ADDIS ABABA UNIVERSITY
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CLIMATE CHANGE AND VARIABILITY AND ITS IMPACT ON THE LIVELIHOOD OF PASTORALISTS: CASE STUDY IN DIRE *WOREDA* OF BORANA ZONE, OROMIA REGION

A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN RURAL LIVELIHOOD AND DEVELOPMENT

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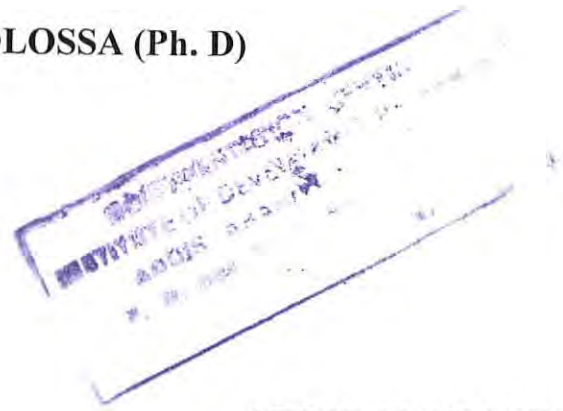

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Title

Climate Change and Variability and Its Impact on the Livelihood of Pastoralists: Case Study in Dire Woreda of Borana Zone, Oromia Region.

By

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ACRONYMS

BZFEDO	Borana Zone Finance and Economic Development Office
BZPDO	Borana Zone Pastoral Development Office
CARE	Co-operation for Assistance and Relief Every Where
DFID	Department for International Development
FGD	Focus Group Discussion
GHG	Greenhouse Gas
HPG	Humanitarian Policy Group
HS	Household Survey
IEK	Indigenous Ecological Knowledge
IIED	International Institute for Environment and Development
ILRI	International Livestock Research Institute
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for the Conservation of Nature
KII	Key Informant Interview
masl	Meter above sea level
MGDs	Millennium Development Goals
mm	Millimeter
NMA	National Meteorological Agency
PA	Pastoralist Association
PFE	Pastoralist Forum Ethiopia
PROLINNOVA	Promoting Local Innovation
SC-UK	Save the Children United Kingdom
SLF	Sustainable Livelihoods Framework
SLOT	Strength, Limitation, Opportunity and Threat
SNNPRS	Southern Nations, Nationalities, and People Regional State
SOS SAHEL	Save Our Soul SAHEL
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WISP	World Initiative for Sustainable Pastoralism

Glossary of Local Terms

The meanings of the following words are according to contextual usage.

Arda	Local administrative structure below pastoral association
Birte	Yellow fever
Bona- dheera	long dry period
Buusa-gonofa	Social supporting system or safety net
Dabaree	Transferring of milking animals for long period of time
Gadaammojji	Senior elders perform special rite of passage that enables them retired from political leadership
Gogeessa	Line of classes in the Gada system
Hameessa	Transferring of milking animals for short period of time
Hiriba	Giving animals for those households' lost their animals
Jarsa- dheeda	Elders of rangeland management
Jarsa- Gosa	Clan elder
Jifu	Giving some part of meat for the villagers by someone
Korma loon moo'u	Senior bull which oversee the herd
Kormaa-korbeesa	Sacrifice bull or he-goat
Mona	Kraal
Oola qolajii	Event of drought when most livestock died and if their skin found everywhere
Uchee-daanfachu	Adding water on the flame of fire anticipated to escape from risks
Uchuma	Making fire from stick through friction
Uluuqqoo	Passing through installed branches believe to escape from risks
Uusa	Reading the intestine of slaughtered animals

Abstract

This thesis is about the impact of climate change and variability on the livelihood of pastoralists; case study in Dire district of Borana zone, Oromia region. This study initiated as the result of impacts of climate change particular recurrent drought which has been affecting the livelihoods of Borana pastoralists due to weakening of indigenous adaptation mechanisms used by community for centuries.

The study planned to assess the impacts of climate change and variability on pastoralists' livelihood and the local adaptation mechanisms that have been practiced by local communities to mitigate its impacts. The materials for the study were mainly drawn from primary sources on the basis of fieldwork conducted in two purposively selected *kebeles*, namely Madacho and Higo of Dire district. The qualitative methods such as key informant interviews, focus group discussions, observation and case studies were employed to understand climatic impacts on pastoralist livelihood and status of their indigenous adaptation mechanisms in reversing the impacts. Furthermore, secondary data sources were reviewed to supplement the findings.

The results of the study depict that Borana pastoralists, who are residing in drought prone area and repeatedly hit by recurrent drought with weakening indigenous adaptation mechanisms, have been affected by climatic impacts and put their livelihoods at risk. Other compounded factors like inappropriate settlement pattern, top-down development approaches, inappropriate water development interventions without considering rangelands management, regionalization policy of Ethiopian government which doesn't consider pastoral ways of life, population pressure, interethnic conflict, imposition of 'modern' structure on customary once without appropriate replace, bush encroachment, deforestation and individualizing communal resources have escalated the impacts on their livelihoods.

The research concludes that pastoralists whose livelihood depend on and sensitive to climatic factors with weakened indigenous adaptation mechanisms are the most affected one and alternative ways of improving their resilient capacity need to be sought. As the indigenous adaptation mechanisms used by the pastoralists are ineffective during the epoch of technological advancement backing to the root is found to be imperative to reduce compounded impacts.

CHAPTER ONE
INTRODUCTION

1.1. Background

It is predicted that billions of people, particularly those in developing countries, face shortages of water and food, and greater risks to health and life as a result of climate change and variability. Concerted global action is needed to enable developing countries and local communities whose livelihood depend largely on natural resources to adapt to the impacts of climate change and variability that are happening now and will worsen in the future (UNFCCC, 2007).

Although no country is immune from the potential impacts of climate change, the impacts are highly variable over space, capabilities and time. In particular, climate change and variability will present a significant challenge for developing countries particularly pastoralists (IPCC, 2007 cited in Akililu and Alebachew, 2009).

Ethiopia is home for about 12-15 million pastoralists who reside in 61% of the nation's landmass. The pastoral areas are estimated to comprise 42% of the national total livestock population (PFE, 2009). Climate change and variability will have serious impacts in pastoral areas, which among others increased severity of recurrent droughts. Due to climate variability pastoral areas are under the constant hit of recurrent drought which results in huge amounts of livestock losses that are basis for the livelihood of the pastoralists.

It is widely recognized that poor communities' particularly pastoralists of Borana who are politically and economically marginalized and whose livelihoods are highly dependent on natural resources with weakened local adaptation mechanisms due to various influences are highly vulnerable to the impact of climate change (Macchi, 2008). High dependence on natural resources and climate sensitive livelihoods coupled with the existence of rampant poverty, weakening of local adaptive mechanisms and variable weather events put pastoralists in most vulnerable position (Akililu and Alebachew, 2009:3). The problem is very serious in the arid and semi-arid areas, especially among the pastoralists like Borana who are residing in periphery of the country where the recurrent drought is the major catastrophe.

Pastoralism in East Africa in general and the Borana in particular constitutes an old age tradition that historically proven capable of adaptation to arid and semi-arid region. "Thus, the Borana pastoralists are not single spectator in the face of this crisis'' (Gemechu, 2002). They have

developed different types and forms of indigenous survival strategies to cope with recurrent drought. Pastoral communities in the Borana Zone of Oromia region have been changing and adapting their livelihoods to changing environmental conditions for centuries. Recurrent droughts have been a major issue throughout history in the Borana pastoral lowlands, and strategies to cope with, and adapt to these droughts are embedded in communities' traditional social structures and resource management systems (Riché et al., 2009). However, the weakening of local adaptive mechanisms due to different internal and external factors has made Borana pastoral community remain vulnerable to recurrent drought.

Historical trends and factors in Borana lowlands show that, the frequency of drought is increasing from time to time without giving time to recover from previous drought shocks. This leads to the death of huge number of livestock which is the basis for pastoral livelihoods.

It was based on, these assumptions that, this research was conducted to study the impacts of climate change and variability on pastoralist livelihoods with particular emphasis to Dire district which is frequently stricken by recurrent drought.

1.2. Statement of the Problem

Pastoral communities in arid and semi-arid regions of Africa live with the expectation of drought and have developed coping mechanisms to mitigate its impacts. The impact of climate variability (drought) is particularly acute for pastoral communities whose livelihoods mainly depend on livestock and where social support networks are less developed (Barton et al., 2001).

According to Manager (2000), factors like demographic growth, agricultural impasses, incorporation of pastoral economies into the market economy, general insecurity arises from civil wars and conflicts, inappropriate development interventions, negligence of traditional knowledge, faulty national and international policies as well as other factors arising from climate and ecology are affecting the pastoral system. The same author emphasized that these led to rapid sedentarization and urbanization, a breaking down of traditional cultures, transformation of gender relations, and degradation of natural resources and growing vulnerability of pastoralists to ecological and economic stress (Manager, 2000:1).

Some of the major pastoral problems in Ethiopia are, the marginality of the area (arid and semi arid) they occupy, unreliable rainfall, shortage of water, poor infrastructure, inappropriate development interventions, bush encroachment, interethnic conflict, and social service and market problems. The appropriation of pastoral communal resources by state, the expansion of protected areas, privatization of land, the encroachment of farming into grazing land, occurrence of recurrent drought, restricted mobility and famine are also the problems that the pastoralists are facing (Ayalew, 2001).

Adapting to climate change will entail adjustments and changes at every level – from community to national and international. To cope with current and future climate stress Borana communities must build their resilience by diversifying their livelihoods and adopting pastoral friendly technologies to cope with climatic impacts. Local coping strategies and local knowledge need to be used in synergy with government and local interventions by giving due attention. But, in Borana pastoralist areas these indigenous coping mechanisms; have been weakening over time. For instance Gamado et al (2006:113) stated that "less application of indigenous ecological knowledge (IEK), the gap between traditional and formal systems, and trends of disobeying traditional rules and regulations were identified as current challenges for the Borana pastoralists". These challenges have resulted in adverse impacts on livelihoods of Borana pastoralists coupled with climate change and variability.

Pastoralism is a way of life, which is well suited to the arid and semi-arid parts of Africa, and it is an adaptation and this adaptation has solved a number of problems related to making a living in the dry lands despite climate change and variability which affects the livelihood condition of the Borana pastoralists (Helland, 2000:25).

Due to marginalization of pastoralists; their local adaptive capacities may have been eroded and they may be more susceptible to climate change and variability than other communities. Borana pastoralist is the one who currently facing the impacts of climate change and variability due to eroding of their local adaptive mechanisms that have been used for centuries.

Borana pastoralists have developed and practiced different types and forms of indigenous survival and adaptive strategies to cope with recurrent drought. Among, other things, digging of deep wells, mobility between wet and dry season grazing areas or rotational grazing, herd diversification, eating wild foods, splitting of herds and families, strategic settlement pattern and traditional supporting system are worth mentioned. However, "development interventions did not consider such knowledge because the pastoral production system was considered as backward and a factor for land degradation" (Scoones, 1995 cited in Gamado et al., 2006).

The large majority of the people living in the Borana lowland areas of Ethiopia are pastoralists, deriving their income and sustenance from livestock and livestock related activities. As the pastoral based livelihood is fundamental to the welfare of the population of Borana and problems in the pastoral economy; quickly translate into the crises for the population as the whole due to recurrent drought (Helland, 2000:25).

By taking all these problems into account this particular research was conducted purposely in Dire district where the recurrent drought has been the major catastrophe for long periods of time. Dire district is one of the potential grazing area and sources of deep wells (*Tulla* wells) which are most dependable dry season water source in terms of water yield volume and reliability (Helland, 1977a, cited in Boku, 2000). As deep wells are major water sources in Dire district the rangeland around deep wells are highly overcrowded and failed to serve highly populated livestock and lead to degradation of rangelands. Due to these high deaths of livestock were observed in Dire district and putting the livelihood of the community in danger and coupled with recurrent drought which is the result of climate variability. Pastoralists of Dire district are known by practicing local adaptation strategies to mitigate impacts of climate change and variability in spite of natural and man-made factors that impede the practices and threatening the livelihoods of the community.

From my personal exposure and live experience I argue that the frequency and severity of drought has been increasing over time in Borana pastoralist area without giving time for recover and this has affected the livelihoods of the community.

This research, therefore, attempted to explore the impacts of climate change and variability, particularly recurrent drought on livelihoods of Borana pastoralist of Dire district and their local adaptive mechanisms that have been practiced to mitigate climate change consequences.

1.3. Objectives

This thesis has got general and specific objectives, which have been attained ostensibly through the course of research work.

1.3.1. General Objective

- To analyze the impacts of climate change and variability on pastoralists' livelihood and to assess the local adaptation mechanisms practiced by local communities to mitigate its impacts.

1.3.2. Specific Objectives

- To assess impacts of climate change on livelihood resources of the pastoral community.
- To understand the perceptions of local community about the impacts of climate change and variability on their livelihoods.
- To identify local adaptive strategies that has been used by the community to mitigate the impacts of climate change and variability at local level.

1.4. Research Questions

The leading questions of this study were:

- What are the key livelihood resources of the Borana pastoralists' community and climate related hazard(s) affecting their livelihood resources?
- What have been the observed changes in timing, frequency and intensity of these hazard(s) and segments of the community vulnerable to the impacts of climate change and why?

- What are the local adaptive mechanisms used by the community and their status to mitigate the impacts of climate change and variability?
- What are the non-climatic factors that influence climatic impacts and opportunities available for the Borana pastoralists to cope with the impacts?

1.5. Justification and Significance of the Study

Borana pastoralists who live in arid and semi-arid ecological zone and depend on climate sensitive livelihoods particularly livestock are most vulnerable and affected ones with recurrent drought. The frequency and magnitude of drought has been increasing from time to time and has affected their livelihoods. These communities has been neglected by policy makers and development actors for decades as marginalized community and resulted in livelihoods insecurity. Despite of all these, they have managed their natural resources and livelihoods through customary institutions by practicing different indigenous adaptation mechanisms to mitigate the impacts of climate change and variability. Nevertheless, these indigenous adaptation mechanisms that have been practiced by Borana pastoralists for centuries have been threatened by natural and man-made factors and put the livelihoods of the community at risk. As Borana pastoralist community is rich in indigenous knowledge, viewing them as half full half empty glass is one of the current community based development approaches which any development actors need to give due attention to strengthen the existing local knowledge and considering new interventions as value addition rather than replacing. Understanding the impacts of climate change and variability on livelihoods of Borana pastoralist and the role of their indigenous adaptation mechanisms in reducing the impact has a great contribution in improving the livelihoods of the community.

The impacts of climate change and variability on pastoralists are not new subject, but these impacts did not link with pastoralist livelihoods and indigenous adaptive mechanisms to mitigate the impacts.

The information generated by this research is expected to contribute to the existing body of knowledge about the impacts of climate change and variability on pastoralist

livelihoods and local adaptive mechanisms which are environmental sound and have significant role in mitigating the impacts of climate change and variability and need to buildup or promote.

1.6. Limitation of the Study

This study is limited to the impacts of climate change and variability on the livelihoods of Borana pastoralists. In the course of the study if not all, most of the intended objectives and research questions were addressed. Since the research has its primary objectives focused on, there are other compounded issues which have upper hand in affecting the livelihood assets of Borana pastoralists in addition to climate impacts are beyond the scope of this research. There are issues like encroaching of pastoral lands for different investments without any consultation, regionalization policy of Ethiopian government, pastoral development policies and theories, role of women in mitigating climatic impacts and holistic management in improving rangelands which have direct relations with livelihood assets of Borana pastoralists were not thoroughly discussed.

This research has attempted to deal with indigenous adaptation mechanisms used by local community to mitigate the impacts of climate change on their livelihood assets and how those indigenous adaptation mechanisms inversely affected by climate change and variability. Another main concern of this research was to identify major climate related risks that are affecting the livelihood assets of Borana pastoralists.

1.7. Organization of the Thesis

This study is organized into eight chapters. Chapter one deals with background of the study, statement of the problem, objectives, research questions, justification and significance of the study and limitations of the thesis.

Chapter two is mainly concerned with review of literatures. It comprises theoretical and empirical literatures, analytical framework and conceptual underpinning.

Chapter three focuses on research methodology which comprises rationale for the selection of research area, study design and sampling techniques, data collection methods and analysis.

Chapter four presents study area, public services and customary institutions, Borana social structure, Gada system, profile of the respondent households, mobility history and livelihood assets of the households in the study areas.

Chapter five describes drought and famine in the Borana oral history and different indigenous adaptation mechanisms used by Borana pastoralist to mitigate climate impacts.

Chapter six and seven analyze the impacts of climate change and variability on livelihood assets, indigenous adaptation mechanisms and discusses climate change and variability risks of the study area.

Chapter eight presents summary of the research, concluding remarks and recommendations for future actions.

CHAPTER TWO
LITERATURE REVIEW

2.1. Theoretical Literature

2.1.1. Overview of Climate Change and Variability

"In contemporary thinking the term climate change has become a core issue in various developmental, environmental, social and political forums at the grass roots, national, regional and international level'' (Akililu and Alebachew, 2009:13). The Intergovernmental Panel on Climate Change (IPCC) in 2007 concluded that warming of the climate system was unequivocal and very likely (more than a 90% chance) caused by humans (Ares *et al.*, 2009:1). The IPCC also concluded that global emissions would have to peak by 2015 and be reduced by 25-40% by 2020 and by 50-85% by 2050 to have a 50% change of limiting global temperature increase to 2^{o}C.

