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COLLEGE OF DEVELOPMENT STUDIES

CENTER FOR RURAL DEVELOPMENT

PASTORALISM UNDER STRAIN: NATURAL RESOURCE DEPLETION AND ITS EFFECT ON PASTORAL LIVELIHOOD IN YABELLO DISTRICT BORANA ZONE, OROMIA REGIONAL STATE, ETHIOPIA.

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BY: SARA ARERO SASURE

ID NUMBER: GSR/7441/11

ADVISOR: ALI HASSEN (Ph.D.)

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TITLE

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By

SARA ARERO SASURE

JUNE 2020

ADDIS ABABA, ETHIOPIA

Addis Ababa University

College of Development Studies

Center for Rural Development (CRD)

This is to certify that the thesis prepared by Sara Arero Sasure, entitled; "Pastoralism under strain: natural resource depletion and its effect on pastoral livelihoods in Yabello district, Boorana zone, Oromia regional state, Ethiopia." And submitted in partial fulfillment of the requirements for the Degree of Masters of Arts in Rural Livelihood and Development complies with the regulation of the university and meets the accepted standard with respect to originality and quality.

Submitted by:

Sara Arero **Signature _____ Date _____**

Approved by the Board of examiners:	**Signature**	**Date**
Dr. Ali Hassen **ADVISOR**	_____	_____
Dr. Abate Mekuriaw **INTERNAL EXAMINER**	_____	_____
Dr. Terefe Degefa **EXTERAL EXAMINER**	_____	_____

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

Declared by: Confirmed by:

_____ _____

_____ _____

Candidate Advisor

Enrolment No: ID GSR/7441/11
Address: Tel: +251 911 977003
E-mail: saraareroh@yahoo.com

Addis Ababa, Ethiopia

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Acronyms

CSA	Central Statistical Agency
CbEWS	Community-based Early Warning System
DFID	Department for International Development
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
HS	Household survey
IEK	Indigenous Ecological Knowledge
IGAD	Inter-Governmental Authority for Development
KII	Key Informant Interview
M.A.S.L	Meter above Sea Level
NGO	Non-Governmental Organization
NR	Natural Resource
PA	Pastoral Associations
PFE	Pastoral Forum Ethiopia
REDD	Reducing Emissions from Deforestation and Forest Depletion
SK	Square Kilometers
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNDP	United Nation Development Program
UNEP	United Nation Environmental Protection
WISP	World Initiative for Sustainable Pastoralism
WRI	World Resource Institute

Abstracts

Ethiopia is one of the most severely affected countries by natural resource depletion which resulted in a decline in productivity and qualities of pastoral range resources, loss of biodiversity, and suffering of the people and animals in chronic food and feed shortage respectively. The full implication of loss and depletion of rangeland resources as well as main causes exposed the country to the natural resource depletion. The main objective of this study was to investigate natural resource depletion and its effects on pastoral livelihoods in Yabello District. The data for this study were collected using surveys; key informant interviews, questionnaires, observation, and focus group discussions. Dikale, Dhadim and Haraweyu Kebeles were selected purposively where natural resource and other causal issues to the problem of natural resource depletion is observed. 177 households were selected for collecting the data. The household number from each Kebeles was considered based on the Kebeles population proportion. The results of the investigation showed that the natural resource of the study area is highly depleted and placed pastoralists under strain. The study areas three decades ago were under good resources conditions which are changed to a new problematic situation. Increase in human and cattle population pressure which increases demand on natural resource use and lack of alternative sources of resource use and land ownership, crop cultivation which is a newly emerging system in the area are the major causes for natural resource depletion in the area. Moreover, bush encroachment, lack of commitment at an individual level, and organizations in range resources management are some of the prevailing causes of rangeland degradation in the district. The effect of natural resource depletion on rangeland, livestock assets, food security, water resource, soil, biodiversity, range ecosystem, loss of forest cover and extinction of palatable species which affects pastoral livelihood was clearly observed in the study area. The research made through investigation of the causes of natural resource depletion, consequence and effects, perceptions, and trends, risks, indigenous coping, and controlling mechanism. Pastoralists whose livelihoods depend on the natural resource with weakened indigenous coping mechanisms are the most affected ones and alternative ways of improving their resilient capacity need to be sought for the future survival as a complement of their coping mechanisms. The indigenous coping mechanisms used by the pastoralists are ineffective during the age of technological advancement. Pastoralists have managed their natural resources and livelihoods through customary institutions by practicing different indigenous mechanisms to restrain the effects of resource depletion.

Keywords: Pastoralism, Natural Resource Depletion, Livelihood, Population Pressure, and Yabello

Chapter One

1. Introduction

1.1 Background

There is much debate worldwide over natural resource allocations. This is particularly true during periods of increasing scarcity and shortages as a result of depletion and overconsumption of resources (Schilling, and Chiang, 2011). There are various methods of categorizing natural resources; these include the source of origin, stage of development, and by their renewability. On the basis of origin, natural resources may be divided into two types: Biotic resources are obtained from the biosphere (living and organic material), such as forests, animals, and fossil fuels. Abiotic resources are those that come from non-living, non-organic material. Considering their stage of development, natural resources may be referred to in the following ways: Potential resources are those that may be used in the future, for example, petroleum. Salvati, 2008). Actual resources are currently used for development, such as wood processing, reserve resources that can be developed profitably in the future. Stock resources cannot be used due to lack of technology or non-renewable: (not naturally form in the environment (Minerals)) (Salvati L and Marco Z, 2008).

In recent years, the depletion of natural resources has become a major focus of governments and organizations such as the United Nations (UN). This is evident in the UN's Agenda 21 Section Two, which outlines the necessary steps for countries to take for sustains in their natural resources. The depletion of natural resources is considered a sustainable development issue. Among the most notably many interpretations of the term sustainable development, the Brundtland Commission's which says to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. However, in broad terms, the sustainable development is balancing the needs of the world population and species now and also in the future. The depletion of natural resources, (rangeland and water in the context of pastoralist area) is associated with social inequality. Across the world, pastoralists are strongly associated with rangeland. “Rangelands” is a broader term than “grassland”, and includes regions where woody vegetation is dominant; moreover, it is common in texts describing land from the viewpoint of livestock production. Grasslands are just that, and the term has a more biological emphasis (Gillison, 1993). Considering most bio-diversities are located in developing countries, depletion of these resources could result in losses of ecosystem service for these countries. Some view this depletion as a major source of social unrest and conflicts in developing nations among which actual depleted resources like pasture that currently used are a source of conflict and strain seriously the livelihood of the pastoralist community.

The depletion of natural resources is caused by 'direct drivers of change' such as mining, overgrazing, petroleum extraction, fishing, and forestry as well as 'indirect drivers of change' such as demography (e.g. population growth), economy, society, politics and technology,

practice of agriculture (Ben Collen 2017). The depletion of natural resources is a continuing concern for society. The value of a resource is a direct result of its availability in nature and the cost of extracting the resource. The more a resource is depleted, the more the value of the resource increases. There are several types of resource depletion, the most known being, aquifer depletion, deforestation, mining for fossil fuels and minerals, pollution or contamination of resources, slash-and-burn agricultural practices, soil erosion, and overconsumption, excessive or unnecessary use of resources. (Rodolfo et al, 2014). Arid and semi-arid grazing systems in east Africa are seen as highly vulnerable to socio-economic factors like income, education, employment, etc. More generally, there is an assumption that pastoral areas face not only an increased risk of resource depletion, due to increased variability in rainfall, higher temperatures, human and livestock population even if mean rainfall is predicted to rise (Bryman, 2008). African pastoralists are very unevenly distributed; occupationally specialized pastoralists principally dependent on camels, cattle, and sheep are virtually confined to areas north of the equator in semi-arid regions (Blench, 1998a). Agro-pastoral communities, which own cattle, sheep, and goats, also occur in the northern region but predominate south of the equator.

Ethiopia has Africa's largest livestock population. Over 60 percent of its land area is semi-arid lowland, dominated by a livestock economy. To gain a fuller understanding of pastoralist regions, the Pastoralist Communication Initiative of the United Nations Office for the Coordination of Humanitarian Affairs, together with Ethiopian officials and pastoralist leaders, considered some of the choices pastoralists may make over the next 20 years in order to adapt to changing circumstances. Four possible scenarios were envisaged. The analysis took into account the special nature of the lowlands, their natural resources, and the influences of climate, international markets, economy, and governance (UN 1987). 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 have serious impacts in pastoral areas, which include among others, the 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 the basis for the livelihood of the pastoralists. Climate change is already impacting populations, livelihoods, and ecosystems as a general and natural resource as a particular in the pastoral area of Borana. Exacerbating poverty and leading to infrastructural breakdown and social insecurity, it threatens to set back development efforts by decades, profoundly affecting all of the people. Further, the potential for natural environmental hazards and future climate change to undermine the country's economic development and social progress is great and growing (Abate, 2009).

Traditional pastoralists broadly accept pasture and rainfall as givens and adapt their social and herding systems to take the best advantage of them. Pastoralism is the main production system in the dry lands. Pastoralists inhabit a marginal environment in which livelihood options are limited by the natural environmental factors, mainly unreliability of rainfall which has a direct correlation with natural resource depletion. This holds true for Borana pastoralists of Southern

Ethiopia which is characterized by frequent drought and rainfall variability that causing natural resource depletion. The problem is very serious in the arid and semi-arid areas, especially among pastoralists like Borana who are residing in the periphery of the country where the recurrent drought is the major natural disaster. The Borana land is populated mainly by the Borana Oromo for whom pastoralism provides the major source of livelihood. 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).

The frequency and magnitude of drought have been increasing from time to time and has affected pastoralist livelihoods. Borana pastoralists who live in the arid and semi-arid ecological zone and depend on climate-sensitive livelihoods particularly livestock are the most vulnerable and affected ones with the recurrent drought that causes natural resource depletion. These communities have been neglected by policymakers and development actors for decades as marginalized communities and resulted in livelihoods insecurity. Despite all these, they have managed their natural resources and livelihoods through customary institutions by practicing different indigenous mechanisms to restrain the effects of resource depletion (Tache, 2008). Nevertheless, these indigenous mechanisms that have been practiced by Borana pastoralists for centuries have been threatened by natural and manmade factors and put the livelihoods of the community at risk. The effects of resource depletion on pastoralists are not a new subject, but these effects were not link with pastoralist livelihoods and indigenous mechanisms to restrain the effects.

This study has assessed the cause of natural resource depletion and its effects on pastoralist livelihoods and their coping strategies for resource depletion problems. Collectively, this knowledge represents a dynamic information base that supports the pastoral communities in the study area in order to understand the constantly changing and varying resource depletion.

1.2 Statement of the problem

Pastoralism is a way of life and a production system for a substantial number of Africans who inhabit arid and semi-arid areas. Pastoral communities live with the expectation of natural resource depletion by overgrazing, drought, and have developed coping mechanisms to minimize its effects. 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 (Brooks, 2006). 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 sedenterazation and urbanization, a breaking down of traditional cultures, transformation of gender relations, and depletion of natural resources and growing vulnerability of pastoralists to ecological and economic strain (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, natural resource depletion, 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, pasture land depletion, restricted mobility, and famine are also the problems that the pastoralists are facing (Ayalew, 2001). Adapting to climate variability entails adjustments and changes at every level from community to national and international. To cope with current and future climate strain, Borana communities must build their resilience by diversifying their livelihoods and adopting pastoral friendly technologies to cope with natural resource depletion effects. 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 natural resources managing 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 in the Borana pastoralists as current challenges". Borana pastoralists coupled with pasture depletion have challenged and resulted in adverse impacts on livelihoods.

Pastoralism is a way of life, which is well suited to the arid and semi-arid part 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 the marginalization of pastoralists (Socially, economically and politically); their local management capacities have been eroded and they were more susceptible to climate variability than other communities. As deep wells are major water sources in the area; rangeland around deep wells are highly overcrowded, depleted, and failed to serve a large number of livestock populations and it leads to serious depletion of range resources. From my personal exposure and experience, I argue that the frequency and severity of resource depletion have been increasing over time due to climate change and other factors in Borana pastoralist area without giving time for recovery of natural resource (pasture) and asset and this would have an effect on the livelihoods of the community in the study area. This research, therefore, investigated natural resource depletion, causes and effects, its change on the livelihoods and the links between the depletion of natural resources and its effects on the livelihoods of Borana pastoralists of Yabello district.

1.3 Objective of the study

1.3.1 General objective

The general objective of the study was to investigate natural resource depletion and its effects on pastoral livelihoods in Yabello District.

1.3.2 Specific objectives

Specific objectives were:

1. To investigate the causes of natural resource depletion in Yabello district.
2. To assess the status of the existing pastoralist perception of natural resource depletion in the study area.
3. To identify the effects of natural resource depletion on pastoral communities' livelihoods.
4. To explore coping strategies used to overcome resource depletion problems.

1.4 Research questions

What were the policy implications of the interpretations of pastoral natural resource depletion and the culture of the community to understand the cause and to manage the consequences? This study considered resource depletion within the context of pastoral production in Borana, raising the following research questions:

1. What are the major causes of natural resource depletion in the study area?
2. How do the Borana pastoralists perceive and determine natural resource depletion?
3. What are the effects and consequences of resource depletion on the pastoralist livelihood in Yabello district?
4. What strategies were employed by pastoralists to cope with natural resource depletion?

1.5 Significance of the study

The Borana pastoralists, numbering about 0.5 million (Ethiopia CSA, 2014), inhabit the lowlands of Borana and the Guji Zones of the Oromia Regional State. The society is a patrilineal one, consisting of 18 geographically intermingled clans. The clans are organized into two intermarrying moieties called Sabbo which comprise 3 clans and Gona, which comprise 15 clans. The society is also organized into age grades and generational class systems, in which five generational classes (gogeessa or luba) alternate in assuming power every eight years (Gada period) in terms of governance responsibilities (Asmarom, 1973).

The Borana land is semi-arid, featuring contrasted seasonality with an altitudinal range of 1000m to 1500m above sea level, and a mean annual rainfall measuring below normal. There are four

locally defined seasons comprising two rainy seasons (long rain − Ganna, and short rains − Hagayya) and two dry seasons (long dry season − Bona Hagayya and the short dry season − Adoolessa). In normal years, the long rains are received between March and May, and the short rains between September and October. The onset and cessation of the rains of the two rainy seasons are often irregular, but the Ganna rains are more reliable than the Hagayya rains in their amount, temporal and spatial coverage. The former rains account for 60% of the total annual rainfall, while the latter rains contribute only 40% (Sutter, 1995).

This research paper can assist other researchers as a starting point for those who want to conduct further research on this topic and the information generated by this research was expected to contribute to the existing body of knowledge about the effects of resource depletion issue on pastoralist livelihoods and local management mechanisms.

1.6 Scope and delimitation of the study

This study was limited to natural resource depletion and its effects on the livelihoods of Borana pastoralists in the Yabello district. In the course of the research work if not all, most of the intended objectives and research questions were addressed. This research has attempted to deal with indigenous management mechanisms used by the local community to restrain the effects of resource depletion on their livelihood.

Many limitations happened in the course of the research work. Some of which were stated hereunder as follows.

1. Reluctance: Some respondents were expecting payments.
2. Local security issue: there was intermittent inter-ethnic conflict within the Borana areas. Therefore, some of the adult males were not available for participation during conducting research work.
3. Corona virus Pandemic: This is a worldwide pandemic that has impact having a profound and serious result on the global economy and has sent policymakers looking for ways to respond and the communities to stay at home. Accordingly, Ethiopia takes measures that hinder the movement within the people and social meetings and of course, this affected the plan of the research work to some extent.

To overcome the above limitations, researcher was used different approaches, methodologies and above all face to face discussions with pastoralists to collect the research data on timely bases.

1.7 Organization of the Thesis

This study is organized into eight chapters that hold the related concepts, but need to be managed separately.

Chapter one deals with the background of the study, statement of the problem, objectives, research questions, significance of the study, and the scope and delimitations of the thesis.

Chapter two is mainly concerned with the review of related literature. It comprises concepts of natural resource depletion, pastoralism, effects, cause and management of natural resource depletion, pastoral livelihood, and way out of depletion of the natural resource.

Chapter three focuses on research design and methodology which encompasses the study area description, research approach, study design, and sampling procedure, data collection techniques, and methods of data analysis.

Chapter four analyses socio-demographic and economic characteristics of sample respondents' household profile, age and sex composition, marital status, family size, study area description, public services, mobility history, and main source of livelihood assets of the households in the study areas.

Chapter five presents the perceptions and trends of Natural Resource Depletion on livelihood basis perceptions on rangeland depletion, approaches to rangeland management and trends of natural resource depletion in the study area.

Chapter six analyzes the causes, consequence and effect of natural resource depletion on livelihood basis. In this chapter the main cause, the consequence and effect on different aspects of natural resource depletion were analyzed.

Chapter seven presents indigenous coping mechanisms and designed strategies to reduce natural resource depletion in the Study Area

Chapter eight includes summary of the research, conclusion and recommendations for future actions.

Chapter Two

2. Review of Related Literature

2.1 Concepts

2.1.1 Natural resource and depletion

Along with all vegetation, crops, and animal life that naturally survives upon the heretofore identified characteristics and substances. Natural resources are resources given by nature without any actions of humankind. It includes sunlight, atmosphere, water, land (includes all minerals) over the natural resource allocations, there is much debate worldwide nowadays. This is particularly true during periods of increasing scarcity and shortages, depletion, and overconsumption of resources (Schilling and Chiang, 2011). In recent years; a major focus of governments and organizations such as the United Nations (UN) is the depletion of natural resources. For countries to take to sustain their natural resources the evidence outlines the necessary steps.

Among the most notably -many interpretations of the term sustainable development, the Brundtland Commission's which says to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. However, in broad terms, the sustainable development is balancing the needs of the world population and species now and also in the future. The depletion of natural resources is associated with social inequality. Considering most bio-diversities are located in developing countries, depletion of these resources could result in losses of ecosystem service for these countries. A major source of social unrest and conflicts in developing nations is over natural resource issues.

Mining, petroleum extraction, fishing, overgrazing, and forestry as well as direct drivers of change such as demography, economy, society, politics, and technology, the practice of agriculture are the major cause of world resources. (Ben Collen, 2017). The depletion of natural resources is a continuing concern for society. The value of a resource is a direct result of its availability in nature and the cost of extracting the resource, the more a resource is depleted the more the value of the resource increases. There are several types of resource depletion the most known being; aquifer depletion, deforestation, mining for fossil fuels and minerals, pollution or contamination of resources, slash-and-burn agricultural practices, soil erosion, and overconsumption, excessive or unnecessary use of resources (Rodolfo, et al, 2014).

Therefore, based on the above facts and issues, can be define natural resource depletion natural resources that are consumed at a faster rate than that of replacement. Resources that can either be renewable or non-renewable, existence without human actions is called natural resources. The terminology that is used in reference to the following: water usage, farming, and fossil fuel consumption, fishing, and mining are termed as natural resource depletion. Natural resource

depletion, above all, is measured in terms of its availability in nature and is the premise that the value of a resource is very important.

2.1.2 Pastoralism

Pastoralism revolves around the herding of animals, often domesticated livestock such as cattle, sheep, goat, camel, horses, or donkey. Pastoral communities are highly mobile, as they follow their herds, moving from one grazing area and water source to another according to the seasons or as they exhaust local feed sources. According to this definition, pastoralist communities do not practice any agriculture, and their herds are their only source of food. Pastoralism generally has a mobile aspect, moving the herds in search of fresh pasture and water and is a successful strategy to support a population on less productive land, and adapts well to the environment. Pastoralism is a form of animal husbandry, historically by pastoralist people who moved with their herds (WISP, 2008,). Pastoralism often has a mobile aspect but this can take many forms and can be at different scales. Sedentary pastoralism is becoming more common as the hardening of political borders, expansion of crop agriculture, and building of fences reduce the ability to move. Mobile pastoralism includes moving herds distances in search of fresh pasture and water, something seasonally, to nomadism, where pastoralists and families move with the animals year-round. Mobility is a key feature qualifying pastoralism. The term pastoralist is used when mobility is high and in irregular patterns; transhumant when there are regular back and- forth movements between relatively fixed locations; and sedentary for the rest (Koocheki and Gliessman, 2005). Grazing in woodlands and forests may be referred to as silvopastoralism, Composition of herds, management practices, social organization and all other aspects of pastoralism vary between areas and between social groups. Many traditional practices have also had to adapt to the changing circumstance of the modern world, including climatic conditions affecting the availability of grasses.

Pastoralist herds interact with their environment and mediate human relations with the environment as a way of turning uncultivated plants like wild grass into a consumable, high-quality food. In many places, grazing herds on savannas and woodlands can help maintain the biodiversity of the savannas and prevent them from evolving into dense shrub lands or forests. Grazing and browsing at the appropriate levels often can increase biodiversity in Mediterranean climate regions (Oba, G., 2001).

Ethiopia's pastoral population, one of the largest in the world is estimated to be 15 percent of the country's total or an estimated 14 million people; including the majority of the population in Somali and Afar Regions and 10 percent of Oromia Region (the Borana and Karrayu pastoralists) as well as areas of the Southern Nations, Nationalities and Peoples, Gambella and Benishangul Gumuz Regions (Herlocker, 1993). Pastoralists are found in 124 districts or woredas, in 21 zones and 7 regions. Pastoralists inhabit the arid and semi-arid rangelands that account for 65 percent of the national landmass of Ethiopia. Pastoralists' communities

sometimes use fire to make ecosystems more suitable for grazing and browsing livestock. For instance, the Borana people of south Ethiopia use fire to prevent the invasion of the savanna by woody plant species and picks before and during Dergue time. Pastoralism remains a way of life in Borana, and other many parts of the country.

2.2 Cause of natural resource depletion

Pastoralism may have begun in Africa as early as 7000 BC, and its major impact was probably felt by about 3000 BC in both East and West Africa. Pastoralists have not historically been perceived as having a good relationship with the environment. Accused of overgrazing and desertification, more recently they have been seen as responsible for methane emissions and low feed conversion rates. The most important arguments revolve around overgrazing, land depletion, and the alternative use of rangeland to sustain a broader range of biodiversity (Blench, 1995). Other literature has focused on range depletion and vegetation change caused by overgrazing or climatic variability (Coppock 1994). Causes of depletion of natural resources in the pastoral area can be cited as; overpopulation, Poor Farming Practices, overconsumption of Natural Resources (pasture), Pollution, and Water shortages.

Natural resource depletion is occurring as a result of no grazing management plans, removal of vegetation for fuel wood, and no clear authority of rangeland ownership. In the pastoral area shift in species composition, loss of range bio-diversity, less plant cover, low small ruminant productivity, reduction in biomass production and soil erosion are the major indicators of natural resource depletion. According to the same authors, pastoral communities have some realization about natural resource depletion by assessing their livestock production or health, forage availability, and traveling in search of forage. However, the effect of natural resource depletion on other services like carbon sequestration, conservation of plant and wildlife biodiversity, water harvesting and spreading infiltration, and many other environmental services are either not monitored, documented, or disseminated the information among the various sectors of society. The main scholarly stated causes of natural resource depletion are explained as follows.

2.2.1 Climate change

Climate change affects the amount and distribution of pastures and water points. Although the long term effects of climate change are difficult to predict, the most important predictions made by climate change models are of rising temperatures and changes in precipitation with an increased number of extreme events (Brooks, 2006). Erratic and unpredictable rainfall along with extreme weather conditions and longer and more frequent droughts would affect the sustainability and efficient use of rangeland resources. Livestock survival during the dry seasons and availability and productivity of grazing areas, and the existence of water points, are critical to decline with marked consequences for pastoral livelihoods. The pressures associated with human population growth, economic development, land-use change, and climate change are

major challenges facing rangeland development professionals and practitioners. A rise in temperature and rainfall has been measured at the Inner Mongolia Rangeland Ecosystem Research Station in the last 20 years. With an increase in temperature have come more dry land, windy periods, and hence increased erosion events (Chen et al .2003).

2.2.2 Overgrazing

Setting stocking at higher density has commonly resulted in a decline in the most palatable perennial species and an increase in less favorable species (Oba, 2001). UNEP single out human effect specifically, livestock grazing as being the cause of irreversible depletion which prevailed during the past two decades. According to the World Resource Institute (WRI, 1992), overgrazing is the most pervasive cause of soil erosion and then depletion. The study in China showed that in some cases low lying prairie rangelands face increased salinization as a result of overgrazing (Blench and Florian, 1999).

2.2.3 Encroachment of bush

Bush encroachment is the suppression of palatable grasses and herbs by encroaching woody species often unpalatable to domestic livestock (Ward, 2005). The ecological succession in the Borana rangelands indicates that the potential of the grasslands is threatened by bush encroachment in many areas (Alemayehu, 2004). This type of depletion occurs where indigenous shrubs and trees encroach on to former grassland areas and changing them to various forms of shrub grasslands. On the other hand, the density of trees and shrubs may increase into thickets or various wood types and reduce the relative amount of grass and therefore livestock production (Raj, 2005). Invader bushes have started to produce seeds in abundance and so to created opportunities for the establishment of new generations of bushes (Blench and Florian, 1999). In some instances, woody encroachment is speculated due to a lack of foraging by livestock and lack of fire. Thus both overuse and underuse have been implicated in affecting vegetation dynamics (Herlocker, 1993).

2.2.4 Sedenterazation

The effects of overpopulation and government policies on agriculture, food availability, and increased poverty have contributed to the Sedentralization of pastoralists (Alemaeyu, 2005), Herlocker (1999) in Alemayehu (2005). Sedentralization of pastoralists leads to the concentration of people, livestock, farming, and other types of land use centered on permanent water supplies. These sites become centers of overuse of natural resources and subsequently resulted in rangeland depletion and reduced biodiversity.

2.2.5 Drought

The frequent drought in the many parts of the world's dry-lands and notably in Africa is a prominent factor, which has contributed to natural resource depletion. The crisis in the pastoral production systems of the Sahel in the early 1970s showed the great repercussion of the sequence of dry years on the rangeland depletion. When there are drought and over-grazing together, the effect on the productivity of rangeland is double-barreled (Herlocker, 1993). Prolonged drought including a shortage and erratic rainfall can cause serious natural resource depletion. Rainfall during drought is hardly adequate to allow grasses to grow and unable to fill the surface water ponds (Alemayehu, 2004).

2.2.6 Rain-fed agriculture encroachment in rangelands

Recent encroachment of rain-fed cropping into the better moisture pasture land can be understood as a response to newly created national polices for increased food production and increased emphasis on cash crops as producers of foreign exchange (FAO, 1993). Thus value exchange relationships between pastoralists and farmers have broken down. This type of natural resource depletion is widespread in the Middle East and Africa, particularly in the eastern and southeastern, where agriculture and pastoralism in the past were in balance with environmental conditions. The accelerated natural resource depletion should be considered in parts as a reflection of unequal economic development and access to resources at national and local levels; and also linked with poverty, inadequate resource management, and poor infrastructure (Raj, 2005).

2.3 Effect of natural resource depletion

In Ethiopia land depletion caused by soil erosion, wind erosion, over-grazing, and mono-cropping. These are some of the major causes of low and declining natural resources. The country has continuously faced challenges in conserving its soil fertility which is mainly caused by fragile soils, undulating terrain, and highly erosive rainfall. Increase productivity and restrain depletion of fragile lands and ecosystems help to build the productive assets of pastoral communities, in ways that sustainably used from watersheds. The key areas of eligible intervention activities include local level land use planning; support productivity-enhancing interventions of community watershed as well as support to soil fertility and overall resources management services. People's awareness and understanding of natural resources were also being raised through special communication. A pastoralist livelihood, in general, has three pillars namely, natural resources, livestock, and people. Climate change and variability have an adverse effect on natural resource in general and livestock in particular. It is confirmed that climate change and variability have negative effects on natural resources such as pasture, water sources, farmlands, and trees. For the Borana pastoralists, natural resources mainly include rangeland and water.

2.3.1 Effects on livestock assets

The most important of assets owned by the pastoralists are their livestock. Pastoralists coincide with being the owner and herder of livestock. It is through the possession of animals that the full personality of the pastoralists is realized from birth to death (Brooks, 2006). However, the cumulative effect of the dramatic change in the size of grazing lands and loss of strategic pasture and water areas has already led to a severe decline in the size of the individual livestock holding and eventual destitution.

2.3.2 Effects on food security

Periodic drought is a characteristic of the lowland pastoral productions in Ethiopia. Even in climatically normal years, there are localized parts of the lowlands that suffer from drought. Many famines of various magnitudes have affected the pastoralists; the most one is being droughts of 1973/1974, 1984/1985, 1994/1997, 1999/2000, and 2002/2003. The famines of 2002/ 2003 were one of the worst impacts of drought in recent years, which has claimed thousands of animal and human lives in Borana, Somali and Afar regions. In some areas, about 80% of the entire animal population is estimated to be de criminated (Sutter, 1995).

2.3.3 Effects on water shortages

The major causes of water resource depletion occurred due to contamination, wastage, and the destruction of natural water catchment areas are poor farming practice, deforestation, and pollution. World population as of today, approximately one billion lack access to clean water because of the effects of deforestation and contamination of water sources and groundwater.

2.3.4 Effects on soil

Long trees and shrubs have been found to improve the nutrients status of their close surroundings in semi-arid shrub communities, arid grasslands, tropical and subtropical savanna, eastern Sahel, savanna, eastern Africa savanna, and Southern Africa savanna. All the studies which measured carbon, nitrogen, phosphorus revealed a consistent horizontal pattern in the topsoil. The content of these elements declines gradually as a function of a distance from the trunks and significantly lower in the open ground than sub-canopy soil (Swift, 1991).

2.3.5 Effects on biodiversity impoverishment

Biodiversity is the variability among living organisms, from inter alia, terrestrial, marine and other aquatic ecosystems, and the ecological complex of which they are part. This biodiversity includes the diversity within species, between species and of ecosystems according to the convention on biological diversity of article 2 (UN, 2006). Natural heritage and life support system for every country and all people can be gained through the diversity of species on earth.

But species are disappearing at 50 to 100 times the natural rate largely due to human activities including over exploitations of biodiversity, habitat depletion and fragmentation, climate change, pollution, and invasion by induced species (Chen, 2003).

2.3.6 Effects on the rangeland ecosystem

Changes in the natural vegetation dominated by the grass layer leading to dominance by a woody cover and increase in unpalatable forbs are considered as a threat to range conditions (Oba et al; 2000). Overall woody vegetation reduces grass cover through increasing the competition for available water and nutrients and reducing the reaching the grass layer. An increase in woody plant encroachment and herbaceous biomass production are negatively correlated (Gemedo, 2001).

2.3.7 Effects on loss of forest cover

As studies indicated that approximately 18 million acres of forest cover is destroyed annually which represented half of the world's natural forests cover nowadays has already been cleared and clearing. As studies indicate, further deforestation is increase in the past three decades that resulted in a 12% to 17% rise in greenhouse gases globally as a general. The following activities have an effect of devastating deforestation are: soil erosion, an increase in greenhouse gases leading to global warming, loss of biodiversity, increased flooding, and drought.

2.3.8 Effects on extinction of species

As a result of resource overexploitation and habitat depletion, some species may go extinct due to the changes in the living conditions of faunas. The habitat for thousands of animals, forested regions and savanna grassland are under serious deforestation and forest habitats are progressively destroying and overgrazing savanna grassland. The marine species such as the tuna fish are similarly led to a drastic reduction in the number due to practices such as overfishing and pollution.

2.4 Natural resource management

Natural resource management and depletion are always a difficult task due to the interactions of various biological, environmental, and social factors. Trends have been changed from traditional natural resource management approaches like looking and focusing only the biological factors and ignoring the social and traditional aspects of natural resource management to community-based and co-management approaches. It is hard to determine the value of the natural resource in terms of environmental services like carbon sequestration, watershed management, biodiversity, and eco-tourism. In arid and semi-arid areas natural resources like rangeland are the major free grazing areas for livestock all-round the year (Mirza, 2006). However, many factors such as climate, humans, and animals are causing depletion of these resources. Most pastoralists are poor

and dependent on natural resources. Traditional management practices were sustainable, but increasing pressure on land and inappropriate management and development policies are causing the depletion of a large area of rangeland. For example, it has been reported that nearly 50% of the Tibetan plateau of grasslands is depleted (Wilkes, 2008). The geographic extent and many important resources of natural resources make their proper use and management vitally important.

2.5 Pastoral livelihood

The capabilities, assets as both material and social resources and activities required for a means of living for human being can be called as livelihoods. Natural, human, financial, and social capital, activities, and access comprise livelihood assets. The living gained by the individual or household, determine institutions and social regulations together as a system. It comprises the capabilities, assets, and activities required for a means of living for the livelihood of individuals. Capabilities and assets both now and in the future, while not undermine the natural resource base and can cope with and recover from stresses and shocks and enhance its existence can be called a sustainable livelihood.

2.5.1 Sustainable livelihood

The idea of sustainable livelihoods was first introduced by the Bruntland Commission on Environment and Development as a way of linking socio-economic and ecological considerations in a cohesive, policy-relevant structure. The 1992 UNCED expanded the concept, especially in the context of Agenda 21, and advocated for the achievement of sustainable livelihood as a broad goal for poverty eradication. Sustainable livelihood is a livelihood that can cope with and recover from economic, social and natural stresses and shocks and maintain or enhance its capabilities and assets both now and in the future. Sustainable livelihood is not undermining the natural resource base at present. Therefore, due to the fact it considers the factors that mediate access and claims in addition to assets and activities, the current study has adopted the definition of livelihood (Ellis;2005).

2.6 Way out of depletion of natural resources

2.6.1 Controlling deforestation

The initiatives that could help to reduce the natural resources depletion programs like (REDD, Reducing Emissions from Deforestation and Forest Depletion), the New York Declaration on Forests, and the United Nations should be aimed at checking against deforestation. These initiatives should be donated money for incentives to encouraging the general public to conserve forests. The habitat and protectors of some of the sustainability programs that the world's unique plant/animal species and water sources are aim to educate people about the importance

of conserving natural resources and enacted as a way of focusing on the long-term risks associated with environmental depletion.

2.6.2 Reducing oil, mineral, and material consumption

The objective of the international institutions are discussing on how mineral and oil consumption and exploitation can be reduced. The oil-rich countries and World monetary institutions together with states, and consumable regulatory bodies should collaborate with others towards a common goal for resource conservation. For instance, consumers sensitized on how to adopt re-use, reducing wastage, and recycling techniques of resources and manufactures can be trained on recycling, re-use, and reducing wastage.

2.6.3 Sensitization and awareness creation

People need to be educated that they understand their aggregate impact of their contributions to natural resources depletion on how their daily practices put pressure on scarce natural resources. To encourage people to preserve and restore the natural environment by getting involved in conservation efforts, the main purpose would be to create awareness.

2.6.4 Indigenous mechanism to restrain resource depletion

Borana pastoralists have managed their natural resource like pasture and water by using their own knowledge and experiences without any external support and interference for about hundreds of years. This indigenous natural resource management system is based on an interaction between plants, grazing animals, and the local communities with non- living elements of rainfall and soil playing a key role. In this system, the role of herders is to manipulate the herd's mobility in accordance with available fodder and water resources (Oba 1998:3). Watson stated that Borana has a strong set of natural resources governing indigenous institutions that are said to provide them with coherent internal governance (Watson, 2003). Access to and use of resources is shaped by a variety of overlapping institutions, regularized practices, set of rules and organizations and decision-making practices. The Borana social structure provides a framework within which pasture and water resources management is carried out at two broad levels of traditional administrative structure (Boku 2000:34). These two levels are namely “administration from above” and “administration from within”-the former by Gada system (the supreme administrative body not only in natural resource management but also in all other social affairs as far as Borana social structure is concerned) and the latter is the management of *tula*, deep wells by clan arrangement. Boku argued that ownership right and administrative responsibility for running the wells is based on clan while that of the pond is based on territorial units such as *olla* (village), the compound villages occupying a particular unit of geographic area or adjacent area of the geographic unit, *reera.*

Chapter Three

3. Research designs and methodology

3.1.The study area description

3.1.1 Location and size of the Yabello Woreda

Yabello Woreda is found in pastoral areas of Borana Zone of Oromia Regional State, Ethiopia. Astronomically the district is located between 5^{o} 23' 12.7" North Latitude and 38^{o} 32' 52. 6" E Longitude and relatively the district is bounded by Arero district of Borana Zone in the east, Dubuluk districts of Borana Zone in the south; Elewaye district of Borana zone in the west and Gomole of Borana zone in the north. Yabello is the capital of the Woreda which is 565 km far from Addis Ababa. In relation to other Woreda of Borana zone Yabello is among the largest Woreda with an estimated total area of 555,000 ha (Source: Yabello Woreda Agriculture and Natural Resource Development Office).

3.1.2 Topography and climate

The climate of the study area is hot for most of the year. The rainfall is erratic and variable and dominantly a bimodal pattern. The main rainy season is "Ganna" that runs from mid-March to the end of May and which account for about 60% of the total rain-fall occurring in the area. The short rainy season in the area is known as "Hagayya" that runs from mid-September to the end of October, which accounts for 40% of the total rainfall occurring in the area. The amount of rainfall varies from a maximum of 700mm to a minimum of 500mm with an average rainfall of 600mm. The overall average temperature ranges from a mean maximum of 28^{0}C to a mean minimum of 14^{0}C. The topography of the district dominantly composed of plains and the elevation varies from 1450m to 2200m above-average sea level (source: Yabello district office of rural agriculture and pastoralist development). The impact of the failure of rain differs among the three rainfall regimes and corresponds with the degrees of their reliability. The failure of the *hagayya* rains creates heightened stresses in the following long dry season, yet with good planning, the impacts can be minimized. If the pasture from the preceding long rains is adequate, the chance of the livestock surviving failure in the short rains is generally higher than in the situation when the long rains fail. The failure of the long rains results in a phenomenon known as *oolaa*, meaning the absence of rainfall or drought, which often causes severe shortages in terms of animal feeds, water, and human diets, and subsequently leads to increased hardship and livestock mortality (Tache, 2008).

3.1.3 Land use

According to the estimated data from Yabello district office of rural agriculture and pastoral development about 292,028 ha (52.62%) and 11,971 ha (2.19%) are for grazing and cultivation

respectively. The rest of the land of the district is occupied by several land-use patterns such as forest (both natural and manmade), bush-lands, shrub-lands, open woodland, exposed sand soil surface, uncultivated land, and others.

3.1.4 Vegetation cover

The type of vegetation that is covered Yabello Woreda is mostly characterized by sparse vegetation mainly composed of grasses, natural forests like acacia tree and manmade forests like Acacia albida, Boswelliapapyrifera, Casuarinaequisetifolia, Commiphora Africana, Croton macrostachys, Delonixelata, Dovyalisabyssinica, Moringaoleifera, Olea Africana, Schinusmolle, Sesbaniasesban and Juniperusprocera (Source: Yabello district office of agriculture and Natural Resource development Office).

3.1.5 Livestock population

The Yabello Woreda pastoralists and agro-pastoralists are traditionally depending on cattle, goat, and sheep for household food security and a few donkey, mule, camel, and chicken. Currently, from the total livestock population, the largest number is taken by goats (222,779) and cattle (265,877). Sheep, camel, donkey, chicken, and mule accounts 97,011, 44,042, 6,646, 92,470, and 833 respectively according to Woreda census in 2013 (Source: Yabello Woreda Agriculture and Natural Resource Development Office).

3.1.6 Demographic characteristics

According to the Central Statistical Agency (CSA, 2007) and house-hold survey data, the Yabello Woreda has a total population of 90,448 out of which 38,269 (42.3%) are Male and 52,179 (57.7%) are females. The crude density of the Woreda is about 0.18 persons/per hectare. The total population of the three selected Kebeles is 17,167. Dikale, Dhadim, and Haraweyu kebeles have according to the report of Yabello Woreda pastoral Development Bureau (2013) are about 6,173, 5,484 and 5,510 household respectively.

3.1.7 Livelihood strategy and farming system

It is known that agriculture is the backbone of the Ethiopian economy and the rangelands are the major sources of livestock production for the pastoralist community. The Yabello Woreda rangelands are a dominant source of food and household income. According to the Yabello Woreda office of rural agriculture and pastoralist development office, there are 15 pastoral associations (PAs). Out of the total population of the district, about 68% depended purely on pastoralism, 32% on agro-pastoralism for their livelihood. The cultivated and grazing land of the Woreda is estimated to be 11,971 ha (2.19%) and 292,028 ha (52.62%) respectively. Agro-pastoralism is a newly emerging phenomenon in the Yabello rangelands.

3.2. Research approach

The research study has employed a mixed research approach, which involves both qualitative and quantitative approaches to investigate a complex problem. This approach was used because efforts were made to have better insights and understanding about the effects of natural resource depletion on the pastoral livelihood of the district. Thus, the combination of qualitative and quantitative approach was used to conduct this study by cross-checking the relevance and accuracy of the data or information that was gathered through different tools and techniques. As qualitative method is the main method for this research were data collected by different data gathering tools were analyzed using qualitative narration.

3.3. Study design

This study was conducted as a cross-sectional study of household surveys to collect quantitative data and qualitative data to get an in-depth insight into the issues under consideration. The research approach that was applied in this study is a mixed research approach, as mentioned above which involves both qualitative and quantitative approaches to investigate a complex problem. This approach was being used because efforts were made to have better insights and understanding about the effect of natural resource depletion on the pastoral livelihood of the district. Thus, the combinations of qualitative and quantitative techniques were used to conduct this study by cross-checking the relevance and accuracy of the data or information that was gathered through different tools and techniques.

3.4. Sampling procedure

3.4.1. Sampling technique

The research used multi-stage sampling techniques to select the study district, kebeles, and sample households. The study district was selected purposively by considering pasture and water that has been affecting the livelihoods of the community and sample kebeles was be selected to represent the district in different directions and their representativeness in reflecting the realities of the Yabello district. Selecting sample households from the whole kebele was being difficult to manage. To overcome this problem and to get representative sample households, first, a lottery method was used to select three villages as the household is homogenous in its nature from each kebele, and then the sample households were again selected by listing households names found in select villages through simple random sampling. The total sample households within each kebele were equally divided to select villages without considering the number of households found in each area. One thing that needs to bear in mind is that even if there was no significant differences among villages within a kebele there are differences among households within a village based on wealth status, access to livelihood assets, availability of productive labor, and livelihood activities particular household has engaged in.

3.4.2. Sampling frame

The sampling frame consists of 15 kebeles of Yabello district and three kebeles were purposively selected. These three kebeles were selected based on differences in accessibility to different natural resources, interaction with other kebeles of the neighboring district for resource management, etc. Focus Group Discussions were carried out with people who reside in the sample kebeles. Key informant interviews were conducted with local knowledgeable people from study kebeles, districts, Zone, and Government experts who know well about the area under study.

3.4.3. Sample size determination

A two-stage sampling technique was utilized to collect the primary data. Firstly, three villages Dikale, Dhadim, and Haraweyu were selected purposively out of 15 Kebeles in the district. At this stage, very great care was being taken to select Kebeles to represent the district in terms of physical, socio-economic, and organizational characteristics sufficiently. Following this, the sample household heads were selected from each kebele using a systematic random sampling method. Accordingly, registered households 6,173 in Dikale, 5,484 in Dhadim, and 5,510 in Haraweyu PAs were identified. The total household size of the three selected Kebeles was 17,167 according to the report of Yabello Woreda Agriculture and Natural Resources development office (2013).

To determine the sample size (n) of the households those to participate in the study; the sampling formula developed by Cochran was used with a desired degree of precision for the general population. In this case, population variable (p) is a household unit variable which is given as:

$$n = NZ^2PQ/d^2 (N-1) + Z^2PQ$$

Where; n=sample size of household
N=total number of housing units
Z= standardized normal variable and its value that corresponds to a 95% confidence interval equals 1.96
P= housing units variable (rural household)
Q=town household=1-p
d= allowable error

According to the data obtained from districts' agriculture and Natural resource development office (2019), there are about 90,448 household units; out of these 12,341 households (p) are rural town inhabitants. Hence; using the above formula n = 151. Therefore n = 151 is the minimum sample size of housing units for reliable results. But, to be safe in case of non-cooperativeness of household, unforeseen problems during data collection, and other cases the sample size was increased by 17%, and 177 household heads were surveyed. Then, the sample

size was being distributed to each village on the basis of household proportion. Accordingly 71 (36%) from Dikale, 53 (32%) households from Dhadim, and 53 (32%) households from Haraweyu were taken.

In the household survey method, 177 households were considered as research subjects, and a survey was conducted from January 15 to February 15, 2020. Of the total sampled households 53 (30%) of them are female-headed households based on the reality on the ground. The appropriate time to interview the respondents was found to be in the late afternoons to meet them in their village in their spare time. The final thesis questionnaire was organized and administered hence based on the pre-testing feedback from data enumerator.

3.5. Data collection techniques

The study employed both quantitative and qualitative research methods. Different methods were used to generate different data for the study. Data were obtained through different tools such as interviews and questionnaires that would help to harness diverse ideas about the same issue and assist in cross-checking the results, and consequently help to increase the validity, reliability of the findings and make easy data analysis (Bryman, 2008). This study obtained data from primary sources (household survey, key informant, and secondary data sources (published and unpublished reports). A brief description/ overview of each method are provided below.

3.5.1. Observation

During the observation checklist was used to observe wealth status, natural resource condition (water, pasture, etc.), resource management practice, etc. Field note was taken at every step and issues raised during focus group discussions with 3 groups from elders, women, and youth in three sample kebeles and key informants interview of 10 people from elders and government officials to get depth insight about the issue under investigation. And also the method used during the whole period of fieldwork activities by informally discusses with people; observed different activities carried out by the community to identify the effects of natural resource depletion. Different community meetings were attending to cross-check the issue and perspectives of the community on the topic under study.

Focuses were given to various community events during fieldwork. The events include the kebele level meeting, child naming, marriage ceremony, and coffee ceremonies. As the researcher culturally familiar with all these community events, it created more opportunities to interact with community members and having a deep understanding of issues under study.

3.5.2. Household survey (HS)

A household survey is one of the tools for gathering primary data. Both open and close ended structured questionnaires were employed to generate qualitative and quantitative data from the respondents. The main contents of the questionnaire were personal information of the respondent, household demographic information, household sources of livelihoods, natural resource depletion information, and availability of social services. The questionnaire was prepared in English language and translated to local language (Afaan Oromo). Six local enumerators who can at least understand the English language were hired and trained to administer the questionnaire. Pretesting of questionnaire handling was conducted to see about its appropriateness.

3.5.3. Key informant interview (KII)

The key informants were selected purposively to collect important data. 10 key informants were interviewed at the district level, 8 people from knowledgeable local elders, and 2 people from Government officials who know about natural resource histories and present situations and its effect on community livelihood that have been observed by the community. The checklist questions for key informants' interviews have two major parts namely perception of the local community on the effects of natural resource depletion on their livelihoods. The interview was semi-structured in which some guiding questions were used and based on the response of key informant probing was used for digging much information.

3.5.4. Focus group discussion (FGD)

Focus group discussion helps to inquire about people's perceptions, opinions, beliefs, and attitudes towards a subject under study and 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 effects of natural resource depletion on pastoralist livelihood and also their resource base production. In this particular research, three focus group discussions (one per Kebeles) that comprise 7-12 people were conducted with purposively selected community members consists of elders, youth, and women. First focus group discussions were conducted in Dikale kebele with 6 community members and 4 people from service providers who live with the community separately. The second one was conducted in Dhadim with 8 community members. A third focus group discussion was conducted in Haraweyu kebele with 8 community members. The allocation of focus groups discussion among three kebeles was made purposively by considering the awareness level of women to openly speak during the meeting, the interaction of particular kebele with other neighboring kebeles for natural resource availability, depletion and different social services within a kebele. The three focus group discussions attended by 26 people. The information

obtained from focus group discussions were analyzed and checked with those obtained by other methods for triangulation.

3.6. Secondary data sources

The unpublished and published materials, articles, proceedings, project reports and other data available are the main secondary data sources used in this research thesis at different levels from local to international.

3.7. Methods of data analysis

The data from open-ended questionnaires were computed using qualitative and quantitative data analysis methods. Those data that were generated from the household survey were analyzed by using descriptive statistics such as frequencies, percentages, etc. in explaining and describing the issues under research. Those data from key informants interview, focus group discussions and observation was analyzed and described through opinion interpretations after sorted out, grouped, and organized. Secondary data was summarized and finally, generalization was made based on the results of the analysis. The analysis was mainly descriptive and target to answer the questions that arise in the research questionnaire.

Chapter Four

4. Socio-demographic and economic characteristics of sample respondents households profile

4.1 Socio-demographic, social services and mobility history of respondent households

This chapter analyzed the socio-demographic, social service, and mobility history that include age and sex composition, ethnic groups, marital status, family size, etc.

4.1.1 Age and sex composition of sample respondents

The importance of age and sex extends considerably beyond the demographic count. The division of labor in pastoralist societies is based almost entirely on age and sex. