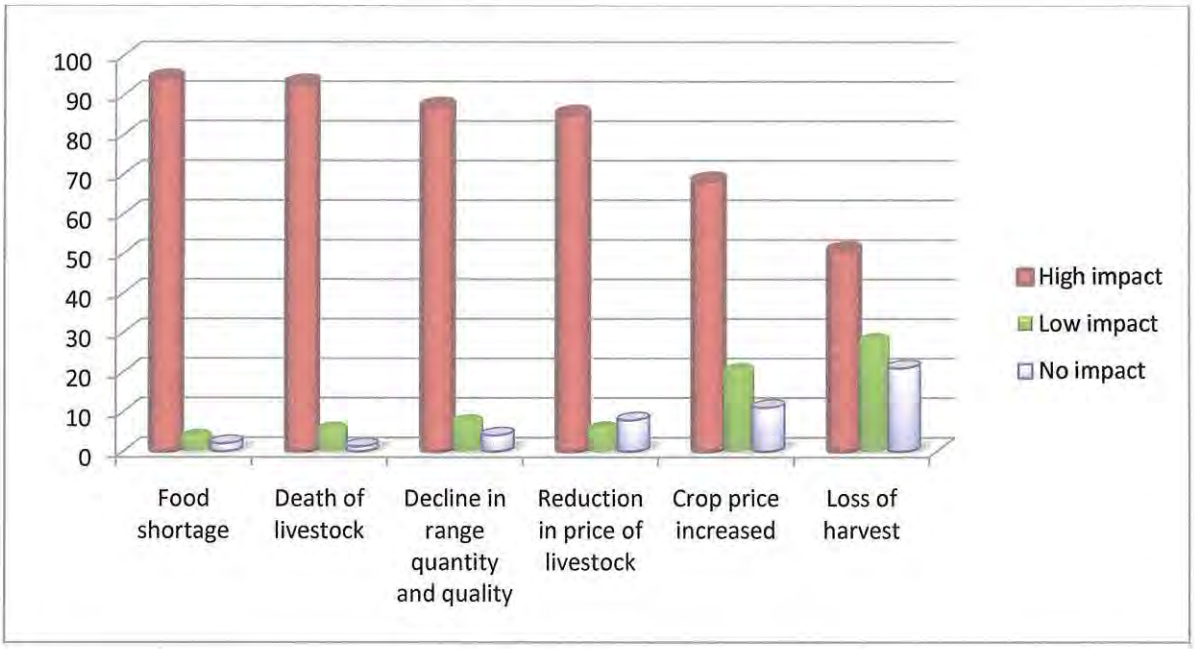
5.2.1 Increasing Temperature in the area

It was grasped that almost all the pastoralist communities agree there was a considerable change regarding the temperature in the area. All the participants of FGD agreed that the temperature of the area is increasing over the last years. More distinctively, temperature in the dry season *(Jilal)* has increased where the atmosphere is getting hotter and drier. The duration of the dry and hot season has increased than as it was never before. For instance, Filtu was one of the cold place in Ethiopian Somali region where 20 years ago people used to have charcoal fire at home in the nights to keep themselves warm, but these days people use refrigerated water in the nights to keep themselves cold and this shows the intensity and the pattern of climatic changes in the area (Discussions with the Elders in Filtu, 2015).

Furthermore, (89.4 percent) of the household survey indicates that temperature increase was observed in which the measurement of these pattern of climatic changes was observed in a form of temperature increase, rainfall decrease that resulted in environmental degradation, low productivity and changes in the vegetation. Besides, the secondary data also confirms with the above analysis showing that the Mean annual temperature has increased by 1.3°C between 1960 and 2006, an average rate of 0.28°C per decade (CRGE, 2011). In addition, the daily temperature observations show increasing frequency of both hot days and hot nights. Climate models suggest that Ethiopia will see further warming in all seasons of between 0.7°C and 2.3°C by the 2020s and of between 1.4°C and 2.9°C by the 2050s (Conway and Schipper 2010).

In relation to this, the household survey was asked about the frequency of drought in the area for the last ten years. The majority of the response said that (92.9 percent) the frequency of drought has increased for the last ten years. At the same time, the participants of the household survey were asked to identify the possible impacts that they faced and rank them according to the magnitude of the impact in regard to their livelihood.

Figure 7 Impacts faced and their ranks



Source: Own Survey

Figure six illustrates about the impact of climate change and ranks according to the household survey where the respondents said (94.1 percent) in a form of food shortage, (92.9 percent) death of livestock, (87.1 percent) decline of rangeland in terms of quality and quantity, (85.1 percent) reduction in price of livestock, (68.2 percent) crop price increased while 50.6 percent as loss of harvest.

5.3 Climate Change-attributed problems

Climate change is one of the foremost pressing problems which affect the livelihood system of the pastoralist communities in Liban zone of Ethiopian Somali regional state. The area has experienced several climate change-attributed problems such as droughts, diseases, pests and floods. It is worth mentioning to draw a clear picture about these aforementioned climate change-attributed problems and discuss them one by one in detail.

5.3.1 Drought and its recurrent magnitude

Drought is one of the persistent climate change-related problems that the Liban zone pastoralist communities have experienced over the past several years. In the southern lowland of Ethiopia in which Liban zone is located, drought previously used to occur in every 5 to 8 years but now days the drought cycle changed where it frequently happen very 2 to 3 years (Aklilu and Alebechew, 2009). The participants of the Focus Group Discussions and the KII interviews has also confirmed with the aforementioned findings of the research cited earlier specially in the last ten years where recurrent and prolonged droughts witnessed in the study area. The Key informants have also noted that the pervasiveness of the drought has made pastoralist to be in a vicious cycle drought atmosphere. In addition, the focus group discuss that the researcher had with elders in Filtu and Dollo-ado Woredas indicates that about historical time lines of the frequent droughts that has occurred in the area by giving local names to each drought that the pastoralist communities has experienced in past four decades. These are summarized in the following table:

Table 6 Historical Timeline of Climate Change-attributed problems

Event	Timing	Explanation
Baastaale drought	H/SELASE	Severe drought that resulted significant livestock mortality followed by severe food, water and pasture scarcities, the main Gu rain failed. The word Baasta means in Somali Spaghetti, For the first time Spaghetti relief food was distributed, similarly Pasta was sold in the local shops that existing at time
Hagai Uus drought	H/SELASE	Hagaai Uus was drought that struck in Liban zone, there was erratic rain in the short rainy season and failure of the Main GU' rainy season. Severe food shortage, people were slaughtering animals for food, the word Uus in Somali mean stomach content which means the stomach contents were scattered everywhere.
Fadhi flood and animal diseases	H/SELASE	There heavy flood followed by livestock diseases, the word **Fadhi** means idol or sitting, as the name indicates there was period in which the floods restricted movements
Bu,ula qalad Drought	H/SELASE	Drought that has claimed the lives of animals, due to severe food scarcity the pastoralist were even slaughtering and eating pre-matured delivered camel calves, Bu,ula means calves delivered before their normal birth, according to the old men the drought was sparked After erratic DEYR rain and Gu failure.
Zemenich drought	DERG	Severe drought that resulted food shortages, officials from DERG regime and students were given tusk to distribute food. The drought occurred after the rain of both seasons became erratic with delayed onset

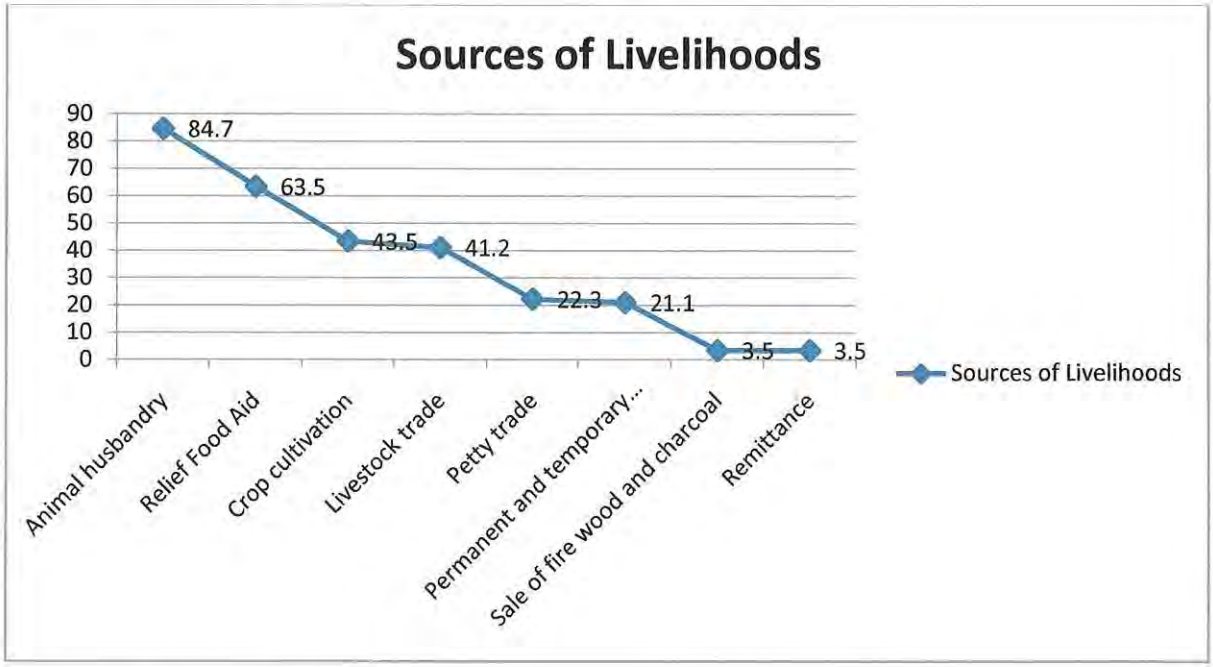
Flood	1977	There was Heavy flood which paralyzed the movement of both animals as well as human movement, roads were destroyed and commodities became scars and expensive. This flood happened on the eve of Ethio- Somali war
Conflict	1977	The Ogade war between Ethiopia and Somali on 1977 had forced large portion of the population to seek refuge in Somalia. Sizable population of Filtu and Dollow-ado district were displaced and became refugees, they only returned home after the collapse of Somali government in 1991.
Lo ba,ay drought	1989-1990	This was severe drought that caused the death of many livestock particularly cattle; the drought was named with its impact "**CATTLE DEATH**". There was failure of Gu rain as a result massive cattle died due luck of pasture and water and in combination of diseases.
Hurgufa drought	1990-1991	Severe drought with catastrophic impact, a lot of livestock and human died as result of luck of food severe pasture and water scarcity followed by livestock and human diseases, the drought had struck the whole of Somali inhabited regions in the whole of horn Africa. In this period Somali government had collapsed and DERG regime toppled, there was transitional government and lowliness in Somali, the clan conflict in Somalia had spilled to Ethiopian Somali region. Limited interventions combined by inter clan conflict and power vacuum had caused significant death toll on both human and livestock. The word HURGUFA means wipe out which means all livestock were wiped out. In this drought both rainy seasons completely failed. There was displacement, in Dollow-Ado town there were IDPS who fled from conflict and drought at Charrati district of Afdher zone. This drought made the animal's price one of the lowest in the memory of the community.
Kor-Uguur drought	1993	There was drought that forced the community to migrate to Filtu district, even the GARRAMARRE clan who mainly farmers along the banks of Web and Genale rivers had for the first time migrated to Filtu, **Kor-Uguur** migrating upwards.
DEYR Maqandrought drought		The Deyr rain failed completely followed by delayed GU rain had sparked into drought. DEYR Maqan means absence of DEYR rain
Abaartii HAlGEI	1995	Severe drought that resulted severe food shortage, animals price dropped, severe water scarcity in everywhere, HALGEI an Norwegian Aid worker working for NCA (Norwegian Church Aid) distributed relief food.
Camel disease	1996	Camel disease breakout that killed many camels
DEYR Shuba flood	998/99	severe flood that closed the whole roads and washed all farms, the prices of all essential commodities sky rotated, food became scarce, some residents of Dollow-Ado town were feeding grass and leaves, Dollow town became an island completely cut off from the rest of the country, the government helicopters were bringing relief food. Both river burst their banks and flooded the

		town. This flooded were caused by Elninon in 1997
Dabader drought	2000/01	It was heavy drought that resulted massive livestock in out migration, livestock migrated to Afdher and Somali poor Deyr rain and loss of Gu rain , had caused the drought that resulted death of livestock
Camel diseases	2006/7	There was camel diseases that originated from AFAR region that killed many camels in Somali region particularly Dollow. The memories of camel diseases outbreak is fresh with every elder, however, when asked other specifies none of them remembers well. This an indication that camels is given more value than other type of animals
Isku gur drought	2008-2009	Once more the pastoralist of Dollow-Ado district migrated to as far as Hayasuftu Filtu and Deka in search of pasture. This drought had stricken many Somali inhabited in Horn Africa; it was when the influx of Somali refugees to Dollow started. The drought was sparked by the failure of main Gu and erratic rain of the Short rainy seasons.
Korahed sadehad	2010/11	Korahed sadehad: It was not severe droughts, both rain falls were erratic, and uneven distribution with early cessation: Korahed **sadehad** means three seasons from now.
Animal abortion	Early 2013	There was wide spread animal abortion disease that affected most of the species particularly camel, this diseases caused milk shortage
Heat stress	continuous	The elders was unable to name specific year of heat stress, the normal temperature of Dollow district is more than 40 decrees in most of the year , in January-April/ September –October the temperature reaches 42 degree Celsius. In June/July the temperature drops to 30 decree, it was difficult for them to differentiate normal temperature and excessive heat, however, they all acknowledged substantial temperature increase in the last 20 years.

Sources: Discussions with Elders

Similarly, the Households survey shows 94% of the respondents ranked that drought is first and foremost climate change- attributed problems that these households experienced in one way or the other whereas number quite significant one when it is compared to other climate change-induced hazards such as floods, disease and pest.

Figure 8 Sources of Livelihood

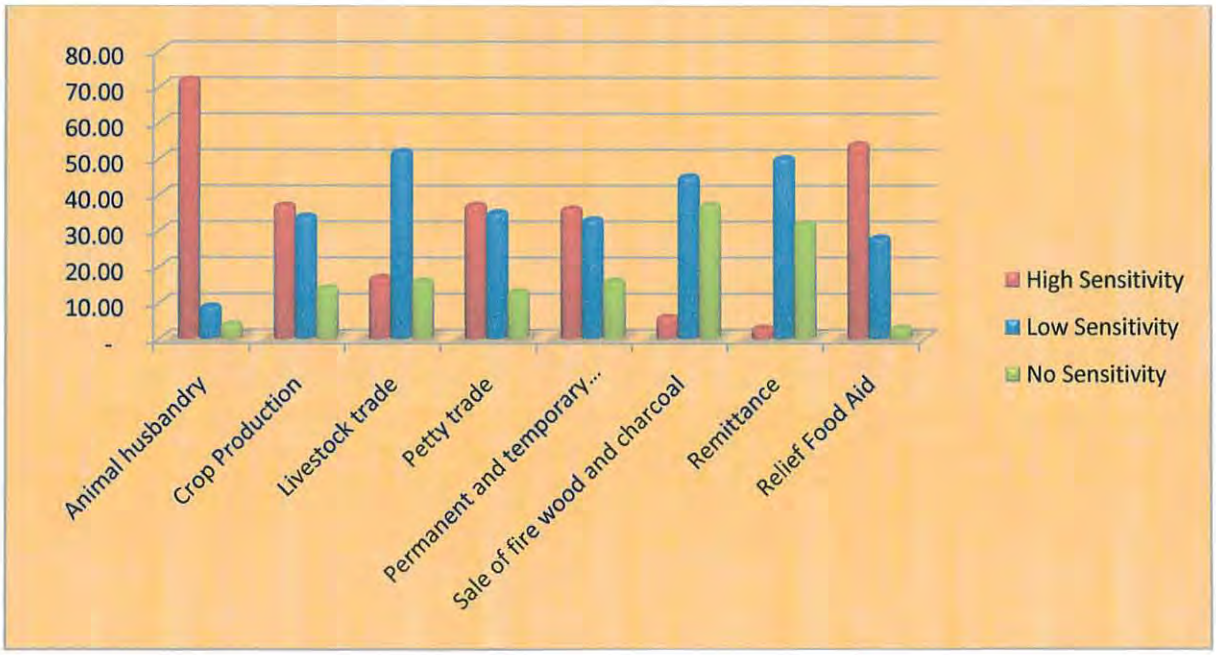


Source: Own Survey, 2015

It can be observed from the figure seven, the household survey that majority of the respondents' livelihood sources are from the animal husbandry. Traditionally, it is known that the pastoralist communities are highly dependent on livestock and the finding of the household survey typically represents that animal husbandry is a source of livelihood for (84.7 percent) of the respondents while (63.5 percent) said that their livelihood sources is from free relief aid and this mainly due to three of the four study kebeles get food from NGOs operating in the area. Particularly Boqolmayo and Adad Kebeles of Dollo-ado are PSNP beneficiaries a program that was started in the country in 2004 whose main aim is to protect pastoralist assets during the drought and stress times in the area while Jayga'ad somewhat get seasonal food that comes from WFP and administered by the regional local government as a result of this many of the respondents of the household survey coincidently revealed that they are part of food aid beneficiaries in the area. On the other hand, crop production represents the third livelihood sources of the household survey figuring about 43.6 percent of the household respondents and majority of these households are the inhabitants of Ayinle and Jayga'ad Kebele where both livestock and crop productions is predominantly practiced. The other livelihood sources that the respondents reported is livestock trade where for about (43.1 percent) is based on their livelihood. Livestock

trade and permanent and temporary are (22.3 and 21.1 percent) for each while remittance and sales of charcoal represent about (3.5 and 3.5 percent) for each respectively.

Figure 9Livelihood Sensitivity



Source: Own Survey, 2015

The above figure, figure eight presents about the sensitivity of the livelihood sources of the household respondents showing that animal husbandry has been ranked as the highest sensitive, relief aid rated as the second highest sensitive followed by crop production as the third highest, petty trade fourth, livestock trade as the fifth highest sensitive and permanent and temporary employment sixth highest sensitive where sell of fire wood and charcoal remittance seventh and eighth highest sensitive livelihoods to the climate change-attributed problems respectively.

5.3.2 Livestock Disease

The other climate change-attributed problem that was identified by the FGD and the KII was livestock disease in the study kebeles. It was observed that most of the participants have related the diseases that they experienced with drought by arguing that droughts are coupled with both existing and newly emerging diseases which causes severe illness and livestock deaths. Furthermore, the participants emphasized that during intense drought households are forced to

migrate or move from where they are residing in search of pasture and water. In this respect, the households and their livestock are exposed to new environment which has health risks to both human and livestock. There were instances that the FGD and KII experts expressed about even camels and goats which are believed to be one of the drought resistant animals are highly affected by these livestock diseases.

5.3.3 Flash Floods

Floods are also in widespread in the study area mainly Dollo-ado district since Dawa river in the town and most of the time cause rampant destructions in the area. For instance, the elders explained how flood affected in Dollo-ado district in which the severity of flood had closed the whole roads and washed all farms in the area. The prices of all essential commodities sky rocketed, food became scarce. As a result of this, some residents of Dollo-Ado town were forced to eat grass and leaves to feed themselves as there was no food available at that time. The participants of the FGD narrated that Dollo-ado town became an island which became completely cut off from the rest of the country. The residents of the town remember that the government helicopters were bringing relief food. Both river burst their banks and flooded the town in this particular time. Even recently, according to the 2014 Deyr Assessment Report of Liban zone revealed that there have been flash floods in some parts of Dollo-ado and Filtu which caused a considerable damage to the livelihood assets such as farm land, irrigation motors as well as killing quite number of livestock (Multi Agency Deyr Report of Liban 2014). These flash floods were due to heavy rains in the highland parts of the country even though the rains which has been observed in the study area were not significant ones but it reinforced heavy rains that occurred in other parts of the country particularly highland areas.

On the contrary, the household survey that was conducted in the research Kebeles didn't disclose flash floods that occurred in the area since most of the flood reported areas are near in the river banks. The floods also contribute to spread of serious diseases such as acute watery diarrhea, cholera, fever and malaria for example KII of both Dollo-ado and Filtu stressed that malaria became prevalence in expanding to new areas has never been seen before and emphasized on that climate change has direct and indirect effect on the spread of disease and pest.

5.4 The Effects of Droughts on Livestock

There is no question that several studies in different parts of the southern low lands of Ethiopia have revealed the reality of drought that has been linked with climate change problem threatening the pastoralist community's livelihoods in these areas. The pastoralist livelihood system is dependent on livestock and this confirms with the result of the house hold survey that was conducted in the four study kebeles. However, loss of livestock due to recurrent drought in the study area is a very serious challenge that is threatening the livelihoods of the pastoralist communities of the four study Kebeles. For instance, over the last ten years the trends of livestock holding indicate that there is a drastic reduction in every household's livestock holding status. In this regard, the respondents of the household survey mentioned that they were almost nurturing or herding for different type of livestock.

Despite having this viable herd diversification strategy in place, the respondents of the household survey demonstrated that there is livestock decrease trend in terms of both growth and regeneration where about more than 80% of respondents validates this in the below table:

Table 7 Livestock Holding Trend of the Household Survey Respondents

Livestock holding	Number of livestock before 10 years	Number of livestock before 5 years	Number of livestock Now	Number of livestock		
				High increase in %	Low decrease in %	No change at all
Cattle	1071	834	577		69	
Goat	3316	4908	2282		46	
Sheep	1799	1155	692		60	
Camel	804	1747	660		38	
Donkey	85	134	67		50	
Chicken	188	118	113		96	

Sources: Own Survey, 2015

The result of the survey indicates that cattle holding status has considerably decreased in the trend between ten to five years and now for about (69 percent), for goat (46% percent), for sheep (60% percent), for camel (38 percent), for donkey (50% percent) and for chicken (96% percent) respectively. It is apparent that ten to five years is quite long period of time but pastoralist are people who memorable to their livestock holdings since they value livestock greatly.

The informants of the FGD described about how a camel's milk used to support a family size of ten approximately about ten years ago and how the cattle used to eat grass in some few meters away from their households but the distance for grazing sometimes is away 100 km from their households. Besides, livestock declining both the KII and FGD had stressed about the productivity, regeneration and reproductive capacity of livestock are making the situation of the pastoralist communities from bad to worse case scenarios as the loss of very essential resources leads to increase the vulnerability of these households in respect of the their livelihood and asset holdings.

Moreover, when asked about the possible causes of the livestock decreasing, respondents pointed out that the major causes for the livestock decreasing were described as follows: death due to recurrent droughts were (91.8 percent), high off take selling livestock for household consumption (90.6 percent), death due to livestock disease (89.4 percent), Sell livestock to send many children to school (49.2 percent) has positively agreed about the aforementioned categories while Sell livestock to build house in town (62.4 percent) and Conflict (83.5 percent) has reported that disagreed both conflict and sell of livestock to build a house in town are not the cause for decreasing the livestock holding status of the household survey respondents as illustrated and ranked according to the priority that they have experienced in the below table.

Table 8 Causes of Livestock holding Decrease

Causes of Livestock Decreasing	Yes	No	Percent	Ranks		
				1st	2rd	3rd
Death due to recurrent drought	78	7	91.8	5		
High off take or selling of livestock for house hold food consumption	77	8	90.6	4.5		
Death due to disease out breaks	76	9	89.4	4		
Sell livestock to send many children to school	42	41	49.2		2.3	
Sell livestock to build house in town	30	53	62.4		2.2	
Conflict	12	73	83.5			3

Sources: Own Survey, 2015

Apart from drought, Livestock disease was illustrated as another risk or hazard that reduces growth of the pastoral production system immensely. Together with the effects of drought, disease causes severe deaths of livestock which reduces the size of livestock through driving up the calves' mortality rates. It also causes the decline in livestock production and productivity. The implication of livestock disease to household food security is obvious whereby it decreases milk, meat that is one of the vital elements livestock products (Aklilu and Alebachew 2009).

Concerning the trend of livestock disease, the key informants of studied sites disclosed that it is declining due to the veterinary service provided by government as there is no assistance from various NGOs working in the area. This has made that services provided by the government do not match with the existing demand of the pastoral communities for their livestock. Consequently, they reported that some diseases still affect the health of their livestock.

According to the information obtained from Woreda Livestock Expert in the study area, the main diseases affecting the livestock population in the area as whole were noted as foot and mouth disease (FMD), Lamp skin disease, Contagious Bovine Pluro pneumonia of cattle, Contagiuos

Caprine Pluro pneumonia (CCPP) of goat, respiratory and Gastro intestinal disease of sheep Camet Trypes of camel and New castle disease of poultry. Therefore, the stock disease is an influential constraint in the economy of pastoral people.

5.4.1 The Climate Change Impact on Natural Resource

There was wide consensus among the FGD and KII that climate change has a great effect on key natural resources in the pastoral communities in Liban zone. The study area used to be rich with rangeland resources but it appears that rangelands have gradually been degraded whereby the valuable rangeland has been replaced with indigestible bushes resulting from low quality grass species in the area. It seems that there has been a significant change to the landscape of the study area as a result of recurrent droughts and other anthropogenic factors over the past ten years. According to the participants of the FGD, recurrent droughts and population pressure are repeatedly stated as the main factors for the observed change in the area. Additionally, discussions with the expert DPPB reveals that forests, grasslands and agricultural ecosystems in the study area are in critical condition. Discussions with the Elders in the study area revealed that different plant species were flowering and fruiting irregularly.

On top household survey's responses and verification in the field provided evidence of invasive species like ***Aligarob*** *presobis/julifilora and* ***Kaligii nolaada*** *pertinium* which is not edible for livestock and these weeds are taken as major causes of declining cereal production, grass coverage and reduction of perennial local herbs. At the same time, the common herbs of the area (which is edible for livestock), are disappearing/decreasing from the area. Some of the community members believe that changes in temperature and rainfall are creating favorable environments for pests, diseases and invasive species to emerge, spread and encroach on grass land. Erratic rainfall patterns and winds are contributing to soil erosion, soil fertility loss, and crop damage are having an adverse impact on livelihoods of most of these communities, thus increasing risk to food security (Riche et al 2009).

Though drinking water is increasing due to availability of water storage tanks and water pipes, the participants of FGD said that they are facing more drought periods resulting decrease in natural springs and irrigation water. This may affect agriculture, and subsequently cause widespread food insecurity in the area.

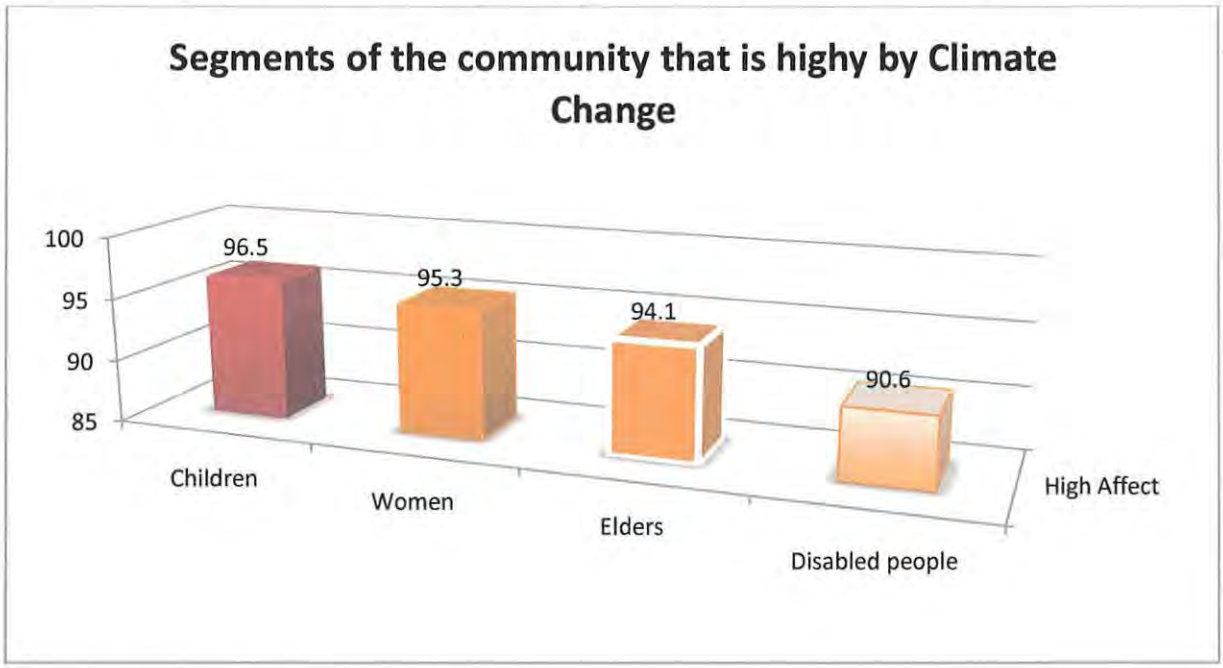
5.4.2 Climate Change Effect on Various Segments of the Pastoralist Communities

Climate change affects different segments of the pastoralist communities including women, children, elders and disabilities differently. However, the degree of affect and vulnerability varies between and within the segments of the pastoralist communities. For instance, women in the study area are shouldering several responsibilities and desperately struggling to meet these responsibilities accordingly. The major tasks that pastoralist women in the study areas are required to meet are taking care of the children, preparing food for the household, looking after the sick and weak livestock, milking, fetching water and firewood for their households respectively. Aklilu and Alebachew (2009) clearly indicated that "climate change induced hazards create additional burdens on women in many ways and make them vulnerable to its impact".

In times of drought, women are overloaded with huge work and shortages of household resources where they are pressured to meet the demands of their households mainly water and food. Culturally, women in the study area first feed their household members mainly elders, children and husbands and latter feed themselves nevertheless in the times of drought where there is severe food shortage these pastoralist women are exposed to malnutrition as they do not get enough food to feed themselves.

Similarly, children are also exposed to malnutrition and dropout from schools as their families constantly migrate from one place to the other in search of water and pasture particularly during drought periods. It is apparent that all the participants of the FDG agreed that children, women, elders and disabled people are also one of the most vulnerable segments of the community as they are dependent on other members of their families.

Figure 10 Segments of the community highly affected by the climate change



Source: Household Survey, 2015

Similarly as it can be seen from the above chart, the household survey also complements that climate change highly effects children where the respondents rate more than (96.5 percent) in the same time putting women in the second category of the segment of the pastoralist communities that are highly effected by the problems of climate change corresponding to (95.3 percent), elders in (94.1 percent) and disabled people 90.6 percent accordingly. It seems obvious that the impact of climate change in the study area is widespread effected in a different aspects of the pastoral communities and the vulnerabilities that they are exposed for the past two decade. In other words, the pastoralist communities had been responding to the various shocks and risk that they have experienced in the past and now it is time for us to turn the focus on the responses as well as coping strategies that the pastoralist communities have employed in order to tackle over the years.

5.5 Livelihood Diversification as local strategies to cope with climate change

It was observed that pastoralist communities in the study area apply a combination of strategies to cope with the effects of climate change-attributed hazards.

The main local strategies to cope with climate change are among others herd diversification, crop production, seasonal mobility and social supporting systems. The other additional local strategies that cause harm to wider environment are selling charcoal or firewood, overgrazing and cultivation of unsuitable lands where these result in further desertification and degradation of vital environmental resources such as land, pasture and water.

5.5.1 Herd diversification

It appears that herd diversification is sustainable strategy that is part and parcel of livelihood diversification as it offers various opportunities to manipulate livestock products. It also enables the pastoralist communities to adjust to the widespread of risk that is associated with the changing climatic conditions. Furthermore, pastoralist communities nowadays practice herd diversification by having multi-livestock species so as to utilize different herding environment (Oba 2013).

Generally, it can be observed that there is a shift from grazer livestock such as cattle and sheep to more browser livestock like camel and goats. This is mainly attributed that camels and goats more resilient and adaptive to the changing harsh climate conditions and vegetation cover. Conversely, cattle and sheep are more vulnerable and less resistant to droughts and need to have fodder preferences, more water and consume grasses rather than browser (Toulmin 1994; Ali 2008).

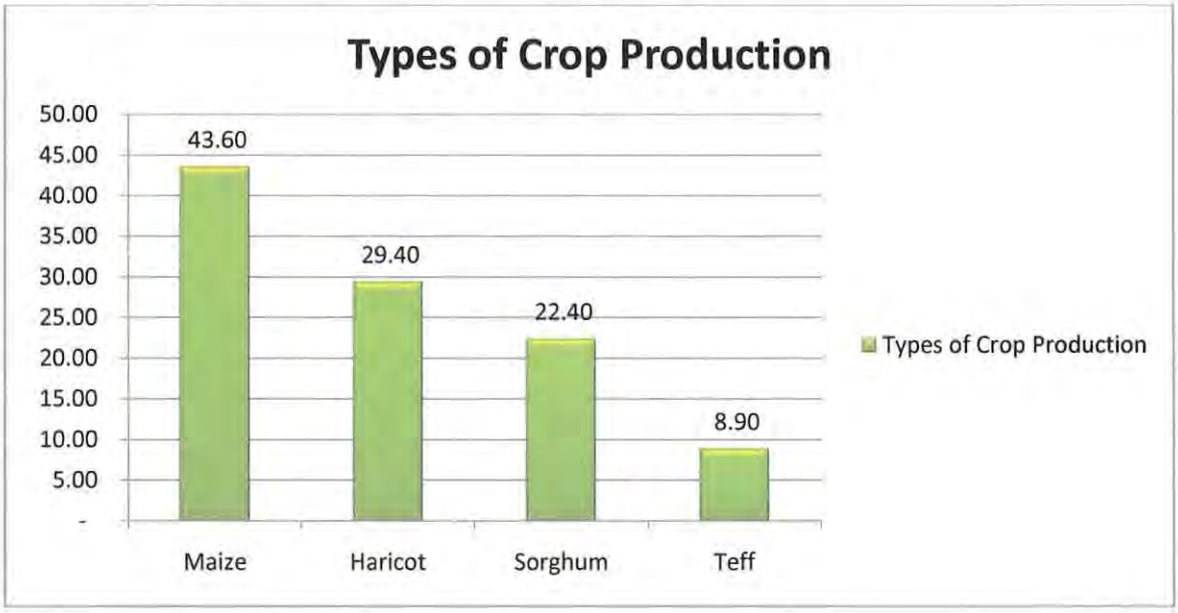
Besides, the demand for camels is increasing these days as compared to cattle. In addition to this, camels are an old age tradition and social prestige among the Somali pastoralist in the study area. The participants of the FGD noted that camels and goats are milked even in the intense period of drought while caws can hardly give milks during these periods. In terms of market goats and sheep are considered to be "walking money" as it was put by one of the participants since they are easily manageable to be sold in the market due to the increasing demand for goat and sheep these days.

In addition, the result of the household survey indicates that (70.1 percent) of the households use herd diversification as local coping strategy to cope with the impacts of climate change.

5.5.2 Crop Production

It was observed in the study area that pastoralist communities practice crop cultivation and use this type of livelihood as a supplementary strategy in order to escape from the risks of highly depending on livestock as the only source of livelihood. The participants of the FGD expressed that there has been expansion of farm to rangeland areas that has never been cultivated before where the expansion is related with decline in range resources and the decrease of both in size and productivity of livestock in the study area. According to the household survey, the respondents indicated that they have started crop cultivation (26.6 percent) said that they started in between five to ten years and (10 percent) revealed that they started this livelihood in between eleven to six teen years while the remaining (5.9 percent) out of the total (43.6 percent) that are engaging in this livelihood activity responded to from seventeen to twenty one years ago. When it comes to the land size that these households have, the respondents reported that (37.6 percent) owns land size of about one up to two hectares while the remaining (6 percent) out of the total (43.6 percent) households have two up to four hectares respectively.

Figure 11 Types of Crop Production



Source: Own survey, 2015

In addition, the households were asked about the type of crops that they cultivate in the household survey and the responses disclosed as it is shown in figure two where the illustration is that all the (43.6 percent) of the households said that they have been cultivating maize, (29.4 percent) for haricot, and (22. 4 percent) for sorghum and (8.9 percent) for teff and the decrease in teff is due to the amount of rainfall in the area is not enough for teff to grow in the area since the crop needs huge amount of water to be irrigated and this means that this type of crop production is not suitable for rain-fed farm in pastoral areas in the country. Furthermore, the major crops are also cultivated in the river bank areas where irrigation is available and it is promising since the clans who reside in that particular area have been farmers for long period of time. Beside the above results, the participants of the household survey were asked about the trends of crop production whether it was decreasing, increasing or not. They replied that 39 percent of the total (43.6 percent) of the household that involving in this livelihood said that the trend was decreasing, (2.1 percent) said it was increasing while the rest (2.5 percent) said that there was no change at all. When asked about the factors behind the reduction in crop production, the household survey results showed that about (81.7%) said drought, (69.5%) pest outbreak, (57.3%) absence of high yield seeds, (51.5%) absence chemical fertilizer and (43.1%) floods and ranked first, second, third, fourth and fifth respectively.

It is apparent that rain-fed crop cultivation is used as complementary strategy but the increased frequency of droughts combined with crop disease and pests and unreliability of rainfall makes the suitability of crop cultivation as un-viable strategy and it is also obvious that its sole dependency might accelerate the vulnerability of the pastoralist communities (Aklilu and Desalegn, 2013).

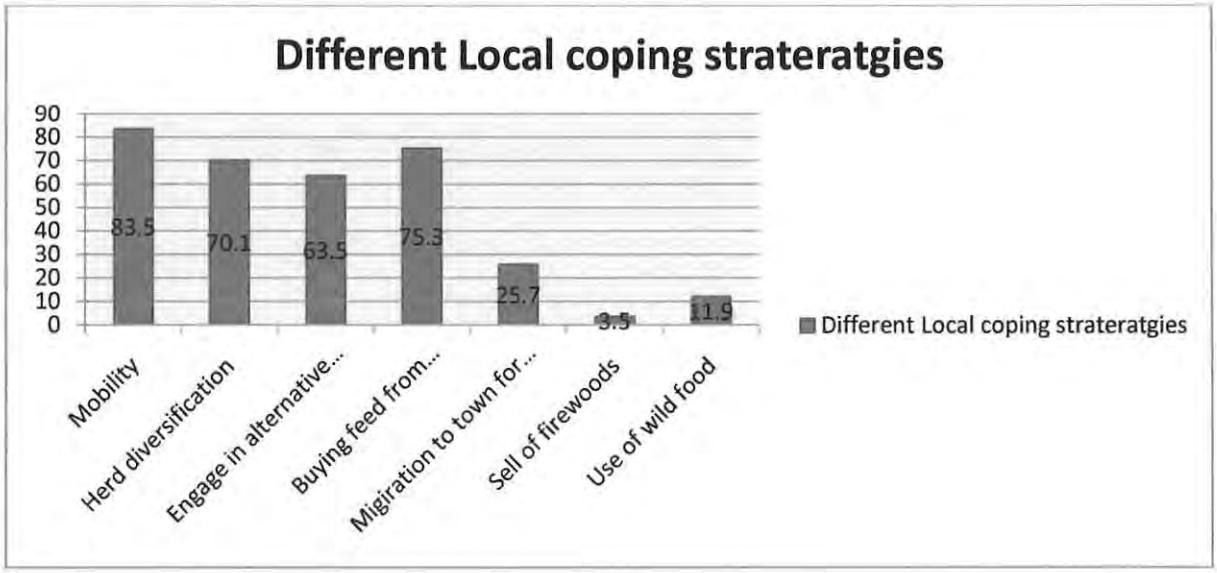
It can be grasped from the above findings that pastoralist communities in the study area use rain-fed crop cultivation as a supplementary strategy for their livelihood.

5.5.3 Resource sharing

Resource sharing is another long standing strategy which is common among the pastoral communities. These are social support mechanisms that increase the resilience of the pastoralist communities and it is used in all the southern low land of the country varying from the local meaning (Bamlaku 2013). In the study area, FGD explained about *Irmansi* which is literally

means milking. It is when household that do not have a lactating livestock is given a milking caw, goat or camel so as to use it throughout the year and brings back when the household recovers from that particular situation. The other was *Rai* it is usually referred as when a child or youth from close relative of poor pastoralist family is allowed to herd for rich relative in exchange of food, livestock and benefits in a form of payments. The last element of these social support systems was *Dhowrto* which is a contribution made to a poor family in a form of livestock, milk and food during the *Jilal* dry season. These social systems are in place among the pastoral communities as a social security system and redistribution of wealth among the pastoralists. They are arranged to support pastoralist household who lost their crucial assets to the climate change attributed problems such as drought, disease, conflict and floods. However, the capacities of these traditional institutions often face challenges to overcome the intensity of these problems overwhelmingly.

Figure 12 Local Coping Strategies



Source: Own Survey, 2015

In short, the above figure eleven illustrates the other different local strategies other than crop cultivation, resource sharing and livelihood diversification. The results show that mobility is said to be (83.5%), herd diversification (70.1%), engaging in alternative income sources (63.5%), buying feed from another place (75.3%), migration to town for work (25.7 %), sell of firewood (3.5%) and use of wild food (11.9%) respectively

5.5.4 Livelihood Diversification

Livelihood diversification is part and parcel of the local strategies to cope with climate change-attributed problems. Livelihood diversification is essential factors that can contribute to overcome the climate hazards that affect the pastoralist communities in Liban zone.

Generally, there are two broad classifications in regard of livelihood diversification (Barrett et al 2001). The first one is natural resource based activity and non-natural resource based activities. It can be observed in the study area that both the two classification are practiced by the households according to the survey results. For instance, natural resource based livelihood activities that are practiced in the area are livestock raring, crop cultivation, selling of charcoal or fire woods and other natural resources related livelihood activities other than the ones mentioned above.

The other non-natural resources are wage from both permanent and temporary employment as well as petty trade. This indicates that livelihood diversification exists in the study area where it can be employed as one of the local strategies to cope with climate change-attributed problems that affect the pastoralist communities in Liban zone in general and in four study Kebeles in particular.

Studies conducted in similar areas indicate that livelihood diversification in pastoral areas is already happening fast and affects different social groups in different ways (Fratkin 2013). The driving forces (factors) for diversification may include destitution as well as wealth, and the search for crisis survival options as well as opportunities to invest and accumulate. The poor pastoralists have been forced to diversify out of livestock herding, in activities like petty trade and earning wages from both permanent and temporary employment, which offer them minimum returns (Ibid). It appears that these livelihood activities are additional sources of income since they are non-pastoral activities where pastoralists generate income that complements their traditional pastoral livelihood activities (Sandford 2013).

There were key questions that have guided the research paper in order to find the status of the current livelihood diversification in the area. The questions will now enable us to analyze more deeply in livelihood diversification as a viable strategy that can increase the adaptive capacity of the pastoral communities in the study area. The first question about livelihood diversification was what has been changed in terms of livelihood activities? As it was forwarded to both FGD and household survey participants, the majority of the household survey participants (80 percent) admitted that there has been a change in the livelihood activities that they are engaging and it was identified that each household had minimum two livelihood sources or more than that. For example, livestock and petty trade or animal husbandry and crop production or trade and permanent employment and so on the list may go on. This shows that at least there is livelihood diversification and the type of the diversification as well as the rate of engagement.

The second question was what has cause the change of the livelihood activity? To put it down, a significant proportion (85 percent) of the respondents mentioned in one way or the other that climate change-attributed problems has caused the change of livelihood activities. For example, those who were practicing only in animal husbandry before five or ten years ago now realized that it is hard to survive within the exacerbating environmental conditions in the area and started a complementary rain-fed crop cultivation to at least survive since its viability is under question and added to petty trade to make sure that their adaptive capacity is not weakened.

The third question was does the change contribute to cope with climate change impacts? To what extent does it help? Similarly, around (40 percent) of the respondents replied that the change is contributing to the problems associated with climate change somehow building their reliance to the shocks of the climate change where one of the participants pointed out that for example if drought occurs this year "it is possible to overcome with my shop" the other participants argued that the income they gained from diversification enabled them to send their kids to schools which is investment for future pastoral generations.

The last key question was does the change sustainable in both the short term and the long term? The answer to this question divided the participants into two but the researcher forwarded the consideration of other influencing factors as new enabling pathways to ensure the sustainability of the aforementioned change and let's now turn to discuss these elements one by one in detail.

A. The growth of urban sedentary system formations in villages or small towns

The growth of new urban villages or small town are clearly observed throughout the study area as it has been noted by both FGD and KII experts posing new opportunities to flourish in pastoral areas. For instance, in Filtu district alone, 63 small/villages have been emerged since 2000 and each town has an estimation of over 50 households. The small/villages are filled with large number of youth, women, men and elderly people who are striving to capitalize on none livestock livelihoods (Abdi et al 2013).

In relation to this, these new ways of life style might bring about opportunities for the pastoralists to engage in new livelihood activities sustain these livelihood diversification in relative terms. Demand for urban goods and service such construction of homes has intensified in the area creating employment opportunities for many who depends on casual labor as they do not have skills or trades that they can sale to such urban settings.

Further, along with the mushrooming of small villages/ towns business activities such as expansion of commoditization of livestock products such as livestock fodder production, livestock marketing, milk trading can add a value to the sustainability of the change that has been observed in the study area.

It seems that this might be a new pathway that can enable livelihood diversification to address options for new livelihoods for large number of people in these emerging towns and villages to cope with the effects of climate change in the long-run.

B. Commoditization of Livestock and its products through expansion of markets

It appears clear that the formation of aforementioned villages will definitely need to get services and goods mainly livestock and its products where markets can expand in which the value of livestock products such as milk, butter and meat will increase sharply. For example, one of the participants of FGD stressed that the demand of commodities such as meat and milk is increasing from time to time specially in small towns in the study where pastoralist usually adjust to this new trends and make use of these new pathways.

Finally, it seems that the aforesaid influencing factors as a new pathway and the observed reality in the ground can at least facilitate the opportunities for livelihood diversification to sustain in at

least in the long term since pastoralist communities in the study area are already making use of the diversification in short term as one of the local strategies to cope with the impact of climate change in the area.

5.6 Institutional Responses

The federal government of Ethiopia has developed various policies, strategies and programs designed to improve the livelihood of the people through reduction of poverty and environmental protection schemes. Previously, there was an explicit policy of climate change though it used to incorporate in various sectoral policies (Aklilu and Alebachew 2009). But recently in 2011 the government has adopted Climate Resilient Green Economy so as to respond to challenges associated with climate change and at same time develop green economy by visioning to become one of the Middle Income Countries in the world by 2015 (CRGE 2011).

There are institutional responses that are conducted by state and non-state actors which are aimed in reducing the impact of climate change-attributed problems in the study area in many ways. The state actors usually engage in emergency aid to the vulnerable and the victims of climate change hazards. In the discussions with the DPP office in the study area raised in a number of incidents such as 1997/98, 2006, 2008/09, 2011 that the state actors where in 1997/98 flood disaster in Dollo-ado, the government used helicopters to provide relief food to the victims of the disaster where the government carried out rescue operations by providing the necessary in the emergency period. Furthermore, the state actors assist the victims to relief and rehabilitate by recovering the livelihood of the victims in the post emergency period.

In 2004, the government of Ethiopia in partnership with multinational donor aid group lunched Productive Safety Net where the main purpose of the program is to support the most vulnerable household in the community through direct food and food for work arrangements. In the study area, Boqolmayo and Adad Kebeles are part of the program whereas Jayga'ad is part of government relief food through WFP according to the expert of DPP office. The regional government in coordination with the federal government has introduced resettlement program where certain pastoralist households are transformed from pastoralists to agro-pastoralists by providing fertilizers and provision of seed as well as training though the appropriateness of such

intervention with the community consultation is questionable as one of the FGD noted admittedly.

Moreover, there are various committees in the local administrations led by the DPP and BoFED district offices in coordination with NGOs operating in the area to conduct early warning and assessment prior to a disaster for immediate intervention even though delays of intervention has been raised during intense periods in the FGD. The non-state actors or NGOs that are working in the area implement several projects that were designed to increase the adaptive capacity of the pastoralist communities in the area. In most cases, the projects that these NGOs implement revolves around in awareness creation, provision of social services, health and enhancing livelihood diversification by using various income generating activities and strategies. It appears that these kinds of projects contributes to minimize and mitigate the climate change-attributed problems though the capacity of NGOs to address wide beneficiaries seems to be lagging when it is compared to the scale of the problems in the area.

To mention few NGOs operating in Filtu area Pastoralist Concern a local NGO operates in the area where its intervention is about building the capacity of the pastoral communities through Women Capacity Building by providing Provision on saving and credit opportunities for pastoralist dropout women. The program organizes women in cooperatives that create their own business. In return, the cooperative buys gums and incense which the pastoralist communities collect it from the forest to sale and get alternative income for their household. The other intervention include provision of food for work opportunities, construction of water reservoirs that help people during dry seasons, establishment of pastoralist field schools which was best way to mitigate the effect of the climate change.

Other organizations like Save the Children also provide nutritional intervention during dry seasons and DFAP project which is developmental food aid program. Mercy corps also provides hay or fodder through its PRIME project. The PRIME project directly addresses about climate change-attributed problems and promotes more focus on livelihood diversification and market oriented strategies as well as veterinary services for livestock however the project is in the initial stages. But in Dollo-ado, it is the concentration of NGOs because of the Somali Refugees in the area where almost all international organizations, UN agencies have a presence in the area.

Chapter Six

Conclusion and Recommendations

6.1 Conclusion

Climate change is one of the burning issues that cause unprecedented challenges that the mankind is facing these days. The impact of climate change is felt throughout Ethiopia though the magnitude varies from region to region.

Thus, pastoral areas such as Liban zone of Ethiopian Somali Regional State are among the most affected areas in by climate change. The effect of climate change on pastoralist communities whose livelihood greatly depends on natural resources are more pronounced than any other community in the country. The impact of climate change has made these pastoral communities the victims of the day as climate change poses serious threat of losing their vital livelihood assets frequently.

The findings of the study indicate that there have been frequent droughts, low rainfall, increasing temperature throughout the study area over the past several years. Similarly it identified that trend of the livestock holding in which the majority of the sampled household's livelihood is based, has been decreasing over the past ten years. It also highlighted that the major causes of the livestock decrease were recurrent droughts; livestock disease and high off-take of animals were rated as the highest ranks. The findings of the study also noted about the most affected segments of the community were children, women, and elders and disabled where the result of the survey showed that they are the victims and the most vulnerable people to the climate change-attributed problems because primarily pastoralist women as climate change added additional burden to their livelihoods.

Moreover, the findings of study indicate that pastoralist communities use wide range of local strategies to cope with the impact of climate change. It identified that crop cultivation is widely practiced in the area as a complementary strategy and expanding to areas that has never been under cultivation though most of these are rain-fed cultivation in which its viability is under question mark as it is susceptible to climate change due to unreliability of rainfall but it is promising in the river bank areas.

The findings also show that both natural based livelihood diversification and non-natural based livelihood diversification is practiced in the area. The findings of the study pointed out that pastoralists are diversifying within the sector of livestock and are engaging outside the natural resources base livelihood such as trade and permanent and temporary employment which has been found as an essential component that can enhance the adaptive capacity of the pastoralist communities in the face of the constant changing climates and the threat that it poses their livelihoods.

However, to sustain the livelihood diversification as a viable local strategy to cope with the climate change-attributed problems in the long-run, the study explained several enabling pathways such as urbanization, commoditization of livestock products and expansion of markets in the study area. It argued that these enabling pathways can facilitate the sustainability of livelihood diversification as adaptive capacity to cope with climate change-associated problems in the area.

Eventually, the study found out that current existing institutional responses are more oriented towards emergency assistance and asset protection. Nevertheless, future intervention needs to consider the new enabling pathways and consider pastoral development as an integral part of urban development rather than treating it purely as rural development in order to increase the adaptive capacity of the pastoralist communities through livelihood diversification programs in both the short term and in the long-run.

6.2 Recommendations

Climate change-attributed problems are posing severe damage to the livelihoods of the pastoralist communities in unprecedented manner. Thus based on the findings of the study, the following recommendations are assumed to be guiding in the responses to cope with the climate change-attributed problems in both the short-term and long-term:

Livelihood diversification in both natural based activities and non-natural based ones such as trade and permanent and temporary employment can be strategies to cope with the climate change-attributed problems and can enhance the adoptive capacities of the pastoralist communities.

Pastoral development initiatives should be programmed with the aim of improving the adaptive capacity of pastoralist communities and livelihood diversification is an option that can turn a new page in the lives of these communities in the face of the constantly changing environment and the risks associated with it.

Policy makers and development practitioners should consider pastoral development as an integral part of urban development rather than pure rural development.

The new enabling pathways should be released as emerging trends in the study area that can be platform to strengthen the livelihood diversification as a workable strategy to cope with the impact of climate change in the long-run.

In regard of expansion of dry land crop cultivation, an effective land use planning with the involvement of all the stakeholders should be developed to avoid unnecessary clearance of rangelands and inappropriate agro-ecology crop cultivation practices as a sedentary way of life that do not enhance the adaptive capacity of the pastoralist communities in the study area in particular and the region in general.

Conduct further research on the issue so that it can increase the knowledge on the subject matter of the issue in the future.

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Appendices

Appendix 1

Questionnaire for the Structured Household Survey

I. Background information about the household

1. Name of the household head_____

2. Sex of the household head (1) Female (2) Male

3. Name of the Kebele _____ 4. Age of the household age _____

6. Marital Status (1) Single (2) Married (3) Divorced (4) Widowed (5) Polygamy

7. Educational level attained

1. Illiterate (2). No formal education but read and writes (3). Grade_____

II. General Information about Household's sources of livelihoods (Tick)

8. **What does your family sources of livelihoods from? (Multiple responses are possible). (Tick)**

A. Animal husbandry _____ B. Crop cultivation _____ C. Livestock trade _____

D. Petty trade _____ (in what? _____)

E. Permanent and temporary employment _____ (where/amount? _____)

F. Sale of fire wood and charcoal _____ G. Remittance _____

L. Free relief aid _____ (from whom? _____) M. Food for work _____ _) P. Other (specify) _____

9. From the table below please prioritize 1 up to 5 your major alternative sources of income to mitigate effects of climate change (i.e. drought, flood and disease) and its sensitivity.

S/N	Sources of income	Yes No	Sensitivity		
			High sensitivity	Low sensitivity	No sensitivity
1	Animal husbandry				
2	Crop cultivation				
3	Livestock trade				
4	Petty trade				
5	Permanent and temporary employment				

6	Sale of fire wood and charcoal				
7	Remittance				
8	Free relief aid				
9	Food for work				

III. Livestock holding information

10. What type of livestock species your family has? (Tick)

A. Cattle_____ B. Goat_____ C. Sheep_____ D. Camel_____ E. Donkey_____

F. Mule____ G. horse_____ H. chicken _____ I. Others_____

11. From livestock species you have which one can cope with current climatic condition of your locality? Prioritize in order of withstanding climatic shocks.

A._____B._____
C._____D._____
E._____

12. How do you see your livestock holding status from last ten or five years to date?

S/N	Livestock holding	10 years	5 years	Now	Number of livestock		
					High increase	Low decrease	No change at all
1	Cattle						
2	Goat						
3	Sheep						
4	Camel						
5	Donkey						
6	Horse						
7	Mule						
8	Chicken						

13. If your responses to question 12 is decreasing what are the possible causes of the high or low decrease in your livestock holding status of number and rank the major causes in the table?

S/N	Causes of livestock decreasing	Yes No	Ranks		
			1st	2rd	3rd
1	Death due to recurrent drought				
2	Death due to disease out breaks				
3	Conflict				
4	High off take or selling of livestock or buy house hold food consumption				
5	Sell livestock to build house in town				

6	Sell livestock to send many children to school				

IV. Crop Production Information

14. Do you have cultivated or farm land for crop production?

A. Yes B. No

15. Since when did you start crop production?

16. Is there any change towards intensified crop production?

17. If you have cultivated land what is the size of your land either in

hectares_____

18. What are the typical crops you have been growing on your farm land? (Multiple response possible)

A. Maize B. Haricot bean C. Wheat or Sorghum D. Teff E. Barely

F. Other specify _____

19. How do you see the trend of your production for last ten years?

A. Increasing (B.) Decreasing (C.) Constant (D.) No idea (E.) Others specify_____

20. If your response for question number 19 is decreasing in production, what were/are possible causes for decreasing in production and rank accordingly in below table? (Multiple responses possible)

S/N	Causes of decreasing production	Yes No	Ranks		
			1st	2rd	3rd
1	Drought				
2	Flood				
3	Absence of high yielding variety seeds				
4	Absence of chemical/organic fertilizer				
5	Pests out break				

21. How did you engaged in crop production?

A. Intentionally B. As opportunistic C. I do not know how I engaged D. Others specify_____

22. How do you see the future crop production in your locality in relation to current climatic condition?

A. Advisable B. Not advisable C. It is difficult to judge D. I have no idea E. Others specify

V. Livelihood Diversification

23. What has changed in terms of livelihood activities?

24. What caused the change?

25. Does the change contribute to the cope with climate change impacts? To what extent does it help?

26. Is the change sustainable in both short term and the long term?

VI. Climate change and its impact

27. How do you see the change in temperature for last ten years?

A. Increasing trend B. Decreasing trend

28. In what ways do you observe the patterns of rain fall in your locality for last ten years?

A. Increasing trend B. Decreasing trend

28. How about the frequency of recurrent drought in your locality for last ten years?

A. Increased from time to time B. Not major change C. Decreased from time to time D. I have no any idea.

29. If the response for question number 28 is increasing in frequency of drought from time to time, what possible impacts did you face? And rank impacts according to their magnitude on your livelihoods? (Multiple response possible)

S/N	Possible impacts	Yes No	Ranks		
			High impact	Low impact	No impact
1	Death of livestock				
2	Loss of harvest				
3	Decline in range quantity and quality				
4	Food shortage				
5	Reduction in price of livestock				
6	Crop price increased				
7	Death of household members				
8	Migration of household's members for employment opportunity				

30. In your opinion which segments of the community has been affected by climate change and its variability impact? And rank the segments according their degree of harm? (Multiple response Possible)

S/N	Segments of the community	Yes No	Ranks		
			High affected	Low affected	No affect
1	Children				
2	Women				
3	Disabled people				
4	Elders				
5	Specify others				

31. What type of disasters have your household been affected by for last ten years?

A. Drought B. Floods C. Livestock disease D. Human disease E. Conflicts

F. Others specify_____

32. How many times have your households been affected by this disaster in last ten years?

A. once in ten years B. Twice in ten years C. Three time in ten years D. Four and above times in ten years

33. How are you normally warned against climate change hazards that threaten your livelihoods?

A. Through local early warning system B. By national and local authorities

C. By news media (TV, Radio, newspaper,) D. By NGOs

E. Others specify_____

VII. Local Coping strategies at Household level

34. Did you practice any local coping strategies to mitigate impacts of climate change for last ten years?

A. YES B. No\

35. If your response for question number 34 is yes, what local coping strategies you have been practicing? (Multiple response possible)

A. Migration for search of water and pasture or mobility B. Diversification of herds

C. Splitting of herds and family into different locations D. Engage in alternative sources of income E. Making enclosure for calves and lactating cows around village

F. Buying feed from elsewhere G. Hay making H. Cutting and carry

I. Selling of charcoal and fire wood J. Migration to urban area to earn income there

K. Migration to town and employed as casual labor L. Use of wild food

M. Others specify_____

36. From the above local coping strategies of question number 35 please rank five (5) of them which you think do not harm or damage the environment, applicable to practice and viable to cope with current climatic condition under pastoralist condition.

S/N	Coping strategies	No harm to environment	Ranks		
			1st	2rd	3rd
1	Migration for search of water and pasture or mobility				
2	Diversification of herds				
3	Splitting of herds and family into different locations				
4	Engage in alternative sources of income				
5	Making enclosure for calves and lactating cows around village				
6	Buying feed from elsewhere G. Hay making				
7	Hay making				
8	Cutting and carry				
9	Selling of charcoal and fire wood				
10	Migration to urban area to earn income there				
11	Migration to town and employed as casual labor				
12	Use of wild food				

37. What are the government, traditional institutions and NGOs responses that positively facilitate the climate change impact adaptation mechanisms of question no.36 you have practiced? (Multiple responses possible)

A. Traditional institutions B. Government structure C. NGOs development interventions

D. Others specify_____

38. What are the other non-climatic factors that contributed to climate change and variability?

(Multiple response possible)

A. Population pressure B. Deforestation C. Expansion of farm land in to range lands

D. Improper settlement pattern E. Any policy that does not take in account the life style of pastoralists G. Others specify_____

Appendix 2

KEY DISCUSSION QUESTIONS TO GUIDE FOR KII AND FGD

Part I: The Patterns and intensity of climate change in Liban zone in general and in Filtu and Dollo-ado districts in particular.

1. What are the patterns of climate change that has been observed in your locality for the last ten years?
2. What is the intensity and trends of these patterns of change in the area for the last 10 years?
3. How can you measure about these patterns of climate change in this locality?
4. What are the historical timelines for the major events that happened in the area?
5. In your opinion what do you think about the factors of these climatic changes in the area?
6. What are the major climatic hazard(s) that frequently occur in Liban zone in general and that of Filtu and Dollo-ado in particular?
7. How do you see the trends and magnitude of this/ these hazard(s)?
8. What are the non-climatic factors that contribute the climatic change in the area?

Part II: The impact of climate change on pastoral community's livelihoods by focusing on their assets holding.

1. What are the impacts of the climate change in both at community and household level?
2. How this/these climate change hazard(s) affect the major livelihood assets of the Liban zone pastoralist communities?
3. Can you measure the effects of climate change on the pastoralist community's livelihoods and their asset holdings?
4. In your opinion, which segments of the pastoralist community members of the in the area are highly affected by climate related hazard(s)? Why?
5. In your opinion what are the other non-climatic factors aggravate climate change in Liban zone pastoral areas in general and Filtu and Dollo-ado Woredas in particular?

Part III: Examine Livelihood diversification as local strategies to cope with climate change effects at both community and household level

1. In your opinion, how do you respond to the impacts of climate change? What are the responses that the community has been practicing in order mitigate the impacts of climate change?

2. What are the barriers that have been affecting for these local coping strategies at community level?
3. Among local coping strategies that have been practiced by local community which do you found to be effective under current climatic conditions? Why?
4. Which livestock species can relatively resistant to current climatic condition? Why? How do you see the economic viability of those species to improve the living condition of the pastoralist communities in the area?
5. What are the alternative sources of income which is practiced by the local community to mitigate impacts of climate change on their livelihoods?
6. What are the supporting schemes that have been practiced by local community in reviving the victims of climate change to improve their livelihoods situation?

Part IV: The institutional response about effects of climate change to the pastoralist livelihood system in Liban zone.

1. What are the institutional responses to the impacts of climate change at regional, district level in Liban zone?
2. What are the policies and strategies that are in place to tackle the impacts of climate change in both at regional and district level?
3. What programs do you have in place in order to tackle the climate change impacts?
4. Who are the other stakeholders that you work with for mitigating the effects of climate change?
5. Are there NGOs that have interventions which addresses for the impacts of climate change in the Liban zone?
6. Can you please point out the major interventions of these NGOs and how they address the impact of climate change?
7. How effective is the institutional responses of climate change in Liban zone?

Declaration

I, the undersigned, declare that this thesis is my original work and has not been presented for any a Degree (Master's Degree) in Addis Ababa University and any other University and that all sources of materials used for the thesis have been duly acknowledged.

Signature_____

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Date: _____

Confirmed by the Advisor

Signature_____

Name Aklilu Amsalu (Dr)

Date: _____

Place_____ and date of Submission _____