"According to the synthesis report of the IPCC (2007b), between 75 million and 250 million people in Africa are projected to be exposed to increased water stress by 2020" (Amsale, 2010:7).

Climate has a potential to influence biodiversity, pasture, water availability, agricultural production, livelihood strategies, etc and this makes the issue current agenda at local, regional and international levels (Daniel, 2009: 17).

2.1.2. Causes of Climate Change and Variability

At global scale apart from natural conditions such as natural geologic, hydrologic, atmospheric and biotic factors, the main cause of greenhouse gas (GHG) emissions is from carbon dioxide (70%), primarily from burning of fossil fuel (petroleum) imported from industrialized countries, while the other sources for GHG are methane and nitrous oxide caused by deforestation and agricultural activities, particularly the use of pesticides (Yohaness and Mebratu, 2009; Akililu and Alebachew, 2009).

The combination of generally increasing temperatures and shifting rainfall amounts and patterns will clearly have impacts on crop and livestock agriculture. Developing countries

are generally considered most vulnerable to the effects of climate change than more developed countries, largely because of their often limited capacity to adapt (Thomas and Twyman, 2005 Cited in ILRI 2007; Akililu and Alebachew, 2009).

Among the poorest regions, Africa's biophysical and socio-economic environments are highly vulnerable to the impacts of climate change and weather extremes due to high dependency on natural resources and climatic sensitive livelihoods (Akililu and Alebachew, 2009).

2.1.3. Pastoral Livelihoods

Livelihood as a framework to understand poverty and food security in relation to climate change and variability and man -made calamities emerged in the late 1990s and at the beginning of 21st century, being initiated by many scholars (Scoones, 1998, Carney, 1998, Pretty, 1998; Ellis, 1998; 2000; Bebbington, 1999; Rakodi, 2002 cited in Degefa, 2005:85).

Chambers and Conway defined livelihood as follow:

> *A livelihood is defined as 'the capabilities, assets and activities required for a means of living; a livelihood is sustainable when it can cope with, and recover from, stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihoods opportunities for the next generation (Chambers and Conway,1992 cited in Pavanello, 2009:7).*

Pastoral livelihoods in the Sahel historically were underpinned by systems of negotiated access to water and pasture that did not assign exclusive rights, and by reciprocal arrangements between pastoralists and agriculturalists (Brooks, 2006). Many of the inhabitants of the arid and semi-arid rangelands of sub-Saharan Africa gain their livelihoods from pastoral activities, using common property rangeland and water resources which are highly sensitive to climate variability to raise their livestock. They live under highly variable climatic conditions, with their herds subject to large variations in feed and water availability. Managing these strong fluctuations in pastoral livelihoods

is the main development challenge facing agencies seeking to support pastoral development initiatives and pastoralist themselves (Barton et al., 2001).

2.1.4. Adaptation by Pastoralists

According to Markakis and Barfield 1993:

> *Pastoralism is a mode of production that depends on natural forage. In arid and semi-arid regions, this require constant or periodic movements in search of pasture and water, factors that differentiate this form of production from ranching and other forms of livestock husbandry (Markakis and Barfield, 1993 cited in Gemechu,2002).*

According to UNDP (2009:4), "Adaptation is strategies that have evolved through people's lengthy experience in dealing with the known and understood natural variation that they expect in terms of seasons, combined with their specific responses to a season unfolds''. Again adaptation is process through which societies make themselves better able to cope with an uncertain future. Adapting to climate change entails taking the right measures at right time to reduce the negative effects of climate change (or exploit the positive ones) by making the appropriate adjustments and changes which are environmental sound (UNFCCC, 2007:10).

According to Manager (1994) and Fratkin (1996), "pastoralists are culturally adaptive agent to the limitation of nature through their indigenous system'' (cited in Gemechu, 2000:31). Helland (2000:47) further stressed that pastoralism is the only viable and adaptive alternative for most groups of people living in the arid and semi-arid parts of Africa where both the access and availability of water is difficult. Boku (2000:2), specified that "pastoralism among Borana constitutes an age-old tradition that historically proved cable of adaptation to a region characterized by frequent and often dramatic climate variability''.

Seasonal migration of pastoral people along with their livestock between dry and wet season grazing sites is by and large an adaptation strategy and rational use of meager

resources to the spatial and temporal variation of mainly pasture and water over the course of the year (Degefa, 2008:152).

Community-based adaptation to climate change is a community-led process, based on communities' priorities, needs, knowledge, and capacities, which should empower people to plan for and cope with the impacts of climate change through enforcement of traditional institutions (IIED, 2009). According to Umar (1994) cited in Tilahun (2008:19) the pastoral resource use-pattern is based on risk spreading and flexible mechanisms like mobility for rational use of meager resources, traditional resources management systems, splitting large herds into different places and diversification of herd species.

There are many ways in which pastoralists have adapted to the uncertainty of their environment, but a key feature is their strong social organization and customary institutions (WISP, 2007). Pastoralists have developed elaborate and complex mechanisms and institutions that enable flexibility and opportunity. These institutions govern mobility, resource use and redistribution, and have enabled pastoral societies to withstand extreme pressures of both their environment and their competitors.

Traditional pastoral adaptation strategies for coping with climatic effects and other shocks strive to maintain their livelihoods through rational use of existing resources and affiliating with other neighboring communities to share scanty resources despite regionalization policy of Ethiopia which is currently affecting pastoral life style (Tilahun, 2008).

2.2. Empirical Researches

2.2.1. Impacts of Climate Change and Variability on Pastoral Livelihoods

Climate variability is characteristics of all dry lands, but in pastoralists areas like Borana it is particularly potent (Ellis, 1994:37). Ethiopia in general and pastoralists in particular are highly vulnerable to the impacts of climate change and variability. As the rainfall is particularly the most important climatic factor in pastoral areas, declining in rain fall and

the rising temperatures as a result of climate change are undermining the delicate balance between pasture and livestock on which pastoral livelihood depends (Elias, 2009).

To strengthen pastoral livelihoods which result in poverty reduction; mobility of the livestock need to be the cornerstone to adapt climate change effects and for rational use of meager resources (Little et al., 2007:21 cited in Boku, 2008: 228).

Pastoral livelihoods are based on seasonal mobility and common property of natural resources (particularly rangelands), regulated by customary law and practices, customary institutions and leadership, all making use of local and indigenous knowledge (Segovia Declaration,2007).

Most of the pastoral livelihoods assets such as natural, financial, human and social assets on which Borana community depend are significantly affected by climate- related hazards (Riche et al, 2009:30).

2.2.2. Sensitivity of Pastoral Livelihoods to Climate Variability

The main livelihood base for Borana pastoralists in general is livestock and livestock related products which are highly sensitive to climate change and variability (Berhanu and Fayissa, 2010; CARE, 2008; Gemtessa, 2005; Homann, 2008; Kamara, 1998; Cossins and Upton, 1987 cited in Skinner, 2010:51).

Pastoral livelihood systems are effective mechanisms for converting marginal lands into products valuable for households, communities and the national economy despite sensitive to climate change and variability impacts like recurrent drought (USAID, 2003:24).

2.2.3. Pastoralists Response to Climate Change and Variability

Humanitarian Policy Group (HPG) 2009 states that It is not drought as such that makes pastoralists vulnerable, but the growing inability and weakening of indigenous adaptation mechanisms of pastoralists to cope with it. Factors that constrain pastoral drought response mechanisms, especially the mobility of people and animals and degradation in

potency of traditional institutions are the main reason for this. For instance Boku (2000:55), stresses that before weakening of traditional institutions and the development of senses of privatization, villages and livestock mobility among Borana pastoralists is highly systematized by giving due attention for traditional range and water management.

Herd mobility is one of the best and widely practiced strategies that enable pastoralists particularly Borana pastoralists to adapt to the impacts of climate change and variability. However, mobility has been curtailed by a combination of many factors including recurrent drought, expansion of opportunistic farmlands, bush encroachment, inappropriate settlement pattern, inappropriate water development interventions, regionalization, ranches and closures in the communal rangelands resulting in conflict (Elias, 2009).

The responses, pastoralists adopt such as mobility for search of pasture and water, towards climate change and variability that threaten their livelihoods can in turn exacerbate the situation and result in violent conflict due to Ethiopia's politics of ethnic federalism and regionalization which gave less attention for pastoral way of life (Amsale, 2010:4). "In Ethiopia, the politics of ethnic federalism has sparked conflicts among different ethnic groups and different clans within ethnic groups'' (Dida, 2008; Hagmann and Mulugeta, 2008 cited in Amsale, 2010: 19).

Herd stratification was used to tune the selective feeding behavior and tracking potential of different cattle categories to the available grazing and water capacity and as insurance against climate variability (Homann et al., 2005). Strategic negotiations and flexible institutional networks facilitated the herd movements.

The traditional rangeland management system to mitigate impacts of climate change and variability by Borana pastoralists involves classification of the grazing area into open grazing and reserve pasture areas (*kalo*). The classification helps as means of rationing feed for animals that should not be trekked to a far distance or used as a means of minimizing risk of feed shortage during dry season and for ecological balance to avoid overgrazing which result in land degradation (Kejela et al., 2007; Boku, 2000).

2.2.4. Roles of Indigenous Knowledge and Institutions in Mitigating Impacts of Climate Change and Variability

Pastoral development projects in Africa have done little to increase livestock productivity, or to improve the standard of living or food security of pastoral peoples. Several of the reasons for this consistently poor record of development interventions have been pinpointed by Goldschmidt (1981:53, cited in Hogg, 1990) such as failure to account of the knowledge of indigenous people; unaware and unconcerned with goals and needs of pastoral people and they ignore indigenous social organizations which have inborn knowledge about the system.

Pastoralists have a rich knowledge of their rangeland environment that enables them to manage their resources more effectively, and they have institutional arrangements that enable natural resource management on communally managed land. But; the effectiveness of local knowledge depends on how well pastoral institutions are functioning and their capacity to sanction malpractices which are barriers for livelihood activities (WISP, 2008:2). Undermining indigenous knowledge, increased risk of famine and increasing poverty may all erode the traditional social order of the pastoral production system and put the livelihood of the pastoralists in danger coupled with current climate change and variability (PFE, 2009:4).

In Ethiopia, traditional institutions (informal and indigenous institutions) have played important roles in conserving the natural resources, supporting victims of climatic effects, preserving culture and settled resource-use and land disputes. Due to policy changes and less recognition by formal administrative structure, these traditional institutions have lost their roles and made pastoral community vulnerable to climate change and variability (Shimelles et al., 2009:20).

"Pastoralists have long developed customary institutions that help them pool resources across space and time in order to survive in their environment" (Amsale, 2010:33). According to the same author and Ellias (2009) the emergency of private ranches, ethnic federalism, and expansion of farmlands and in appropriate settlement curtail mobility and disrupt other coping strategies to mitigate climate variability.

Drought survival among pastoralists of Africa in general and Borana pastoralist in particular is increasingly becoming arduous. Development programs might reduce problems of climate change if the people are helped to revitalize and recognize indigenous means of coping (Oba, 2001). This has not happened because inborn knowledge of indigenous coping strategies, which is essential and effective for mitigating climate change and variability, is lacking.

According to the Oba (2001:2) there are many reasons why development programs and government policies should understand pastoralists' indigenous coping mechanisms:

- First, coping strategies that are being lost need to be preserved for the future generations (Bellin, 1994).
- Second, it is worthwhile to understand why a system that had previously functioned in the absence of outsider intervention is suffering ecological and economic pressures (Turton, 1985).
- Third, climate change effects management planning itself will benefit from understanding how the societies respond to normal extensions of eco-climatic variations and cope with disasters.
- Fourth, improvement of food security is more likely to result from strengthening the indigenous coping strategies than from introducing new ones (Huss-Ashmore and Katz, 1989).
- Fifth, because their coping strategies are a major component in the survival of pastoralists, climate change effects management plans which ignore them will probably not be sustainable (The World Bank, 1995).
- Sixth, understanding the collapse of pastoralists coping strategies during the past decades may provide improved understanding of the crises likely to recur during the future (Anderson and Johnson, 1988). These factors reaffirm the need for improved knowledge of the root causes of poverty resulting from climate change and non-climate change effects, and measures to mitigate the problems.

Pastoralists employ a number of highly specialized indigenous strategies to safeguard their herds and families in the face of unpredictable and sometimes extreme climatic events, disease outbreaks and social unrest. These strategies ensure the rational use of the

natural resource base on which the herds depend and also build strong social networks (Nassef et al, 2009: 11). Strategies such as mobility, building up herd size as insurance against times of hardship, splitting herds across different locations, diversification of herd species, income generation from non-pastoral activities, and reduction of food intake and change of composition of diets can be mentioned (Hesse et al., 2006; PFE, 2009; Umar, 1994 cited in Tilahun 2008; Elias, 2009; Coppock, 1994).

A key factor for improved management of the Borana pastoralist areas to mitigate impacts of climate change and variability is to give local institutions more authority with regard to local natural resource management (Dejene et al., 2009). Local institutions should be given the right to decide on land tenure issues, recurrent drought adaptation strategies, marketing development, rangeland and water management, etc. Development practioners could play a role in strengthening local institutions that may assume such a role and environmentally friend to mitigate climate change and variability.

2.3. Conceptual and Theoretical Underpinning

The major conceptual issues under this thesis are climate change, Climate variability, pastoral livelihoods, local adaptation strategies and customary institutions that can contribute to mitigate the impacts of climate change and variability on pastoralist livelihood. As the name implies climate change is change in natural environment due to natural and man-made factors which results in various climate change effects like global warming, drought, erratic nature of rain fall, flooding, cyclone, etc; over long period of time. Climate variability refers to the natural characteristics of the earth's climate that manifests in the changes of climate with reference to time. Pastoral livelihood is living condition of pastoral community which highly depends on livestock and livestock related activities which in turn again based on natural forage and water resources. Local adaptation strategies are inborn knowledge and skills that pastoralist have been used for centuries in order to adapt harsh environment in which they live and to economically use meager and patchy resources of communal property under variable climatic conduction through traditional institutions. Customary institutions are inborn local institutions that support affected individuals/ households in order to save life or revive from crisis based

on existing tradition. In Borana pastoralists, food insecurity and poverty are traditional tackled through customary institutions of mutual assistance (Boku, 2008:31). Some of these institutions are *busa*, *hamessa*, *dabare*, *hiriba* and *gonofa*. Among these institutions some of them are considered as first aid or life saving and others are for asset rebuilding.

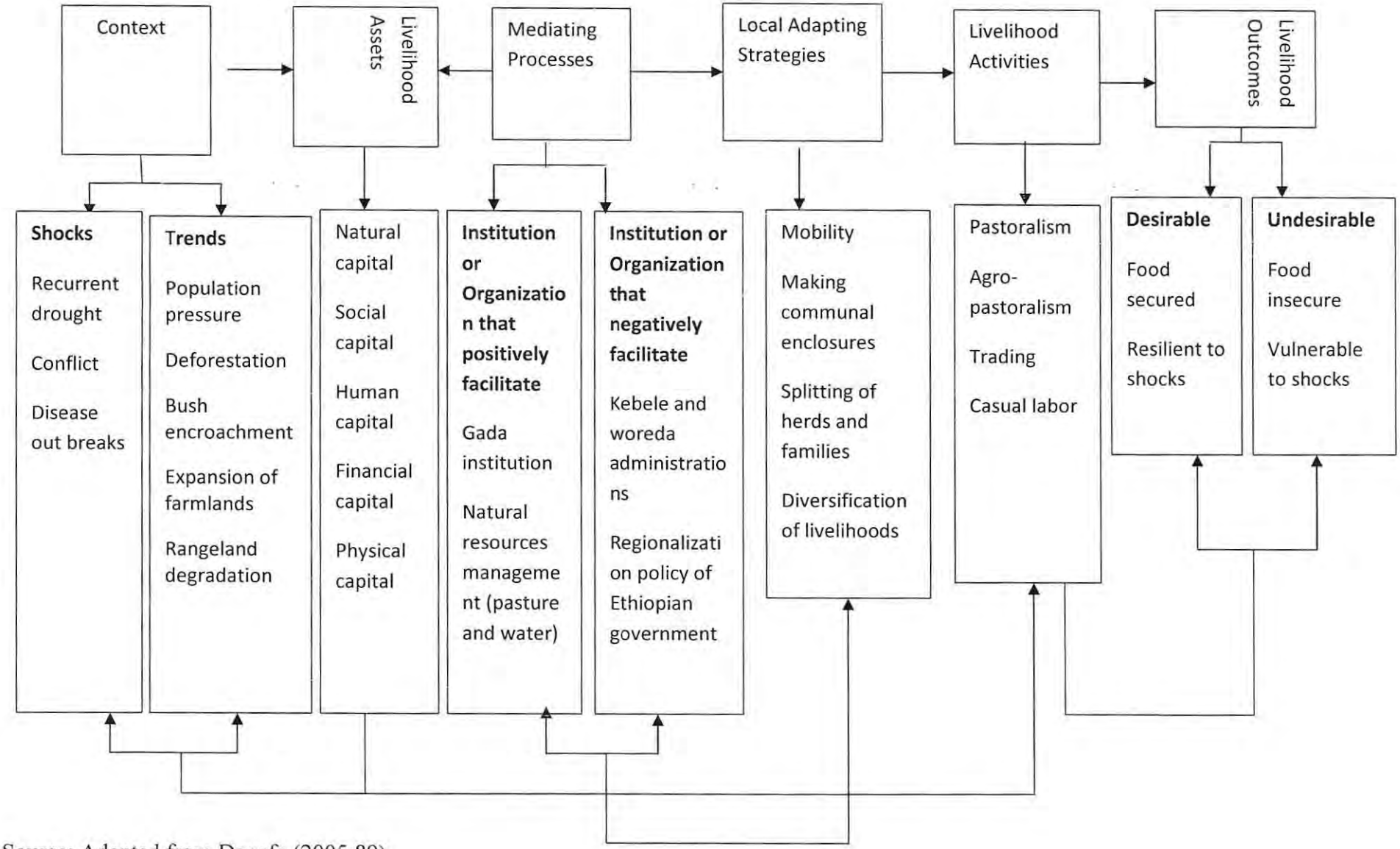
2.4. Analytical Framework

Understanding the impacts of climate change and variability on livelihood of Borana pastoralists led me to use sustainable livelihood framework (SLF) that comprises existing contexts (shocks and trends), local adapting strategies to deal with shocks, livelihood assets, mediating processes and livelihood activities which result in livelihood outcomes. In this research I saw the interrelations between livelihood assets, existing context, mediating processes that comprise institutions and organizations which facilitate or affect livelihood assets, local coping or adapting strategies which include livelihood activities that resulted in livelihood outcomes of the pastoralists.

Ellis (2000:31); focused that the initial points of the frame are the assets accessed and owned by the households as the building blocks upon which households decide to engage in livelihood activities. There are so many factors that determine household's access to assets, among which, age of household head, sex, health status, educational level, availability of productive labor within the household, discrimination, cultural barriers, inappropriate policy, etc are worth mentioning.

As depicted in Figure 2.1, the framework that would be used by this particular research is the one adapted from Degefa (2005:89).

Figure 2.1: Livelihood framework for analyzing climatic impact on pastoralist livelihood



Source: Adapted from Degefa (2005:89).

CHAPTER THREE
REASERACH METHODOLOGY

This research has employed both quantitative and qualitative approaches based on primary and secondary sources of the data available by using different methods such as Household Survey, Key Informant Interview, Focus Group Discussion, Observation, Case study and review of secondary sources.

3.1. Rationale for the Selection of Research Area

This study was conducted in Dire district of Borana zone, Oromia region, which is prone to climate variability mainly recurrent drought for centuries. The district, zone and research topic were selected for the following reasons. First, Borana communities are pastoralists who mainly depend on livestock and livestock related products which is highly sensitive to climatic shocks due to arid and semi-arid nature of climatic condition of the area they inhabit. Second, the zone in general and Dire district in particular is repeatedly hit by recurrent drought and put the livelihoods of the communities in danger. Third, Borana is pastoral community where traditional institutions are relatively strong in managing natural resources and practicing indigenous knowledge in mitigating the impacts of climate change and variability on their livelihoods. Fourth, Borana land is where I was born and brought up. I also used to work there for many years and most of my work experience is related to pastoral development issues. In my life and work experiences I witnessed to observe so many people whose living condition is deteriorating over time due to recurrent drought which affected their major livelihood assets and put the community under relief aid. Finally, Borana pastoralist is the one which is highly marginalized and vulnerable to climatic shocks and whose livelihoods are under threatening condition. All these initiated me to study the impacts of climate change and variability on pastoralist livelihoods in the Dire district of Borana zone, Oromia region.

3.2. Study Design and Sampling Techniques

3.2.1. Study Design

By considering time and logistic constraints into account this study was conducted as cross-sectional study of household survey including qualitative approaches of data collection to get in-depth insight of the issues under consideration.

3.2.2. Sampling Techniques

A. **Sampling Frame**

The sampling frame consisted of all 15 *kebeles* of Dire district and the households who residing in the two purposively selected *kebeles* namely Madacho and Higo. These two *kebeles* were selected purposively based on differences in accessibility to water sources, interaction with other *kebeles* of neighboring district for management of pasture and water, distances from tarmac road and district town for accessibility of some services, etc. Focus Group Discussions and Case studies were carried out with purposively selected people who reside in the selected *kebeles*. Key Informants Interview was conducted with local knowledgeable people from study *kebeles,* district, zone and government and NGOs experts who know about the area.

B. **Sample Size Determination**

There were about 1,306 households found in the two study *kebeles*. Among these households 704 of them belongs to Madacho *kebele* and 602 households are the inhabitants of Higo *kebele*. By considering time, costs and available facilities into account, 10% of the households from total were considered as research subject for household survey. When we distributed this 10% for two study kebeles' proportionally there were 70 sampled households from Madacho kebele and the remaining 61 households from Higo kebele. A total of 131 sample households were interviewed for household survey.

C. **Sampling Procedure**

In this research multi-stage sampling techniques were employed to select the study district, *kebeles*, and cluster [*ketena*] within the *kebeles* and 131 sampled households. The study district and *kebeles* were selected purposively by considering regular occurrence of

drought that has been affecting the livelihoods of the community and their representative ness in reflecting the realities of the Borana zone and Dire district. One *kebele* is divided into four clusters [*ketenas*] which are very far from each other without having significant difference among clusters themselves. Selecting sample households from whole *kebele* was difficult to manage. To overcome this problem and to get representative sample households, first a lottery method was used to select two clusters (*ketenas*) from each *kebele,* and then the sample households were again selected by listing households names found in four selected clusters through simple random sampling (lottery method). The total sample households within each *kebele* were equally divided to selected clusters without considering number of households found in each cluster. One thing that we need to bear in mind is that, even if there were no significant differences among clusters within a *kebele* there are differences among households within a cluster based on wealth status, access to livelihood assets, availability of productive labor and livelihood activities particular household has engaged in.

Accordingly, the following clusters (*Ketenas*) and households were selected from two study *kebeles*.

Table: 3.1. Selected *ketenas* and households interviewed from each *ketena*

Name of sample *Kebele*	**Selected clusters (*ketenas*)**	**Total households in the cluster (*ketena)***	**Selected households**
Madacho	Karsa Haro Guchi	130	35
	Karsa Racha	126	35
Higo	Dambala Himu	97	31
	Kobanya	77	30
Total	**4**	**430**	**131**

Source: Field survey 2011

3.3. Data Collection Methods

3.3.1. Primary Data Sources

A. Household Survey (HS)

Household survey was one method of gathering primary data from horse mouth. By this particular method 131 households were considered and interviewed as research subject from December 2010 to January 20, 2011. Among interviewed household heads 57 (43.5%) of them are females. To enhance the chance of meeting the households in their village, early mornings and late afternoons were found to be an appropriate to interview the respondents. A structured questionnaire that includes both close and open-ended were designed and employed to generate quantitative data from respondents. The main contents of the questionnaire were personal information of the respondent, household demographic information and mobility history, household sources of livelihoods, livestock ownership, crop production information, and availability of social services, perception on climate change and variability and local adaptation strategies (See appendix III). The questionnaire was prepared in English language and translated to local language (Afaan Oromo). Three local enumerators who can understand both English and Afan Oromo languages were hired and trained on how to administer questionnaire. Pre-testing of questionnaire was conducted to see about inclusiveness, its validity, relevance and comprehensiveness. Based on the pre-testing feedback, final questionnaire was prepared and administered accordingly.

B. Key Informant Interview (KII)

Key informants were knowledgeable people who know about the study area and impacts of climate change and variability on pastoralists' livelihood. The key informants were selected purposively. Due to time and logistic constraints twelve key informants were interviewed for this particular research from knowledgeable local elders (8 people), government officials (2 people) and NGO workers (2 people) who know about climatic situations and local adaptation strategies that have been practiced by the local community. The checklist question of key informant's interview has two major parts namely perception of local community on impacts of climate change on their livelihoods

and the adaptation mechanisms they have been practicing (See appendix I). The interview was semi- structured in which some guiding questions were used and base on the response of key informant probing was used for digging much information.

C. Focus Group Discussion (FGD)

Focus group discussion is one of the most important research methods to get varieties of information from different segments of the community for qualitative data. Focus group discussion was conducted to get general information about the impacts of climate change and variability on pastoralist livelihood and local adaptation strategies that have been used by the community (See appendix II). In this particular research three focus group discussions were conducted with purposively selected knowledgeable community members consisted of elders, youth and women and service providers such as teachers, development agents, health assistances and veterinary technicians. Two focus group discussions were conducted in Higo *kebele* with local male (8 people) and service providers (6 people) who live with the community separately. The third one conducted in Madacho *kebele* with female only (8 women). The allocation of focus groups discussion among two *kebeles* were made purposively by considering the awareness level of women to openly speak during the meeting, the interaction of particular *kebele* with other district neighboring *kebeles* for the management of pasture and water and the availability of different social services within a *kebele*. The three focus groups discussion were attended by 22 people. The information obtained from focus group discussions were analyzed and checked with those obtained by other methods for triangulation.

D. Observation

This method was used during the whole period of fieldwork activities by informally discussed with people; observed different activities carried out by the community to adapt the impacts of climate changes and variability and attended different community meetings. During observation field note was taken and issues were raised during focus group discussions and key informants interview to get insight depth about the issue under investigation.

In addition to general observations, there are many events / rituals of the community that were observed during fieldwork. The most important ones were child naming; *Gadaammojji* ceremony; marriage; water well excavation; watering of livestock and coffee ceremony where all villagers meet to together and pray. As the researcher culturally familiar with all these events/rituals it created more opportunity to interact with community members and having deeper understanding of issues at hand.

E. Case Studies

In depth case studies were conducted with different segments of community members to know the impacts of climate change and variability on their livelihoods and local adaptive mechanisms that have been used by the local community to mitigate its effects. After having intimate contact with local communities, four households were selected purposively who were affected by the impacts of climate change and have practiced different coping mechanisms to conduct case studies. Then four case studies; two in each *kebele* were conducted with purposively selected households. Two case studies were conducted with female-headed households and the remaining two with male-headed households. During case studies exercise issues like impacts of climate change and variability on their livelihoods, mitigation mechanisms practiced by the household, predicaments and suggested solutions were discussed deeply. The information obtained through case studies were used to supplement the information collected by other methods.

3.3.2. Secondary Data Sources

The main secondary data sources that were used in this research were both hard copies and online materials such as published, unpublished, articles, proceedings, project reports and other data available at *kebele*, district, zonal, regional, national and international levels.

Fourteen years back meteorological data of study district for rainfall was used as another secondary source of information to compare with community's view.

3.4. Data Analysis

Those data that were generated from household survey was analyzed by using descriptive statistics such as mean, frequencies and percentages in explaining and describing the issues under research.

Those data from key informants interview, focus group discussions, observation and case studies were analyzed and described through opinion interpretations after sorted out, grouped and organized. In addition, a narrative analysis was used after organizing data under themes.

CHAPTER FOUR
STUDY AREA, SOCIO-ECONOMIC PROFILE AND MOBILITY HISTORY OF RESPONDENT HOUSEHOLDS

In this chapter the general overview of Borana Zone and Dire district, socio-economic profile and mobility history of respondent households would be discussed. Again different public services such as education, human health, water supply and customary institutions (Borana social structure and Gada system) were discussed deeply. Furthermore the livelihood assets of the study areas were clearly identified in order to have a sound understanding of climatic impacts on the livelihoods of Borana pastoralist.

4.1. The Study Area

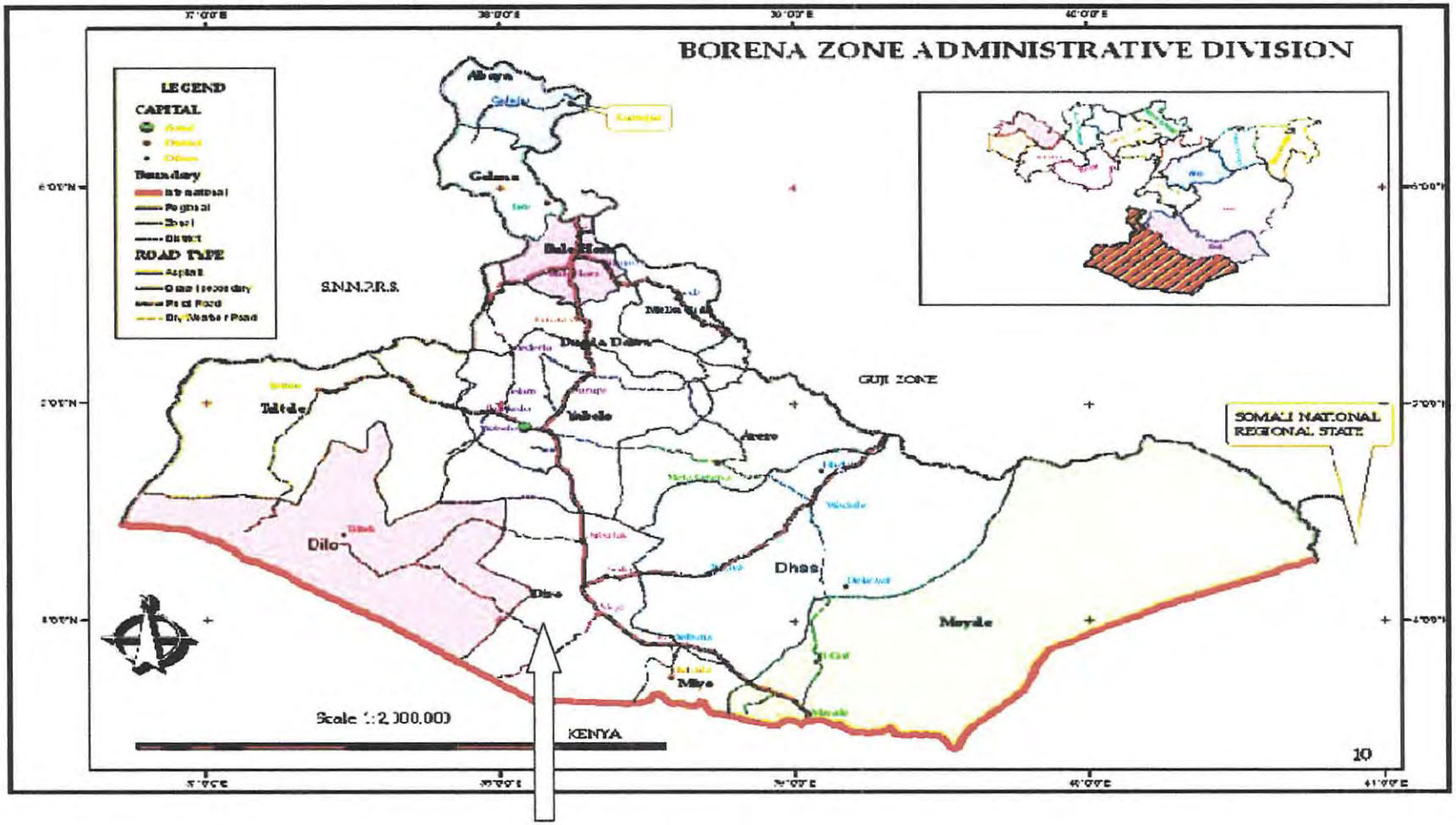
4.1.1. Borana Zone

This study was conducted in Borana zone of the Oromia region which is found in the southern part of Ethiopia bordering Kenya. The zone is divided into thirteen districts and the capital city of the zonal town Yabello is found at a distance of 570 KM South of Addis Ababa. The zone is bordered in the south by Kenya, in the west and north by the Southern Nations, Nationalities, and Peoples Regional State (SNNPRS), in thc south-east by Somali region and in the east by Guji zone. From total districts Dillo and Dhas are classified as pure pastoralists, eight districts including Moyale, Miyo, Dire, Yabello, Arero, Teltele, Dugda Dawa and Malka Soda are classified as agro-pastoralists and the remaining three (Bule Hora, Galana and Abaya) as sedentary farming communities. But, within agro-pastoral districts there are *kebeles* which are considered as pure pastoralists. The rainfall pattern of the zone is bimodal. The main rainy season is locally called '*Ganna*' from March to May which is expected to cover 60% and small rain season is '*Hagaya*' from September to November that covers 40% with average annual rainfall of 500mm. The mean annual temperature varied from 19^0c to 24°C (BZFED, 2009).

Based on the Census conducted by the Central Statistical Agency of Ethiopia (CSA,2007), the Borana Zone has a total population of 962,489, of whom 487,024 are men and 475,465 women with an area of 45,434.97 square kilometers, Borana has a population density of 21.18. The zone lies at altitude less than 1500 meter above sea level (m.a.s.l) with climatic condition of arid and semi-arid areas with pockets of some- humid

areas (BZPDO, 2009). Oromo that constitute Borana people is the major inhabitant of the zone and followed by Guji. Other ethnic groups such as Konso, Burji, etc are also found in the zone (BZFED, 2009).

Figure 4.1 Location of the study area



Source: Borana Zone Finance and Economic Development Office, 2009.

4.1.2. Location and Demographic Feature of Dire District

Dire is one of the 13 districts of Borana zone and located in the southern part of the zone on the way to Moyale. The district is found at a distance of 100 km from zonal capital Yabello and 670 km from Addis Ababa in south direction. According to the Dire district finance and economic development office the total population of the district is 79,777. Among the total population 39,666 are females. The district is sub-divided in to 15 *kebeles*. The estimated total land area of the district is 4,548.72 km^2. The population density of the district is 17.5 people per km^2 (Dire district finance and economic development office, 2010). Borana Oromo is the major inhabitant of the district with other ethnic groups such as Burji, Konso, etc.

4.1.3. Climate and Vegetation

The district has bimodal rainfall pattern with average rainfall of 450-500mm (Dire district pastoralist development office, 2010). The main rain season of the district is from March to May and short rain season from September to November. The average temperature ranges from 16 to 27^0c. The altitude of the district varies from 1320 to 2495 meter above sea level (masl). Most part of the district belongs to *kola* agro ecology except few pocket areas that belongs to *woyinadega*. The major vegetation of the area is bushy shrubs with some forest sites like Gamadu and Gubala. Due to high shrubs coverage charcoal production is common in Dire district, particularly, Madacho *Kebele* where this study was conducted.

Among the two study *kebeles*, Madacho is flat topography with scattered thorny bush. Acacia derpanolobium is the predominant species which affected the rangeland. The *kebele* used to be one of the best rangeland in the district. But, currently due to complex interacting factors such as population pressure, inappropriate settlement, high charcoal production and bush encroachment the *kebele* is highly degraded. In Higo the bush coverage is relatively dense if compared with Madacho and has affected the underneath growth of pasture. Unlike Madacho, Higo *kebele* is characterized by uneven topography.

The climate of the two study *kebeles* is more or less similar that characterized by high temperature and erratic nature of rainfall.

4.2. Public services and Customary Institutions

4.2.1. Education Services

In Borana pastoralists areas the availability of formal education service is one of the major bottlenecks. The formal schools are very scattered and forced the children to go far distances. This has contributed for the low enrollment. The education coverage of the district is 36.9 % in 2010 (Dire district education office report, 2011). According to the Dire district education expert, the national education curriculum which is highland-oriented has contributed a lot to the low enrolment and high dropout of students during dry period from January to mid of March. If the issue of Borana pastoralists were taken into account the school break time ought to be January and February. The expert stresses that even summer education for highland extension agent was arranged to January and February by considering the interests of farmers and arrangement can be made for pastoralists like Borana for which national educational curriculum can't match with their life style. But this has not yet happened due to less focus and poor representation of pastoralists in decision making process.

Table: 4.1 depict enrollments and dropout of students between 2006 to 2010 in Dire district. According to same source, about 17% students' dropout was observed during 2008 which was one of highest drought period that affected Borana pastoralists.

Table 4.1. Students' enrollment and dropout in Dire district from 2006 to 2010

Year	Enrollment			Dropout					
	M	F	T	M	%	F	%	T	%
2006	4203	3815	8018	738	17.6	444	11.6	1182	14.7
2007	3910	3931	7841	657	16.8	357	9.1	1014	13.0
2008	4060	3761	7821	747	18.4	575	15.3	1322	17.0
2009	4228	3976	8204	733	17.3	523	13.2	1256	15.3
2010	4532	4379	8911	738	16.3	510	11.6	1248	14.0

Source: Dire district education office 2010.

The major identified reasons for the dropped out of students from 2006 to 2008 were movement of students' household, demand for child labor during drought period, and lack of household ability to cover all necessary costs of student due to drought effects.

4.2.2. Human Health Services

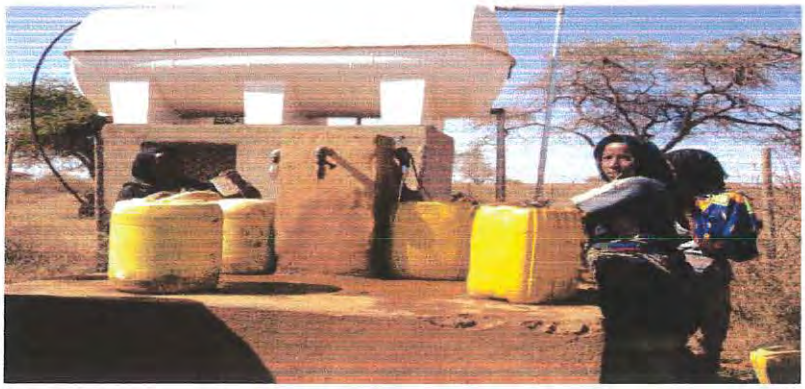
According to Dire district health office annual report (2010) the health coverage of the district has reached 103.5%. But, most of the district health posts and centers have shortage of equipments and facilities (personal communication with Dire district health office head). Those health posts found at far rural areas lack health personnel. According to the household survey conducted on average each household are forced to travel 1-5 hours to reach the nearest health facility which contradicted with above reported coverage.

4.2.3. Water Supply

Among the lowland districts of Borana zone, Dire district is known by deep wells (*Tula*) which is the permanent water source. The total water coverage of the Dire district is 45% (Dire district water and energy office planning document, 2011). On top of this, there are different water schemes rehabilitated and constructed by development actors working in the district. According to the household survey result such water sources like deep well, motorized borehole, cistern and open pond were identified as major water sources.

From the total respondents 100, 80.9, 75.6 and 46.6 % of them have identified deep well (*tula*), cistern, borehole and open pond respectively as major water sources which bridge the dry period water gaps. Among the total respondents 99.2 % of them have confirmed that the deep wells found in their area can stay without drying for whole period of year and bridge dry season water gaps.

Figure 4.2 Higo Motorized Water Scheme



Source: Photo taken during field survey, 2011

Figure 4.3 Open Ponds in Higo Kebele

Source: Photo taken during field survey, 2011

Table: 4.2. Types of water schemes constructed and rehabilitated by different development actors in some *Kebeles* of Dire district.

Name of *Kebele*	Scheme type	Quantity	Current status
Mega	Motorized borehole	1	Functional
	Hand pump	1	Functional
Harahalo	Motorized borehole	1	Functional
Dida mega	Motorized borehole	1	Non functional
Romso	Motorized borehole	1	Functional
	Hand pump	1	Functional
Dubluki	Motorized borehole	2	Functional
	Hand pump	2	Functional
Higo	Motorized borehole	1	Functional
	Hand pump	1	Non functional
Gololicha	Motorized borehole	2	Functional
	Gravity spring	1	Functional
Magado	Motorized borehole	4	Functional
	Hand pump	1	Functional
	Gravity spring	1	Functional
Mana soda	Solar	2	1 functional
Dambala Badana	Hand pump	1	Nonfunctional
Madacho	Hand pump	1	Functional
Dhokole	Gravity spring	1	Functional
Total		**26**	Functional

Source: Dire district water resource development and energy office, 2011

This secondary data doesn't indicate cistern as the major water scheme constructed by development actors working in the area. But, about 80.9% of the household survey respondents have identified cistern as the major water source in their locality.

The reasons for the discrepancy are, secondary data weren't updated regularly, poor record keeping and information gaps among development actors working in the areas.

4.3. Borana Social Structure

Borana are one of the major Oromo group residing in southern part of Oromia region. Borana Oromo are predominantly a pastoral people residing in lowlands of Guji and Borana Zones of southern Ethiopia, and north-eastern Kenya (Halake, 2010: 17). Borana have two major moieties (*Sabboo* and *Goonaa*). *Sabboo* and *Goonaa* are further divided into sub-moieties. *Sabboo* divided into three sub-moieties such as *Digalu*, *Karrayu* and *Mattari*. *Goonaa* is divided into two sub-moieties (*Fullelle* and *Haroressa*). These sub-moieties are again divided into clans and clans further divided into lineages (personal knowledge).

4.4. Gada System

The Borana *Gada* has three fundamental elements such as legislative, executive and judiciary organs which play political, economical, judicial and social roles. According to Halake (2010: 41) "It is through the existence of these organs that the Borana customary laws for natural resource management and other community affairs are made, practiced and protected by the members of community in general and customary leaders in particular".

"*Gada* is a system of classes that attributes almost all human aspects, such as military, political, economic and ritual" (Asmarom, 1973 cited in Halake, 2010:36). The Gada generation of Borana has five *gogeessa* (generation classes) that succeed each other after eight-year of a *Gada* period (Bassi, 1994 cited in Halake, 2010). According to same source each individual enrolled within the class of their father. If the linage of the father belongs to Goba Bule, the children belong to Guyo Goba which is in the same generation classes.

4.5. The Profile of the Respondents Households

4.5.1. Family Size and Ethnic Background

The 131 respondent households have family members of 674 people. The minimum family member of the respondent household is 2 people and maximum number is 9

people. On average each respondent household has 5 family members including husband, wife and children. Almost all of the respondent households of the study area are ethnical Borana Oromo.

4.5.2. Educational Level of the Respondents and their Family Members

The educational status of respondent households revealed that about 87.7 % are non-literate, 9.2% can read and write, 2.3% attended primary education and 0.8 % are second level and above. As the survey result indicated most of the interviewed household heads didn't get a chance of attending formal school. Concerning educational status of their family members, 64.5 % of them are non- literate, 11.7 % can read and write, 22.4 % attended primary level education and 1.3 % are above primary level. Majority of the respondent households didn't send all of their school age children to formal school. This is due to different factors such as distance of the school; child labor is needed to look after livestock and mismatch of educational curriculum with their life style.

4.6. The Mobility History of the Respondent Households

According to household survey result, about 57.3 % of the respondents have stayed in their current location for about ten and above years, 24.4 % have stayed six to ten years and 18.3 % of them stayed for one to five years. The result of the survey indicated that households aren't moving from place to place rather transhumance movement of livestock during critical dry period. Among the 131 households that were interviewed 113 of them (86.3%) preferred to stay in their current location.

Table: 4.3. Perception of respondent households concerning their mobility plan

Do you have a plan to leave this place?	**Higo**		**Madacho**		**Total**	
	Frequency	%	Frequency	%	**Frequency**	**%**
Yes	7	11.5	11	15.7	18	13.7
No	54	88.5	59	84.3	113	86.3
Total	**61**	**100**	**70**	**100**	**131**	**100**

Source: Field survey 2011

4.7. The livelihoods Assets of the Respondent Households in the Study Areas

"The ability to pursue different livelihood strategies depends on the basic materials and social, tangible and intangible assets people possess" (Scoones, 1998 cited in Degefa 2005:86).

According to Borbor Bule the major livelihood assets of Borana pastoralists is natural assets, which highly depends on rainfall. The linkage between access to natural asset and livelihood security for pastoral people is direct (Degefa, 2005). Among the natural assets of Dire district land, vegetation, water sources, salt lakes, wild life and gum and resins were identified during focus group discussions.

The other livelihood assets that were identified by key informant interviews and focus group discussions in Dire district were physical assets such as tarmac road, cell phone service, formal schools, human health posts, veterinary posts and different water points like motorized and cisterns.

Human assets such as productive labor, health, different skills in water and pasture management and peace building were mentioned during focus group discussions and key informants interviews. According to Skinner (2010:54) human asset for the Borana are their skills imbued in the individual and institutionalized in customary institutions for natural resource management and adaptation to climatic shocks.

Financial assets, like different livestock species owned by most interviewed households, crop and saving, were mentioned. Riche et al (2009:35) stated that financial assets Borana pastoralist depend on such as livestock and livestock product, saving and cash directly depend on natural resources and sensitive to climatic impacts.

Social assets identified during focus group discussions and key informant interviews were customary institutions and reciprocity social supporting systems like *buusa - gonofa*, *dabaree*, *hameessa* and *jifu* were mentioned.

According to household survey result, the major livelihood assets of respondent households were livestock (100%) and credit (financial assets) for business activities 53.4%, crop cultivation (38.2%) and casual labor (human assets) 33.6%.

Livestock is the major livelihood assets of Dire district and followed by credit facility established by different development actors working in the area to diversify household's income sources. Abate (2009:30) confirmed that casual labor, informal social organizations and government institutions are crucial to engage in alternative sources of income in order to overcome effects of climatic crisis.

Box 1: Involving in Alternative Livelihood Options

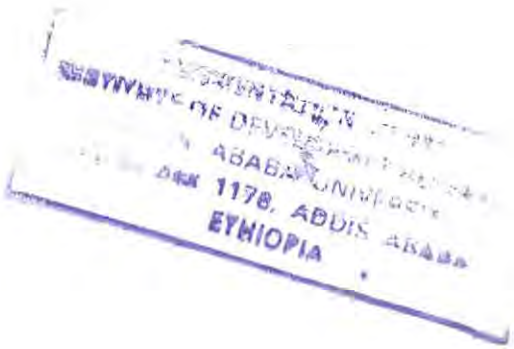
Ato Charfi Wario is 36 years old who is living in Higo kebele, Malicha Guyo village. He is married and has family members of 2 females and 2 males.

During initial stage of Gada Liban Jaldessa (2000-2008) charfi had 30 cattle. In the same Gada period many droughts occurred and the first drought killed 10 heads of cattle and he remained with 20 cattle. Before Charfi regained any head of cattle from previous drought shock, other drought occurred and killed 14 cattle and he remained with 6 cattle only.

During second drought period there were high prices of cereals in the local market and Charfi was forced to sell 2 cattle to cover his household food consumption and left with only 4 cattle.

To sustain his family members which depend on him, Charfi was involved in casual labor work of 'Dubuluki deep well' (tula) rehabilitation which is 20km faraway from his village.
After he has been involved in casual labor activity, he is feeding his family without selling the remaining 4 (four) cattle.

Finally Charfi said, despite temporary nature of the casual labor activities and far distances of my village from town, involving in casual labor can sustain family livelihoods during critical periods of drought.



From this case study I can understand that involving in alternative sources of income during critical drought period can sustain the livelihoods of the household. So, there could be division of labor among household members to improve their livelihood status and become resilient from climatic shocks.

Generally, Dire district is one of the lowland districts of Borana Zone where the availability of social services is at infant stage and characterized by harsh climate and vegetation cover. The availability of public services isn't up to standard and may not match with their lifestyle. The Gada system regulates the management of natural resources and play pivotal role in political, social, economical and judicial processes. Most of the community members of Dire district preferred to stay in their current location without moving from place to place due to expansion of farmlands, inappropriate settlement pattern, water development interventions which didn't consider pastoral ways of rangelands management, etc. The major livelihood assets of study areas are natural capitals which are highly vulnerable to climatic impacts.

CHAPTER FIVE
DROUGHT AND FAMINE IN THE BORANA ORAL HISTORY AND INDIGENOUS ADAPTATION MECHANISMS

In the Borana oral history drought has occurred once in *Gada* period without much affected the livelihood system of the community. Starting from *Gada* period of Goba Bule (1968-1976), the frequency and magnitude of droughts has been increasing over time. There are different internal and external factors which have been aggravating the effects of drought on the livelihoods of the Borana pastoralist. To mitigate the impacts of drought, Borana pastoralist have been used different indigenous adaptation mechanisms and supporting systems. But, these indigenous adaptation mechanisms and supporting systems have been weakened and exposed the livelihoods of the Borana pastoralist to climatic impacts. There are certain coping strategies related beliefs and rituals, practiced by Borana pastoralist to reduce climatic impacts. Among the indigenous adaptation mechanisms mobility, diversification of herds, engaging in alternative sources of income, making communal enclosures, hay making and splitting of herds and families could be discussed in this chapter.

5. 1. Drought and Famine in the Borana Oral History

The Borana oral tradition suggests that drought is cyclic and they remember regional droughts with the *Gada* cycle (Oba, 1998b:73).

According to Borbor Bule, one of the known oral historians of Borana, drought (*Oola*) started in history of Borana during *Gada* period of Bule Dadacha (1776-1783). Then other droughts were remembered during *Gada* periods of Saqqo Dadacha (1814-1821), and Guyo Boru(1885-1891)which was locally remembered by *oola qolajii*. During those *Gada* periods drought had occurred once in eight years. According to Borbor Bule, it was during *Gada* period of Goba Bule (1968-1976) drought occurred more than two times within one *Gada* period. Starting from this *Gada* period drought becomes recurrent in nature even if the frequencies and magnitudes varied. Again other droughts have occurred during *Gada* periods of Jilo Aga (1976-1984), Boru Guyo (1984-1992), Boru Mada (1992-2000) and Liben Jaldessa (2000-2008).

Table: 5.1. Perception of respondent households concerning frequency of drought

How about the frequency of drought in your locality for last ten years?	Higo		Madacho		Total	
	Frequency	%	Frequency	%	Frequency	%
Increasing from time to time	60	98.4	69	98.6	129	98.4
Not major change			1	1.4	1	0.8
I have no idea	1	1.6			1	0.8
Total	61	100	70	100	131	100

Source: Field survey 2011

About 98.4% of the respondent households have indicated that, the frequency of drought is increasing from time to time. Due to recurrent nature of drought the household survey respondents have faced death of livestock (98.5%), loss of harvest (47.3%), decline in range quantity and quality (93.1%), food shortage (87.0%), reduction in price of livestock (95.4%), crop price increased (98.5%) and migration of household members for employment opportunity (42%). In actual condition the terms of trade between livestock and crop price are in reversible direction during drought periods.

According to focus group discussion I have conducted in Higo *kebele* with male group, in the history of Borana the deaths of human being due to drought were recorded during *Gada* period of Jilo Aga (1976-1984) for the first time. In similar fashion, about 10 % of the household survey respondents have reported death of family members due to impact of drought since then. This indicated that the impacts of droughts become sever and more frequent.

According to key informants interviewed, Borana have experienced droughts throughout history but what currently makes it different is, its recurrent nature. Before many years ago drought was known by *Bona dheera* (long dry period), which didn't affect mass livestock except vulnerable animals like calves, lactating and pregnant cows. During that period, Borana communities used to migrate or move to buffer zones where pasture and water could be available due to limited number of human population and practice of

rotational grazing system. Now *Bona dheera* (long dry period) become *olaa* (severe drought) due to population pressure, bush encroachment, proliferation of ranches, inappropriate settlement and water development interventions. Halake (2010: 72) stresses that past development interventions among the pastoral areas of Ethiopia did not take to account the customary system of resource management particularly rangeland and exacerbated the climatic impacts.

According to the same author, the net impacts of pastoral development interventions in Borana resulted in larger population of cattle that degraded the rangeland and disruption of wet season and dry season grazing patterns that resulted in high concentration of human and livestock population around water points.

Borbor Bule also identified other factors that aggravated the impacts of recurrent drought on Borana pastoralists. The factors includes, such as, expansion of farmlands, degrading in potency of customary leaders and imposition of 'modern' institutions on customary ones without replacing them.

Malicha Guyo, one of my key informants from Higo *kebele* while confirming the degrading in potency of customary leaders and imposition of 'modern' institutions on customary ones as follows:

> *"Nama arrabi qara qabu ka mala hin qabnetti lafa irra dabree jaarsa dubbi dhowe" which literally means those talkative people who have no indigenous skills were imposed local elders without substituting them.*

Homann et al, 2005 when stating the degradation in potency of customary leader as follows:

> *The imposition of a formal administration for political administration at the local level interfered with the pastoralists' co-ordination of access to grazing and water resources. Throughout the Borana encampment areas, younger community members, inexperienced in rangeland management, were appointed and given decision-making powers, and excluded the Borana elders committees.*

Famine is a phenomenon created by a serious food shortage when the access of food and water are critically under question. Even if all droughts do not result in famine, drought and famine are very much interrelated (Yonis, 2002:18). The focus group discussions participants from Higo *kebele* have indicated the interrelations between drought and famine as follows:

OOlaan beela dhalti (Drought results in famine)

Beelti hirdhu dhalti (Famine again results in scarcity)

Hirdhun du'a dhalti (Scarce finally causes death due to hunger)

5.2. Indigenous Drought Adaptation Mechanisms

Pastoral people have developed a variety of strategies to cope with the fluctuations in forage and water availability associated with climate change and variability (Barton et al, 2001:13).

In Borana pastoralist area, policy-driven symbolic programs have limited understanding of pastoral economic systems and little has been understood of about local coping strategies, vulnerability to climatic shocks and their resilience (Getachew, 1995:260). According to the same author climatic variability in Borana lowlands is a common phenomenon and communities have established indigenous system that is capable of responding to the variability.

According to the household survey result, about 88.6 % of the respondents have practiced indigenous drought adaptation mechanisms. Among the adaptation mechanisms that have been practiced by respondent households, the following can be discussed.

5.2.1. Mobility

Mobility is one of the indigenous adaptive mechanisms that have been practiced by pastoralists. "The key strategy of pastoralists is the movement of their herds in response to seasonal and annual changes in pastures and water availability" (Ali, 2008:82).

Different factors like imposition of 'modern' institution on customary one, expansion of farmlands, inappropriate settlement, regionalization policy of Ethiopian government, banning of fire application, degradation in potency of customary leaders and bush encroachment are among the barriers that were identified during the fieldwork. Expansion of farm lands and regionalization policy of Ethiopia have curtailed community access to pasture land and further constrained local adaptation strategies like herd mobility which is considered to be a response for climate change and variability impacts (Boku, 2000:120).

The same author further argued that state policy was, and continues to be the promoter of change in Borana customary communal resource tenure, advocates for sedentrization, restricts mobility and devaluing indigenous adaptation mechanisms.

Oba (1998b:88) explained that "loss of mobility implies that the indigenous system of land use is no longer sufficiently responsive to ecological and climatic variability". The same author also argued that the pastoral production system becomes increasingly vulnerable to climatic change and variability.

Borbor Bule, stresses that mobility is one of the most adaptive strategy which is currently under question in Borana lowlands. According to Borbor the following Borana proverb indicates how mobility is crucial for Borana pastoralists.

> *Oolaa Liibanitti dheettee (During drought migrate to Liben)*
> *Jaba bona olla jabaatti dheette (If it becomes serious, move to village with sufficient labor force)*

Borana land is divided into Liben and Dire. Liben is a territory between Dawa and Genale rivers. *Dire* is a Boranaland to the west of *Dawwa* River.

5.2.2. Herd Diversification

Adaptation and risk avoidance are possible through maintaining mixed herds containing different animal species which can withstand different climatic and ecological conditions (Toulmin, 1994:95).

Traditionally Borana are cattle keepers. They value cattle more than other types of livestock both culturally and economically. Due to climatic change and variability and keeping of other livestock species by neighboring communities like Gabra and Garri, most of the Borana pastoralists have started diversifying their livestock herd. The diversity of livestock herds has ecological and economic implication. Almost, all interviewed households have rearing cattle, goat, sheep, camel and chicken all together. Managing different species of animals can help pastoralists to take the advantages of mixed nature of ecosystem.

Rearing all these types of livestock by a single household is one of the strongest indications of adaptation strategy for climate change and variability. Ali (2008) stressed that different species are bred by pastoralists for their resilience to drought and diseases.

According to the household survey result from the livestock species rearing by respondent households, goat (97.7%), sheep (90.%), camel (35.9%) and chicken (45.8%) ranked first, second, third and fourth respectively in relation to withstanding current climatic condition of Borana lowlands. All respondents have agreed that cattle are the most susceptible to drought impacts than other livestock species. Even though the household survey result has indicated sheep are resistant to drought, from my practical experience, next to cattle, sheep are susceptible to drought. The focus group discussion participants from Higo *kebele* have confirmed about this reality.

Figure 5.1 Goats Herds in Higo *kebele*

Source: Photo taken during field survey, 2011

The focus group discussions participants also recommended that, to cope up with current climatic condition, Borana pastoralists need to focus on goat, camel and sheep. They also justify this by the following local proverb:

Jiddu lafa qabadhuu (If you fall down hold the ground)
Deedu re'ee qabadhu (If you are very poor focus on goat)

This local saying indicates how goats are fast rearing, easy to sell/slaughter and can withstand dry lands climatic condition. As most part of the Borana rangeland was invaded by bush species rearing both browsers and grazers is a strategy of controlling bushes and using its advantages.

5.2.3. Engaging in Alternative Sources of Income

Traditionally, livestock was the solely source of income for Borana pastoralists. During dry period the price of livestock drops down significantly but the price of grain increases dramatically and this creates unfair terms of trade. To overcome this problem most pastoralists engage in petty trading, casual labor, credit, traditional healing services and

crop cultivation. Livelihood diversification outside pastoralism is also employed as coping strategy to climate change and variability (Elias, 2009:19). According to Oba (1998a), farming was an economic diversification due to difficulty of climate change and variability for the Borana to rely on livestock for food alone. Halake (2010:76) further stresses that those Borana who are residing around the forest areas and along the bottomlands have picked up crop cultivation practices to diversify their sources of income. Ayalew (2001) further stressed that pastoralists have been involved in a variety of economic activities and drive their sustenance from other alternative sources of income to diversify their income sources. Engaging in alternative sources of income by pastoralists may reduce the degree of climatic impact on their livelihoods.

Box 2: Climatic Variability Risks and Different Alternatives to Overcome

W/ro Tume Abduba is a 46 years old woman who is residing in Madacho kebele, Halake Haphi village. She is widow and has family members of 3 males and 3 females including her. Tume narrated her life story as follows:

Before Gada period of Jilo Aga (1976-1984) that was remembered by an event of drought, cinna titee guracha (episode of black fly); she had a lot of cattle which they depended on for their livelihood. Due to event of drought marked by cinna titee guracha they had lost almost all of their cattle and only remained with six heads of them which weren't in a position to support their family. Then Tume's husband had decided to engage in crop farming and got small harvest for two consecutive years. Then the focus of Tume's husband became on crop farming as major sources of their livelihood.

To fence their farmland, Tume's husband had climbed a big tree and fallen down from it and passed away. For funeral ceremony Tume had slaughtered one of her cattle and remained with five. She also sold one of her cattle to feed her children. Again due to disease outbreak locally called birte (Yellow fever?) her 4 cattle were died and she remained with only one. Then the responsibility of household has laid on the shoulder of Tume. To overcome this, Tume has devised strategies and has been involved in petty trading and selling of borde (local alcohol). She bought local alcohol from Mega town and sell it in her village which is 28 km from Mega.

As the salt lake exist in her neighboring kebele, Tume further engaged in salt production and selling. While she was in such process one saving and credit cooperative initiated by one of the NGO (Action for Development) was established and she became member of that cooperative. After she has joined the cooperative she got loan access and expanded her business activities.

By engaging in such kind of income generating activities, Tume has regained her livestock holding status. Currently she has two cows, two calves, five goats and two sheep which ought not attained if she wasn't involved in such business.

Finally, Tume said, I blamed climatic variability (drought) which had forced my husband to climb big tree and lost his life, and put the responsibility of my family on my shoulder to sustain their life.

To deal with climate change and variability risks, different strategies need to be sought by household members without assessing their feasibility in advance. Through trial and error some long lasting strategies would be found and become major sources of income for the households. Engaging in alternative sources of income reduces the impacts of climatic change on the livelihood of the households.

5.2.4. Making Communal Enclosure (Kalo)

According to focus group discussions I have conducted with service providers in Higo *kebele,* communal enclosure is one of the major indigenous adaptation mechanisms being practiced by local community to reduce the impacts of climate change and variability. This is in line with establishment of communal enclosure in the settled areas as an adaptive response to declining grazing resources (Oba, 1998b:58).

Golo Wako former Dire district pastoral development head, has identified the practice of communal enclosure as one of the effective adaptation mechanisms under current climatic condition if customary institution is revitalized well. From the household survey result, about 81.7% of the respondents have confirmed communal enclosure as environmentally sound, applicable to practice and viable to cope with current climatic condition. Communal enclosures are established at village or cluster levels and reserved for vulnerable animals which can't trek long distances to search pasture. Communal enclosure avoids the fragmentation of the rangelands and protects grazing for weak livestock during most critical times of the year (Shongolo, 1995 cited in Homann 2005).

According to focus group discussions I have conducted both in Higo and Madacho *kebeles* with local community members, barriers like expansion of farmlands, inappropriate settlement, inappropriate development interventions and bush encroachment were identified as major factors has been affecting communal enclosure.

5.2.5. Hay Making

Borana pastoralists have been practicing open grazing system for livestock grazing outside home. For new born calves and weak animals women are making hay when pasture is available and feed them during critical period. In addition to collecting grass in dry season for calf feeding by Borana women (Ali, 2008), hay-making during wet season was encouraged among the Borana to mitigate climatic impacts. By realizing the importance of it, most Borana pastoralists have been practicing hay making to feed their animals during critical time.

According to Malicha Guyo, one of my key informants, hay making practice reduces the distance travelled by women to cut grass during dry periods.

According to household survey result, about 70.2% of the respondents have been practicing hay making as one of the local adaptation mechanisms for climate change and variability.

Figure 5.2 Hay Making Practice in Higo Kebele

Source: Photo taken during field survey, 2011

5.2.6. Splitting of Herds and Families

During dry period when the access and availability of pasture and water was serious problem, pastoralists split their herds and families into different locations. The splitting of herds and families depends on the types and condition of animals and labor availability and requirement for those particular animals in particular location. The splitting of herds and families are risk reduction mechanisms that have been practiced by pastoralists. "Animals may be kept in several different areas which reduce the effects of localized droughts, and disease outbreak" (Ali, 2008: 84).

According to Malicha Guyo, one of my key informants, many better-off Borana pastoralists were forced to enter into polygamy to have enough labor in the family, are to split their herds and families into different locations and have contributed for high population pressure.

Accordingly, about 51.2% of the respondent households have been practicing splitting of herds and families as one of the adaptation strategy to reduce climatic impacts.

5.3. Some Coping Strategies Related Beliefs and Rituals in the Study Area

There are different coping strategies related beliefs and rituals that have been performed by Borana pastoralists to relieve from impacts of climate change and other risks. Most of these beliefs and rituals are performed by local elders. Among the practices *korma-korbeesa*, *soriyo*, *uluuqqoo*, *uchuma*, *uche –danfachu*, etc, are common in the study area.

Korma-Korbeessa- It refer to animal sacrifice done by the men only, i.e. slaughtering bull or a he-goat out-side the village at specified holly tree to pray for rain and to avoid disasters.

Uluuqqoo- Literally means passing through something holly. It is a belief that person or family or people passing through the installed branches or something holy would leave bad things behind.

Uchuma- Making fire with fire sticks through friction and passes or rotates on the flame of that fire in the belief that flame would avoid any anticipated disasters/risks.

Uche-dhaanfachu- Adding water on the flame of fire and believes that a disaster that would be expected to happen could be cooled down.

There are also different observations made by the local elders to forecast about future weather condition like listening to sounds of different birds during night time, observing the behavior of animals in the kraal (*Mona*) like passing out dung at sleeping position, act of bull who oversee the herd (*Korma loon moo'u*), slaughtering animal and read the intestine (*Uusa*), etc, are common practices in the study area.

5.4. Some Self- Help Practices in the Area

Borana pastoralist was known by practicing different self helping mechanisms. Due to impacts of climate change and other factors those self helping practices were weakened over time. Among weakened self help practices like *buusaa*, *gonofa*, *hameessa*, *dabaree*, etc, were mentioned.

Buusaa- Villagers help needy households with milk that is arranged by head of village (*Abba Olla*). Unless it is beyond their control, it is difficult for fellow-villagers to refuse to help poor household. The importance of mutual help is expressed by the following saying:

"*Nami ollaafi duddaan ol eja*", which literally means a person, stands up straight with the help of his/her villagers and his/her back. This stresses how villagers need to help each other.

Hameessa- lending of temporary milking animal by relative or friend for specified period of time. The lending period of *hameessa* is relatively very short if we compare with *dabare*. There are cases where *hameessa* becomes *dabare* based on the consent of lender and condition of receiver.

Dabaree- Transferring of milking animals for long period of time by better-off households. The receiver can use the products of the animal but have no right to sell or transfer without prior consultation of the owner. The duration of *dabaree* can pass from father to child or even more, based on the agreement of the lender. The condition of receiver in managing or taking care of those animals is other decisive factor that can contribute for the duration of *dabaree*. After the expansion of farmlands, lending plough animals (oxen) can be seen as *dabaree*.

In Borana pastoralist area, the drought becomes recurrent in nature and affects the livelihood assets, particularly natural assets of the community which are sensitive to climatic impacts. Different customary institutions which are effective to manage water and pasture resources lost their potency and are kicked-out of the system by immature youngsters. Due to degradation in potency of local leaders and other external factors like bush encroachment, regionalization policy of Ethiopian government, inappropriate development interventions, etc different indigenous adaptation mechanisms used by Borana pastoralist to mitigate climatic impacts have been weakened over time.

There are different self help mechanisms used by the Borana pastoralist to support affected households. As most of the self- help practices have been directly or indirectly dependent on climate change and variability, their status in supporting victim households is currently under question mark.

As the climate related risks are expected to happen regardless of frequency and magnitude of occurrence, strengthening indigenous adaptation mechanisms is found to be imperative and can help in reviving of different self- help mechanisms that have been used by the Borana pastoralist for centuries.

CHAPTER SIX
IMPACTS OF CLIMATE CHANGE AND VARIABILITY ON LIVELIHOOD RESOURCES AND INDIGENOUS ADAPTATION MECHANISMS OF BORANA PASTORALISTS

Livelihood comprises capabilities, assets and activities required for a means of living and that resulted in livelihood outcomes (Chamber and Conway, 1992 cited in Ellis, 2000). The starting point of the livelihood is resources accessed and owned by the particular household as the building block upon which households decide to engage in livelihood activities. The livelihood resources owned by a particular group would be regulated by climatic shocks and trends. There are different ingenious adaptations strategies used by Borana pastoralist to mitigate climatic shocks and trends that are in turn affected by climatic risks.

In this chapter the livelihood resources of Borana pastoralist and impacts of climate change and variability upon livelihood resources would be seen. Furthermore impacts of climate change and variability on indigenous adaptation mechanisms such as mobility, communal enclosure and splitting of herds and families are discussed in detail.

6.1. Impacts of Climate Change and Variability on Livelihood Assets

6.1.1. Impacts on Natural Resources

Pastoralist livelihoods in general have three pillar namely, natural resources, livestock and people. The impacts of climate change and variability become serious on natural resources and then reflect on livestock and people. Riche et al (2009:34) confirmed that climate change and variability has negative impacts on natural resources such as pasture, water sources, farmlands and trees. For the Borana pastoralists, natural resources mainly include rangeland and water. According to Sommer (1998:6) "water and forage are the most important resources for pastoralism and changes in their availability greatly influence pastoralists' livelihood security".

Helland (1984:71) has confirmed that long lasting pastoral production among Borana depend on the balanced relationship between pasture, animals and humans with

recognized and empowered customary institutions. As the frequency and magnitude of drought has been increasing in Borana pastoralist context, its impact on natural resources becoming arduous.

6.1. 2. Impacts on Rangeland

"There is growing concern in the Horn of Africa that global climate change and the increasing incidence of drought are undermining livelihood system in the rangelands" (Flintan and Cullis, 2010:7). The impact of climate change and variability has been affecting the Borana rangelands seriously and there by threatening the livelihoods of the Borana pastoralists. Before some years ago Borana rangeland was one of the best open savannas rangeland in East Africa. Recently due to climatic impacts the open savanna rangeland is covered by thorny or invasive bushes species that affect the rangelands. The focus group discussions participants of Higo *Kebele* have identified invasive bush species as one of the major threats that related to climate change and variability. The Daily monitor news paper (2010:1) witnessed that climate change is set to drive the spread of invasive plants threatening rangelands, forests and fisheries.

The impacts of climate change and variability has affected the settlement patterns of Borana pastoralist community, which, in turn, affects rangeland through disrupting the long-established grazing pattern.

The focus group discussions participants of Higo *Kebele* witnessed that during Gada period of Goba Bule (1968-1976) there were only nine scattered villages in their *Kebele*, but currently more than forty two overcrowded villages established without considering customary rangeland management system. In addition to climate impacts, population pressure is the other factor that has been affecting rangeland productivity in Borana pastoralist areas.

6.1. 3. Impacts on Water Sources

Water sources are communal property among the Borana pastoralists. The major water sources available in the Dire district are deep wells, boreholes, cisterns and open ponds.

The access to these water sources are through existing traditions. Deep wells and ponds have water managers (*Abba Herega*) who coordinate the overall management of the sources. In addition to *Abba Herega* there are appointed daily managers (*Abba Guyya*) who are responsible for day to day management of the water sources. Deep wells are the permanent water source which bridge the dry period water gap in the study area and has forced the people to overcrowd around water sources and resulting in rangeland degradation as the size of rangelands has dwindled.

As the erratic nature of rainfall is common in Borana lowlands area, flooding becomes one of the serious problems that have been affected different sources of water. This forces the community to mobilize existing resources to rehabilitate damaged sources of water according to their tradition. It is through existing tradition that community have been digging or rehabilitating their major water sources. But, due to inappropriate development interventions such tradition becomes weak.

6.1. 4. Impacts on Livestock Holding and Production

Previously Borana are known as cattle keepers. Due to different factors and exposures they have started to diversify their herds. Almost all of the respondent households in the study area are rearing different species of livestock. Despite rearing different species of livestock, the livestock holding status of respondent households has shown decreasing trend over time. About 85.5% of the respondent households have confirmed about this reality.

Table: 6.1. Livestock holding status of respondent households

Livestock holding status of respondent households	Higo		Madacho		Total	
	Frequency	%	Frequency	%	Frequency	%
Increasing	10	16.4	7	10	17	13.0
Decreasing	49	80.3	63	90	112	85.5
No any change	2	3.3			2	1.5
Total	61	100	70	100	131	100

Source: Field survey 2011

The major causes for decreasing in livestock holding were, death due to recurrent drought (85.5%), disease outbreak (53.4%), selling of livestock to buy households consumption (84%) and selling livestock to send children to school (44.3%). The three main causes, those are, death due to drought, disease outbreak and sell of livestock to buy household food consumption are related to climatic impacts.

Table: 6.2. Causes for decreasing livestock holding status of respondent households (Multiple responses are possible)

What are the possible causes for decreasing your livestock holding	Higo		Madacho		Total	
	Frequency	%	Frequency	%	Frequency	(%)
Recurrent drought	49	80.3	63	90	112	85.5
Disease out breaks	18	29.5	52	74.3	70	53.4
Conflict	1	1.6			1	0.8
Selling of livestock to buy HH food consumption	48	78.7	62	88.6	110	84.0
Selling of livestock to deposit money in bank			4	5.7	4	3.1
Sell of livestock to build house in town	1	1.6	4	5.7	5	3.8
Sell of livestock to send many children to school	22	36.1	36	51.4	58	44.3
Livestock looting	1	1.6			1	0.8

Source: Field survey 2011

Table 6.3 indicates death of 12,952 heads of livestock in Dire district due to drought from January 15 to March 3, 2008. During that period, about 2851 households were affected by the catastrophe. Both in Higo and Madacho *kebeles* about 3671 heads of livestock died that belong to 1109 households. From the experience, high death of livestock would be expected during the onset of the rainy season after prolonged drought period. When rain start the death of livestock become disastrous for two consecutive weeks. According

to this data, the death of livestock was higher in Madacho *kebele* and followed by Mana soda which is bordering Madacho. If we compare the death of livestock by type of animals the death of cattle is much higher than goat and sheep.

Table 6.3 Death of livestock in Dire district due to drought from January 15 to March 3, 2008

Name of *Kebele*	Deaths by types of livestock				Affected households
	Cattle	Goat	Sheep	Total	
Harallo	1227	40	25	1292	467
Hododi samaro	689	-	-	689	234
Magado	854	197	47	1098	60
Dida mega	285	-	-	285	77
Dhokole	906	644	200	1750	112
Higo	879	108	40	1027	293
Gololicha	280	-	-	280	109
Romso	324	190	70	584	164
Dubluki	84	110	72	266	53
Mana soda	1361	320	150	1831	109
Madacho	2550	73	21	2644	816
Dambala badana	715	-	-	713	238
Dida jarsa	210	131	28	309	70
Qabana	132	-	-	132	49
Total	10496	1803	653	12952	2851

Source: Dire district pastoralist development office, 2008

In the study area the productivity of the livestock is decreasing over time due to climatic impacts and other compounded factors. The focus group discussion I have conducted in Higo *kebele* with male group confirmed that previously the productivity of livestock was

high and could meet the household members' consumption needs even during dry period. They justified this by the following local saying:

''Amajjii dhalee mani haateti ganna''.

Amajjii means January which is peak dry month in Borana pastoral context. The above proverb indicates that previously cows could give enough milk for the household even if they gave birth during January. This indicates how the productivity of livestock was high during previous period. But the focus group discussion participants agreed that leave alone during peak dry month (January) the households aren't in a position to get enough milk from fifty cows during April to May (good rain period) when pastures are expected to be available.

They also confirmed that currently both poor and rich households of Borana pastoralist are relying on grain purchase during all seasons of the year for their consumption regardless of number of cows they have owned. This clearly showed how the production and productivity of livestock is decreasing in Borana pastoralist area due to climatic variability and other compounded factors such as shrinkage of rangelands, lack of rotational grazing system, disease outbreaks, population pressure, etc. This clearly indicated that most pastoral households of the study area are facing food shortage especially during drought period.

Box 3: Decline in Livestock Holding and Production Due to Recurrent Droughts

W/ro Diramu Dika is a 45 years old woman who is residing in Higo kebele, Dambala himu cluster, Dulacha Duba village. Diramu is widow with family members of 2Females and 6 Males.

Before drought period of Gada Boru Guyo (1984-1992) her family had a lot of cattle, more than 100 heads. Due to drought occurred in the same Gada period and drought induced- diseases, her family left with only 10 cows (Hawicha). Her husband passed away due to outbreak of disease locally called birte. Within the same Gada period another drought has occurred and killed 5 cows and she remained with only 5.

The recurrent nature of the drought within the same Gada period degraded the rangeland and reduced the productivity of livestock. Then Daramu's family has been faced food shortage and she was involved in selling of resin and gum to sustain her family. Involving in such alternative income generating activity has helped Diramu to diversify her income sources and reduce impacts of drought.

Diramu stated that the recurrent nature of drought has affected our livestock holding status and rangeland productivity, which again resulted in low production of livestock.

The focus group discussions I have conducted in both *kebeles* confirmed that regardless of livestock members each household has, no one solely depends on livestock product for their food consumption. Because livestock production has been reduced over time and has failed to feed households. They related this with recurrent nature of drought and degradation of rangelands which is the results of compounded effects.

6.1. 5. Impacts on Social Supporting System

Previously Borana have strong reciprocity social supporting system. According to Borbori Bule, one of my key informants, about 75% of social supporting system was given up due to different reasons. Among the reasons that have contributed to reduce social supporting system, so many needy people who render support, long process taken by social supporting system, migration by poor people to elsewhere rather than waiting for social support, reduction in production of livestock and less commitment of clan leaders (*Jarsa Gosa*) in facilitating *Gosa (clan)* meeting to support needy people were mentioned during focus group discussions and key informants interview.

Dabaree, *hameessa* and *buussa* are social supporting systems that have been affected by climate change and variability impacts. All these social supporting systems are related to the production and productivity of animals which in turn depends on availability of pasture and water resources.

6.2. Impacts of Climate Change and Variability on Indigenous Adaptation Mechanisms

From different indigenous adaptation mechanisms practiced by Borana pastoralist we mainly focus on mobility, communal enclosure and splitting of herds and family under this section. Oba (1998b: III) confirmed that the indigenous adaptation strategies of Borana pastoralists are being weakened by changes in resource tenure regimes and climatic variability impacts.

6.2.1. Impact on Mobility

Mobility which is one of the basic features of pastoralists to adapt climatic variability is, currently under question. According to household survey result 70.5 and 45.7 % of the respondent households have stayed in their current location for more than ten years in Higo and Madacho *Kebeles* respectively. Even 90.2 and 84.3 % of respondent households of Higo and Madacho respectively have a plan to stay in their current location without moving to other place in the future.

According to household survey result there are different external factors that have inhibited their household mobility. Ali (2008:82) confirmed that "Costs are imposed on herders by regulations and restrict their movement".

Table: 6.4. Respondent households' perception concerning external factors affecting household's mobility (Multiple responses are possible)

External factors that inhibit your household mobility	Higo		Madacho		Total	
	Frequency	%	Frequency	%	Frequency	%
Inter ethnic conflict	47	77.1	23	32.9	70	53.4
Regionalization policy of Eth gov't	55	90.2	44	62.9	99	75.6
Lack of water and pasture at a place intend to move	55	90.2	65	92.9	120	91.6
Inappropriate settlement	58	95.1	61	87.1	119	90.8
Recurrent drought	57	93.4	60	85.7	117	89.3
Population pressure	52	85.2	30	42.9	82	62.6

Source: Field survey 2011

Among these external inhibiting factors, recurrent drought (89.3%) and lack of water and pasture at a place intends to move (91.6%) are pure climatic impacts that have been identified by the respondent households. Other factors like inter ethnic conflict (53.4%), regionalization policy of Ethiopia (75.6%) and inappropriate settlement (90.8%) were also identified as external factors that have affected households' mobility in Dire district. According to Elias (2009:16), seasonal mobility of Borana pastoralist to *woyama* (to Eastern part of Borana Zone) has faced major challenges of ethnic conflict due to demarcation between Ormoia and Somali regional states. Ali (2008:83) has identified administrative arrangements (borders and bounders) as one of the major constraints affecting pastoralists' movement. This formal demarcation in combination with climatic effects have escalated ethnic conflict and highly affected Borana pastoralist mobility. Currently, Borana pastoralist move from Southern Ethiopia to Northern Kenya and Vis

versa. But no movement from Borana zone to Somali region for search of pasture and water.

The focus group discussions participants of Higo *kebele* have identified that bush encroachment, expansion of farmlands and inappropriate development interventions are other factors affected their mobility. Due to loss of mobility, rotational grazing system has been affected and resulting in environmental degradation.

Flintan and Cullis, (2010:7) confirmed that reckless development of water in wet season grazing areas has resulted in permanent settlement and year round grazing has affected mobility.

6.2.2. Impact on Communal Enclosure (Kalo)

According to Borbori Bule, the practice of enclosure had been introduced from Guji Oromo neighboring Borana by name of crop farming. Then Borana have adapted enclosure as communal property. The original objective of making communal enclosure is to preserve pasture for vulnerable animals during critical dry period. The enclosures can be made at village and/ or *Arda* level. *Arda* means a group of villages who use communal grazing land and enclosure if necessary. Enclosures can be fenced through mobilizing labor by villagers or demarked by agreement. The users of the enclosure set their own agreed rules and regulations on how to conserve and utilize the enclosures. These rules and regulations are enforced by customary institutions which are responsible for rangeland management (*Jarsa dheeda*).

Due to climate change and variability effects Borana pastoralist has engaged in crop farming as means of livelihood diversification. The ecological crisis made it difficult for the Borana to rely on livestock for food alone and forced to involve in farming as an economic diversification (Oba, 1998b:55). By name of farmland they have grabbed rangeland and introduced private enclosure. "Invariably, areas of higher agricultural productivity are those pockets that are also rangeland productivity hotspots" (Flintan and Cullis, 2010:7). Boku (2000:120) have confirmed that even though Borana lowland is not amicable to crop farming; crop farming has expanded rapidly at the expense of rangeland.

I can clearly argue that the interest behind expanding opportunistic farmlands in Borana pastoralist areas is one means of land grabbing which favor sense of individualizing the communal rangeland.

As the frequency of recurrent drought is increasing over time the rules and regulations of communal enclosure have been weakened. Community is forced to graze the communal enclosures out of its original period and objectives. This is mainly pushed by the pressure of climate change and variability.

6.2.3. Impact on Splitting of Herds and Families

Due to bush encroachment which is mainly the result of continuous grazing of particular site and climatic variability; splitting of herds and families which was indigenous adaptation mechanisms and have been used by Borana pastoralists become under question. Borbor Bule expressed that the expansion of farmlands which is the result of climate change and variability has been affecting the splitting of herds and families. From household survey result, conducted in Dire district about 45.9 and 55.7 % of Higo and Madacho *kebeles* respondents' have practiced splitting of herds and families as adaptation mechanisms to climate change and variability respectively. But this figures highly contradicted with the opinions of key informants and focus group discussions participants. Malicha Guyo one of my key informants of Higo *kebele* specified that inappropriate development of water interventions by development actors highly affected the splitting of herds and family.

Even if the contribution of climate change and variability has upper hand in affecting the splitting of herds and families into different locations, other factors like inappropriate settlement, water development and regionalization policy of Ethiopian government have also negative contribution.

In nutshell, the livelihood resources of Borana pastoralist have been affected by the impacts of climate change and variability. But the impact is highly serious on natural resources which in turn affect social and financial resources.

From the indigenous adaptation mechanisms that have been practiced by Borana pastoralist, mobility, communal enclosure and splitting of herds and families into different locations are impacted by climatic and other compounding factors such as inappropriate settlement, regionalization policy of Ethiopian government and inappropriate water development interventions. The potency of customary leaders in reinforcing the applicable indigenous adaptation mechanisms has been weakened over time and needs to be revitalized.

CHAPTER SEVEN
CLIMATE CHANGE AND VARIABILITY RISKS OF THE STUDY AREA

The study area has been exposed to different climatic variability risks. By coupling with different factors, the risks have impacted the livelihoods of Borana pastoralist. The most prominent of these risks, include recurrent drought, high temperature, low and erratic nature of rainfall, interethnic conflict, deforestation and bush encroachment. The details of all could be discussed as follows.

7.1. Recurrent Drought

Previously drought had occurred once in Gada period. But until recently its magnitude and frequency is increasing from time to time. About 98.4 % of the respondents have confirmed that the frequency of recurrent drought is increasing over time and affected the livelihoods of Borana pastoralist (Table 5.1).

There were different impacts faced by Borana pastoralists due to recurrent droughts. Respondent households have identified death of livestock, loss of harvest, decline in rangeland quality and quantity, food shortage, reduction in price of livestock and crop price increased as major impacts faced due to recurrent nature of droughts by Borana pastoralists.

Figure 7.1 Livestock affected by drought in Higo *Kebele*

Source: Photo taken during field survey, 2011

Table 7.1. The possible impacts the respondent households' of study district faced due to high frequency and magnitude of drought (Multiple responses are possible)

If the frequency of drought is increasing from time to time what possible impacts you face?	Higo		Madacho		Total	
	Frequency	%	Frequency	%	Frequency	%
Death of livestock	60	98.4	69	98.6	129	98.5
Loss of harvest	55	90.2	7	10.0	62	47.3
Decline in range quantity and quality	60	98.4	62	88.6	122	93.1
Food shortage	59	96.7	55	78.6	114	87.0
Reduction in price of livestock	60	98.4	65	92.9	125	95.4
Crop price increased	60	98.4	69	98.6	129	98.5
Death of household members	1	1.6	12	17.1	13	10.0
Migration of households members for employment opportunity	26	42.6	29	41.4	55	42.0

Source: Field survey 2011

Borana pastoralists use different traditional drought forecasting system. According to household survey result, about 88.5 and 98.6 % of the respondents of Higo and Madacho *kebeles* use local early warning system to predict or forecast the occurrence and magnitude of droughts respectively. The local early warning systems used by local community are, reading Astrology, intestine of slaughtered animals, sound of birds/wild animals, behavior of livestock and children while them playing.

Table: 7.2. How respondent households' warned against hazards threatening their livelihoods (Multiple responses are possible)

How you are normally warned against hazards threatening your livelihoods?	Higo		Madacho		Total	
	Frequency	%	Frequency	%	Frequency	%
Through local early warning system	54	88.5	69	98.6	123	94.0
By national and local authorities	5	8.2	16	22.9	21	16.0
By news media (TV, radio, news paper)	3	5.0	1	1.4	4	3.1
By NGOs	1	1.6	13	18.6	14	10.7

Source: Field survey 2011

As we can see from field survey report, about 94% of the respondents use local early warning system and this system need to be strengthened and integrated into modern early warning system to benefit pastoralist community from local, national and international forecasting systems.

7.2. High Temperature

The annual temperature of Dire district rages from 16 to 27^{0}C. "According to the National Meteorological Agency (NMA 2007), the average maximum temperature in the country has been increasing by 0.1^{0}C per decade" (Akililu and Alebachew, 2009:38). All of the respondents of the household survey, key informants and focus group discussions participants have confirmed that the trends of temperature have been increasing over time in Borana pastoralist area.

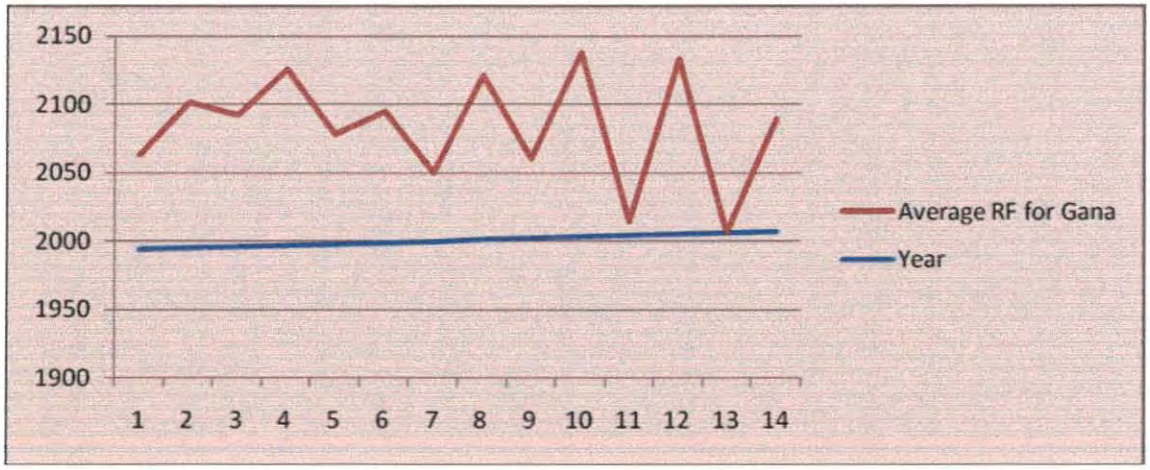
7.3. Low Rainfall

The average annual rainfall in the Dire district ranges from 450 to 500 mm. The rainfall pattern is extremely erratic in nature with variable of late onset and early cessation. Morton (2001:1) confirmed that dry lands are characterized by not only low rainfall, but also erratic nature of rainfall, slow onset and early cessation. The pattern of rainfall in the study area is bi-modal in nature. All of the respondents I have interviewed confirmed that the trends of rainfall have been decreasing over time and there is inter annually variable for past ten to fourteen years in their locality.

Figure 7.2 and 7.3 shows the inter-annual rainfall variability of Mega station for about 14 years (1994 – 2007) by dividing into main rain season from March to May and short rain season from September to November. Rainfall distribution of Mega station is characterized by some degree of inter-annual variability over the past 14 years. Variability is relatively high during main rainy season (March to May) if compared with short rainy season from September to November. During some years, there was a complete fall down of both main and small rainy seasons. According to Figure 7.2 and 7.3 on average the trends of rainfall has been decreasing overtime and this is convergent with community's perception.

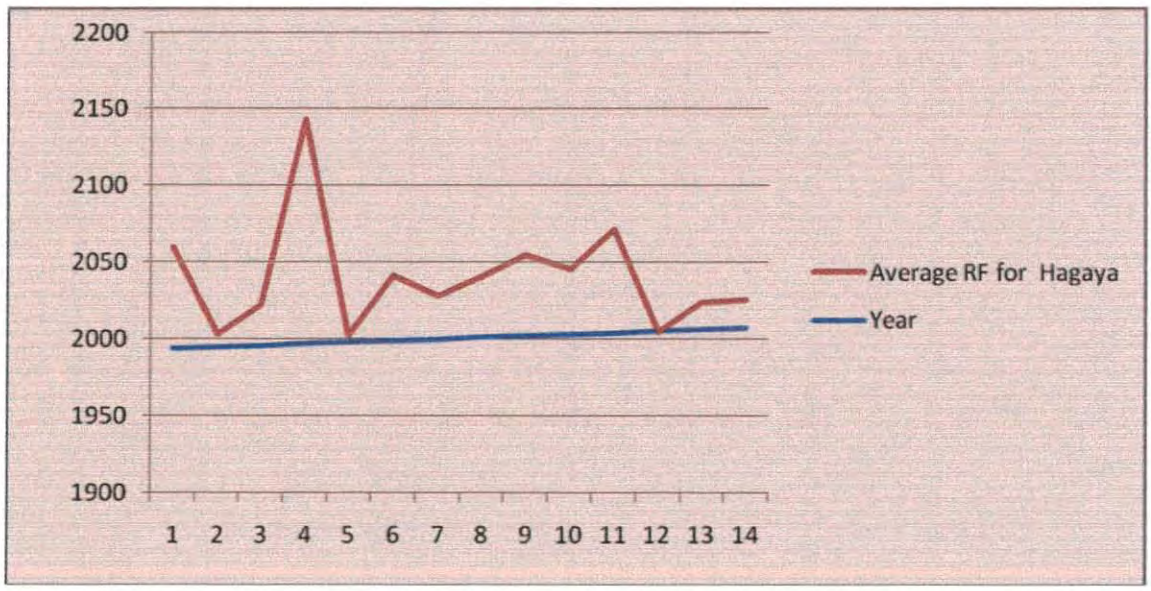
There are few cases where high amount of rainfall were recorded in some seasons. Perhaps the distribution wasn't even throughout the season's rather heavy rainfall within certain days which might caused flooding problems and ceased early.

Figure 7.2 The inter-annual rainfall variability of Mega station for main rainy season from March to May



Source: National Meteriological Agency, 2011

Figure 7.3 The inter- annual rainfall varaibility of Mega station for short rainy season from Septmber to November



Source: National Meteorological Agency, 2011

7.4. Interethnic Conflict

As recurrent drought has been increasing from time to time the problem of pasture and water become prominent among Borana pastoralist area and other neighboring pastoral communities. The scarcity of these resources has induced conflict between different pastoralists groups living in the surrounding. This type of resource based (pasture and water) conflict is very serious during critical drought periods.

About 53.4% respondent households have identified interethnic conflict as one of the major bottleneck that has been affecting pastoral mobility. In actual sense, interethnic conflict isn't only due to climatic problems but there are different aggravating factors. To supplement this idea about 75.6% of respondent households have also identified regionalization policy of Ethiopian government as other bottleneck that induces interethnic conflict. Homann et al.,(2005: 4) specified that "the federal regionalization policy has transferred an area of about one third of the Borana rangelands and two important wells to the Somali Regional State, and this fuelled interethnic warfare between the two pastoral groups".

7.5. Deforestation

Guyo Goba the current Oromo Abba Gada narrated that forest has great role in attracting rainfall, conserving soil erosion, use for animal shades and feed in addition to ritual purpose that perform by ritual villages (Personal communication).

When the frequency and magnitude of drought is increasing from time to time a number of pastoral households lost their livestock. Those groups of people migrate to elsewhere and prefer to reside nearby towns and engaged in firewood selling, charcoal production and poles which have a negative impact on the environment and they have dropped out pastoralism. Deforestation resulted from cutting trees for charcoal-making, pole selling and farmlands expansion (Ali, 2008:89). Riche et al (2009:34) further stresses that coping strategies undertaken by communities in times of drought such as firewood and charcoal selling lead to increased deforestation.

Figure 7.4 Charcoal productions in Madacho *kebele*

Source: Photo taken during field survey, 2011

The rising proportion of pastoral dropouts and the level of poverty in pastoral areas is becoming a serious issue for the environment (Solomon et al, 2008:53). About 93.9% of respondent households have identified deforestation as one of the major impacts of climate change and variability in their areas. Even competition of the resources among different tribes like Borana, Guji, Gabra and Gari due to climatic impacts has devastating effects on forestlands.

BOX 4: Climatic Impacts Forces Household to Involve in Deforestation

Ato Molu Halake is a 45 years old who is living in Madacho kebele, Halake Elema village. Molu has married and his family members are 2 females and 5 males.

Molu narrated his life story as follows:

Before drought of Gada Boru Guyo (1984-1992) Molu had 30 heads of cows and 7 goats. Due to drought occurred in the same Gada period he had lost 16 heads of cows and remained with only 14 cows. Again during Gada period of Boru Mada (1992-2000) other drought occurred and has killed 13 heads of cows and he remained with only one (1).

As Molu has many children, he is failed to feed his family with remaining 1 cow. Then he has forced to sell all 7 goats he had within a year period. Then Molu has devised other strategy to sustain his family members by engaging in charcoal production, fire wood and pole selling. After he has involved in such activities, Molu able to feed his family members and even bought 3 goats.

The numbers of people who have been involved in such kind of activities were increased from time to time and resulted in deforestation. In meanwhile the government has protected the production of charcoal and selling of poles as it has negative implication on the environment. Even if Molu realize the negative impact of charcoal production and fire wood selling on environment, he has forced to continue.

Molu said, it is recurrent drought which has forced me to engage in such kinds of non-environmentally friend activities that contributing for desertification.

According to focus groups discussion I have conducted in Madacho Kebele and personal observations, charcoal production which isn't environmentally sound is practiced by different households to mitigate climatic impacts. Involving in such kinds of activities escalated the impacts of climatic variability and proper orientation need to be given for local communities rather than forcing the community not to do charcoal production blindly.

7.6. Bush Encroachment

"Climate change is set drive the spread of invasive plant and animal species, threatening forests, fisheries and crops in a double blow to nature and livelihoods"(Daily monitor news paper, 2010:1). As the climate has been getting warm and new plant species are becoming dominant and replacing palatable once. Borana rangeland was one of the best rangelands in the East Africa. That rangeland is currently invaded by thorny and invasive bush species which affects grass regeneration. About 35.9% respondent households have identified bush encroachment as one of the major barriers that are affecting indigenous adaptation mechanisms of Borana pastoralist to mitigate climatic impacts. "Currently, more than 70% of the Borana landscape is in poor to fair range condition characterized by bush encroachment and bare soil" (Oba et al., 2004 cited in CARE-Ethiopia, 2008).

Malicha Guyo, one of my key informants, supported the above ideas by what local elders had forecasted concerning bush encroachment problem as follow:

> *Lafti takka tana mata buufatti (Rangeland would be degraded in the future)*
>
> *Buufattee qofa hin aftuu ni gindeeffaatti (Not remained in degradation and would be covered by bush).*

So increased grazing pressure, which is the result of climate change and other factors are accelerating bush encroachment into grasslands.

7.7. Risks on Social Relationships

Pastoralists living adjacent to each other and with other neighboring communities have strong social bondage. Pastoralists share existing resources among each other and move freely based on temporal and spatial condition of pasture and water. Due to climate change and variability, the natural resources (pasture and water) which pastoralists depends on, are dwindling over time and have been scarce. The conflict arisen from shortage of resources has become common among pastoralists and has affected their social relationships. Different Pastoralist ethnic groups who have been living in Borana zone with Borana pastoralists by sharing resources communally for centuries are currently requesting separate land of their own. The intensifying natural resources mainly pasture and water based conflicts which are the result of climate change and variability being provoked between Borana and Gari (Green forum, 2008 cited in Daniel, 2009:22). Perhaps, in addition to regionalization policy of Ethiopian government that didn't consider the pastoralists ways of life; current climatic hazards which threatening the livelihoods of pastoralists are major factors risking social relationships among pastoralists.

7.8. Risks on Social Supporting Mechanisms

Customary institutions of Borana pastoralists had strong social supporting mechanisms. According to Kabale Garbole, one of my key informants, of Higo *kebele* different social supporting mechanisms have been used by Borana pastoralists. But, due to recurrent drought which is eroding the livelihood assets of Borana pastoralists, continuously these social supporting mechanisms are getting weak and the people become egocentric.

> *Given the intensity and frequency of drought and lack of enough time for many of the households to rebuild their herd before the drought again hits, coupled with the increased number of community members requiring assistance from the social safety net, there is indeed an extreme pressure on the indigenous safety net (Solomon et al. 2008).*

Malicha Guyo, the key informants, of Higo *kebele* confirmed that due to climatic impacts the number of people rendering support are increasing from time to time and becoming out of control of local leaders to render the support on time.

The declining in production and productivity of livestock which is mainly attributed to climate change and variability has affected the following social supporting mechanisms such as *dabaree*, *buusa* and *hameessa* which highly related to livestock productivity.

7. 9. Shrinkage of Rangelands and Privatization of Communal Resources

Bush encroachment which is the result of global warming and expansion of farmlands as response to climatic variability were affected rangelands of Borana pastoralists. Boku (2000: 120) stresses that even though the Borana rangeland is characterized by a fragile ecology and not amenable to crop farming; crop farming has expanded rapidly at the expense of rangelands. This has contributed for the shrinkage of communal rangeland and individualizing the commons.

7.10. Impact of Climate Change and Variability on Social Dimension

Climate change and variability has a differentiated impacts on different segments of the community members according to their level of vulnerability. According to household survey report children, women, disabled and elders are the most vulnerable to climatic impacts.

Aklilu and Alebachew (2009: 65) clearly indicated that "climate change induced hazards create additional burdens on women in many ways and make them vulnerable to its impact".

Table: 7.3 Opinion of respondent households concerning segments of community affected by climate change and variability impact (Multiple responses are possible)

In your opinion which segments of the community have been affected by climate change and variability impact?	Higo		Madacho		Total	
	Frequency	%	Frequency	%	Frequency	%
Children	60	98.4	65	92.9	125	95.4
Women	51	83.6	46	65.7	97	74.0
Disabled people	22	36.1	36	51.4	58	44.3
Elders	53	86.9	63	90.0	116	85.6

Source: Field survey 2011

About 95.4 % of respondent households have identified children as prime affected by climatic impacts and followed by elders (85.6%) and women (74%).

Malicha Guyo, has confirmed that children, elders and women are segments of community highly affected by climatic hazards. He stresses that these segments of community cannot migrate to elsewhere and engages in income gaining activities. During climatic shocks high burden of work has lay on the shoulder of women and made them vulnerable. Doyo Dulacha, other key informants, of Higo *kebele* further specified that breast feeding children, elders and pregnant and lactating mothers are more affected segments of the communities if compared with others.

In the course of studying this chapter different risks that have been affected the livelihoods of Borana pastoralist were identified. From the identified risks some of them are direct risks of climate change and variability and others are climate induced risks. Among direct climate related risks recurrent drought, high temperature, low rainfall and bush encroachment can be mentioned. Inter ethnic conflict, deforestation, shrinkage of rangelands and privatization of communal resources and risks on social relationship and supporting mechanisms are climate induced risks.

These risks have differentiated impacts on different segments of community according to their level of vulnerability and capacity to withstand. There are other compounded factors which aggravated the risks of climate change and variability on the livelihoods of Borana pastoralist that need to deserve lobby and advocacy at different levels.

CHAPTER EIGHT
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1. Summary

Understanding the impacts of climate change and variability on pastoralist livelihood and indigenous adaptation mechanisms used by Borana pastoralist are the major focus of this research. This study has raised some questions that need to be dealt with through the course of the study. To answer all questions this study used both quantitative and qualitative approaches by employing different methods and used both primary and secondary data sources that are relevant to the topic of study.

7.1.1. Pastoral Livelihood Assets and their Status

Pastoralists livelihoods mainly depend on three pillars namely natural resource (pasture and water), livestock and people. The effect on one of these pillars can affect other pillars. So, harmonized effort is needed. For effectiveness of livelihoods in general, there are five livelihood assets upon which one can engage in livelihood activities.

For the pastoralists like Borana who are residing in drought prone area and regularly affected by recurrent drought which is the result of climate variability, their livelihood resources are at greater risk. As the livestock (financial asset) is the major livelihood assets, for Borana pastoralists who depend on natural resources (water and pasture), the impact of climate change and variability affect this basic asset and put the livelihood of the community at risk. The impact is highly serious on vulnerable segments of communities like children, lactating and pregnant mothers and elders. There are different shocks and trends like recurrent drought, conflicts, disease outbreaks, population pressure, deforestation, bush encroachment, rangeland degradation and expansion of farmlands which contributed for undesirable livelihood outcome. On top of these there are different climatic induced risks such as dwindling of social supporting mechanisms, shrinkage of rangeland and individualizing the communal resources were other risks contributed for undesirable livelihood outcome.

The other livelihood asset of Borana pastoralist is natural assets which include rangelands, water sources, saltlicks, forests, wild fruits, etc. All these assets are/were highly affected by the impacts of climate change and variability and put the livelihood of Borana pastoralists in danger. In addition to recurrent nature of drought there are other compounding factors like inappropriate development interventions, bush encroachment, inappropriate settlement pattern without valuing indigenous rangeland management system, degradation in potency of local elders, imposition of 'modern' structure on customary once without replacing, regionalization policy of Ethiopian government which did not consider pastoral way of life, deforestation and expansion of opportunistic farmlands have escalated the impacts.

7.1.2. Roles and Status of Indigenous Adaptive Mechanisms to Mitigate Climatic Impacts

Like other pastoral communities, Borana pastoralists are rich in indigenous adaptation mechanisms that have been used for centuries to mitigate impacts of climate change and other risks. These communities have been living for centuries by their own indigenous adaptation mechanisms without any external support and when the availability of social services and technologies were at infant stage. Paradoxically, during the epoch of technological advancement and existence of different development actors that supposed to backstop pastoral communities their indigenous adaptive mechanisms aren't in a position to support their livelihoods. It may not difficult to judge as some basic things were missed or overlooked in the process of contemporary pastoral development that renders at most attention. As Perrier (1994) noted successful development requires polices that enhance the survival of pastoralists by valuing their indigenous adaptation mechanisms in highly variable environment. So, any development interventions need to value and build upon the indigenous technical knowledge of pastoralists communities.

The past development approaches of Borana pastoralist was top-down without valuing the existing indigenous knowledge of community. The introduction of 'modern' approaches has weakened the existing customary once without replacing it and communities become lost their resilient capacity to shocks. Those youngsters who have

limited understanding of indigenous adaptive strategies have kicked- out local elders without replacing their role. This is highly exacerbated by climate change and variability impacts. Among the indigenous adaptation mechanisms weakened overtime due to compounded effects of climate change and development approaches; mobility, splitting of herds and families into different locations, communal enclosure, reciprocity social supporting systems, and customary rangeland and water resource management were identified in the course of the study.

7.2. Concluding Remarks

Developing countries are one of the less contributor and more victims of climatic impacts in the world. Pastoralists whose livelihoods depend on natural resource and sensitive to climatic factors are the most affected one. The livelihood resources of the Borana pastoralist mainly depend on natural assets that in turn affected by climatic impacts. In the course of study different climate related risks such as recurrent drought, high temperature, low rainfall and bush encroachment were identified in the study area. Furthermore, other climate induced risks such interethnic conflict, deforestation, shrinkages of rangelands, expansion of farmlands, privatization of communal resources and dwindling of social supporting systems were also identified. There are indigenous adaptation mechanisms such as mobility, diversification of herds, strengthening of communal enclosures, hay making, etc, used by Borana pastoralist for centuries and found to be environmentally sound and need to be strengthen to mitigate climatic shocks. Again the community agreed that the frequency and magnitude of drought has been increasing over time and put the livelihood of Borana pastoralist under threaten. This can be exacerbated by compounded factors such as inappropriate settlement pattern, regionalization policy of Ethiopian government, in appropriate water development interventions, imposition of 'modern' structure on customary once, expansion of farmlands and sense of individualizing the commons. Also the impact of climate change and other compounding factors have differentiated impact on children, women, disabled and elders due to their vulnerability and less capacity to withstand.

As the old age indigenous adaptation mechanisms used by the pastoralists were effective in the absence of 'modern' era backing to the root is found to be imperative to reduce the climatic impacts.

7.3. Recommendations

Climate change and variability risks with other compounding factors were put the livelihood of Borana pastoralist at risk. To improve this different opportunities which could be environmentally sound and applicable to practice need to assess and recommend for future actions. The following are some of the recommendations that need to get due attention by all concerned:

- Local elders who have basic knowledge and skills in customary resource management need to be revitalized and empowered.
- Any development interventions need to value the existing resources and consider their interventions as value addition.
- The indigenous adaptation mechanisms which are environmentally sound and effective need to be promoted
- During climatic risks special program that reduce the vulnerability of women and build their adaptive capacity need to be seek
- Promote holistic development programs that require a sound understanding of pastoral production system
- As Borana pastoralist livelihoods mainly depend on natural assets, which directly depend on natural resources and highly sensitive to climatic impacts, diversifying livelihood sources may reduce the consequences.
- Integrate local early warning system with scientific prediction of climatic change to maximize the benefit of pastoralists
- During designing and formulating national policies the issue of pastoralists needs to be taken into consideration according to their life style and agro-ecology they inhabit.
- Development approaches need to sought ways of improving the resilient capacity of pastoralists and means of minimizing its impact to climatic shocks.
- Conduct further research on how to revitalize indigenous adaptive mechanisms and innovative ways of mitigating climatic impacts.

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APPENDICES

APPENDIX I

POINTS TO GUIDE KEY INFORMANT INTERVIEW

Part I: Perception on impacts of climate change and variability on livelihood assets.

1. What are the major livelihood assets of the Borana pastoral community?
2. In your opinion what is the trend of these livelihood assets in terms of supporting households' food security?
3. What are the major climatic hazard(s) that have been threaten the livelihoods of the Borana pastoralists?
4. How do you see the trends and magnitude of this/ these hazard(s)?
5. How this/these climate change hazard(s) affect the major livelihood assets of the Borana community?

Part II: Local adaptation mechanisms to mitigate climate change and variability and other factors that aggravate climatic impacts

6. In your opinion what local adaptation mechanisms the community has been practicing in mitigating impacts of climate change and variability?
7. What are the barriers that have been affecting these local adaptation mechanisms?
8. Among local adaptation mechanisms that have been practiced by local community which do you found to be effective under current climatic conditions? Why?
9. In your opinion which segments of the community members of the Borana pastoral community highly affected by climate related hazard(s)? Why?
10. 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 Borana pastoralists?
11. What are the alternative sources of income practicing by the local community to mitigate impacts of climate change on their livelihoods?
12. What are the supporting mechanisms that have been practiced by local community in reviving the victims of climate change and variability to improve their livelihoods situation?
13. In your opinion what other non-climatic factors aggravate climate change and variability in Borana pastoral area in general and Dire woreda in particular?

Thank You !!

APPENDIX II

POINTS TO GUIDE FOCUS GROUP DISCUSSION

1. In your opinion what are the climate related hazard(s) that has/have been affecting the pastoralist community of Borana/Dire woreda?
2. What are the impacts of this/these hazard(s) on livelihoods of Borana/ Dire pastoralists?
3. What are the trends or historical time line of this/these hazard(s) and major events happened on pastoralist community of Borana due to hazard(s)?
4. What do you think the role of government and other development actors in minimizing the impacts of climate change and variability on pastoral livelihoods and to strengthening traditional adaptation mechanisms?
5. SLOT Analyses- In the context of climate change and variability on pastoralist livelihoods, Please give your thoughts on the following elements.

Strengths of Borana pastoral community to mitigate effects of climate change on their livelihoods	Limitations of Borana pastoral community to mitigate climate change effects on their livelihoods	Opportunities available to use by the local community and other actors for mitigation of climate change and variability	Threats that hinder Borana pastoral community in mitigating climate change effects

6. Are there any other issues that you think are relevant for my research, but I have not discussed during the discussion?

Thank You !!

APPENDIX III

HOUSEHOLD SURVEY QUESTIONNAIRE

Name of kebele_____

Name of data collector _____

I. Personal Information

1. Name of the informant_____
2. Position in the household_____
3. Sex

   A. Male B. Female

4. Age_____
5. Ethnic group
   A. Borana B. Guji C. Gabra D. Burji E. Others specify_____
6. Marital status

   A. Single B. Married C. Divorced D. Widowed E. Others

7. Educational status
   A. Non-literate B. Read and Write C. Primary D. Secondary and Above

II. Household Demographic Information and Mobility History

8. Members of household

Please fill the following table
Table 1

S/N	Name of household members	Age	Sex		Husband (tick)	Wife	Child	Others specify
			Male	Female				

9. Household literacy assessment; Please exclude the respondent.
   Please fill the following table
   Table 2

Literacy level	Number of family members	Remark
Non-literate		
Read and write		
Primary-level education (grade 1-4)		
Junior-level education (grade 5-8)		
High school education (grade 9-12)		
Certificate		
College Diploma		
University graduate		

10. How long have you been living in this place?

    A. Less than 1 year _____

    B. 1-5 years_____

    C. 6-10 years _____

    D. other (specify)_____

11. Where was your family living prior to moving to the current location?

_____

12. Why did you leave your previous location?

_____

_____

13. What were your specific reasons for choosing your current location?

_____

_____

14. Do you have a plan to leave this place? Yes _____ No ____

15. If you have a plan to leave, why do you intend to leave this place?

_____

_____

16. If you intend to stay, why do you prefer to stay in this place?

_____

17. What are the factors that determine your household mobility? (Multiple responses possible)

A. Pasture condition

B. Availability and distance of water points

C. Conflict in the area

D. Disease out breaks

E. Others specify_____

18. What are the external factors that inhibit your house hold mobility? (Multiple response possible)

A. Inter ethnic conflict

B. Regionalization policy of Ethiopian Government

C. Lack of water and pasture at place we intend to move

D. In appropriate settlement without living space for satellite herd grazing

E. Recurrent drought without giving much time for regeneration of pasture from last drought effect

F. Population pressure both for livestock and human

G. Others specify_____

_____

19. Please prioritize the most three external inhibiting factors that hinders your mobility

A._____

B._____

C._____

III. Household Sources of Livelihoods (Tick)

20. What does your family sources of livelihoods from? (Multiple response is possible). (Tick)

A. Animal husbandry _____

B. Crop cultivation _____

C. Livestock trade _____

D. Petty trade _____ (in what? _____)

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

F. Sale of fire wood and charcoal _____

G. Causal labor _____ (where? _____)

H. Rental house in town _____ (Amount per month_____)

I. Beekeeping _____

J. Remittance _____ (from whom_____)

K. Pension allowance _____(Amount per month_____)

L. Free relief aid _____ (from whom? _____)

M. Food for work _____ (by whom? _____)

N. Credit _____ (from whom? _____)

O. Sale of blacksmith items _____

P. Income from traditional healing service _____

Q. Hunting and gathering _____

R. Begging _____

S. Other (specify)_____

21. From Ques.no 20, Please prioritize 1 up to 5 your major alternative sources of income to mitigate effects of climate change except livestock husbandry which isn't alternative to pastoralists

A._____

B._____

C._____

D._____

E._____

22. How do you see major alternative sources of income from question number 20, in relation to sensitivity to climate change effects?

A. Highly sensitive B. Less sensitive

C. No any relation with climate change D. Others specify_____

IV. Livestock Holding Information

23. 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_____

24. 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._____

25. How do you see your livestock holding status from last ten years to date? (From Gada Liban Jaldesa to Guyo Goba which is underway?)

A. Increasing B. Decreasing C. No any change D. I have no idea

E. Others specify _____

26. If your response to question number 25 is decreasing, what are the possible causes? (Multiple responses possible)

A. Death due to recurrent drought B. Death due to disease out breaks C. Conflict

D. High off take or selling of livestock to buy hose hold food consumption

E. Sell of livestock to deposit money in bank F. Sell livestock to build house in town

G. Sell livestock to send many children to school

H. Others specify_____

27. From possible causes of decreasing your livestock holding status of number 26 rank the major causes of your own

A._____

B._____

C._____

D._____

E._____

F._____

V. Crop Production Information

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

A. Yes B. No

29. If you have cultivated land what is the size of your land either in timads or hectares_____

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

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

F. Other specify _____

31. 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_____

32. If your response for question number 31 is decreasing in production, what were/are possible causes for decreasing in production? (Multiple responses possible).

A. Drought B. Flood C. Absence of high yielding variety seeds

D. Absence of chemical/organic fertilizer E. Pests out break

F. Others specify_____

33. How did you engaged in crop production? A. Intentionally B. As opportunistic

C. I do not know how I engaged D. Others specify_____

34. How do you see the futurity of 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 _____

VI. Social Services Information

35. Do you have veterinary services in your locality? A. Yes B. No

36. If no, how long does it take you to reach the nearest veterinary service? _____ hours walk for single trip.

37. Do you take your animals to vet service when they get sick?

A. Yes B. No

38. If no, why you don't take them to vet service? (Multiple responses possible)

A. The service is too expensive

B. Traditional medicine is better

C. Inadequate drug and facilities at vet service

D. Vet personnel are not well qualified

E. Vet personnel are not available most of the time at their work place

F. Others specify _____

39. How long does it take you to reach the nearest (livestock) marketing centre? _____ Hours walk single trip

40. How frequently do you go to the market?

A. Daily B. Twice in a week C. Once in a week D. Twice in a month

E. Once in a month F. Others specify_____

_____

41. How do you get about market price or information?

A. Self visit B. From neighbor C. From Radio D. From government employees E. Through Mobile phone communication F. Others specify_____

_____

42. How long does it take you to reach the nearest human health facilities? _____ Hours walk single trip

43. Do you visit the human health centre when you or your family members get sick?

A. Yes B. No

44. If your response to number 43 is no, What are possible reasons? (Multiple response possible)

A. The service is too expensive

B. There is no drug and other facilities at the centre

C. I prefer traditional treatment

D. Health technicians are not available most of the time

E. Other specify_____

45. What type of schools are available in your locality?

A. Regular School only B. Satellite or Alternative basic education only

C. Both regular and satellite schools D. No any school

46. Among the school types available in your locality which one do you prefer to send your children?_____ Why?_____

47. Do you send all your school age children (>=6 years old) to school?

A. Yes B. No

48. If your response to number 47 is no, what are the reasons? (Multiple response possible)

A. Far distance from school

B. Educational curriculum doesn't much with our life style

C. We need child labor for looking of livestock and house hold chore

D. We need child labor to engage in daily laborers

E. We have no financial capacity to send all children to school

F. We never send girls to school except boys

G. Others specify_____

49. Which water sources found in your locality? (Multiple responses possible)

A. Open pond B. Deep well (Tula) C. Bore hole D. Cisterns

E. Protected spring(Burqa) F. Un protected spring G. Scoop wells(Adadi)

H. Others specify_____

50. Among the above water sources which one are the more reliable sources during drought period in your locality? Rank them

A._____

B._____

C._____

D._____

E._____

51. What is the distance of nearest water source from your village?_____ Hours walk single trip

52. Are these water sources sufficient enough to bridge your year round water gap?

A. Yes B. No

53. If no, how do you feel the water gap? (Multiple response possible)

A. Move to other area for search of water

B. Water tankering by development actors

C. Reduce livestock watering frequency

D. Others specify_____

VII. Perception on Climate Change and Variability

54. How do you see the change in temperature for last ten years? A. Increasing trend B. Decreasing trend

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

A. Increasing trend B. Decreasing trend

56. 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

57. If the response for question number 56 is increasing in frequency of drought from time to time, what possible impacts did you face?(Multiple response possible)

A. Death of livestock B. Loss of harvest C. Decline in range quantity and quality D. Food shortage E. Reduction in price of livestock F. Crop price increased G. Death of household members H. Migration of households members for employment opportunity I. Others specify_____

_____

_____

58. From climate change impact you have faced in question number 57, please rank the major climatic impacts on your livelihoods.

A._____

B._____

C._____

D._____

E._____

59. In your opinion which segments of the community has affected by climate change and variability impact? (Multiple response Possible)

A. Children B. Women C. Disabled people D. Elders

E. Others specify_____

_____

60. Please rank the above segments of the community according to degree of harm to climate change impacts

A. _____

B._____

C._____

D._____

61. 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_____

62. 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

63. How are you normally warned against hazards threatening 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_____

VIII. Local Adaptation Strategies/Mechanisms

64. Did you practice any adaptation mechanisms to mitigate impacts of climate change for last ten years?

A. YES B. No\

65. If your response for question number 64 is yes, what adaptation mechanisms you have been practiced? (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 (kallo) for calves and lactating cows around village

F. Buying feed from else where

G. Hay making

H. Cutting and carry

I. Selling of charcoal and fire wood

J. Migration to mining area and does income there

K. Migration to town and employed as casual labor

L. Use of wild food

M. Others specify_____

66. From the above adaptation mechanisms of question number 65 please rank five (5) of them which do you think environmentally sound, applicable to practice and viable to cope with current climatic condition under Borana pastoralist condition

A._____

B._____

C._____

D._____

E._____

67. What are the mediating institutions that positively facilitate the climate change impact adaptation mechanisms of question no.66 you have practiced? (Multiple responses possible).

A. Traditional institutions B. Government structure

C. NGOs development interventions

D. Others specify_____

68. 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. In appropriate development interventions

F. Regionalization policy that does not take in account the life style of pastoralists

G. Others specify_____

69. What are the barriers that negatively affecting traditional adaptation mechanisms of Borana pastoralist in mitigating impacts of climate change and variability? (Multiple responses possible)

A. Imposition of modern institution on traditional one

B. Erosion of farm land

C. In appropriate settlement pattern without considering traditional grazing system

D. Regionalism that affecting pastoral movements

E. Banning of fire application for traditional range management

F. Degradation in potency of traditional leaders

G. Devaluing indigenous traditional knowledge

H. Inappropriate development interventions

I. Poor policy focus on pastoral development

J. Bush encroachment

K. Others specify

70. Please rank these barriers according to their economic and social importance on your livelihoods

A._____

B._____

C._____

D._____

E._____

Thank You for Giving Your Time !!

Declaration

the undersigned, declare that the thesis is my original work, has not been presented for a degree in other university and that all sources of materials used for the thesis have been duly acknowledged.

clared by:

Abarfe Jafar

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Confirmed by:

Advisor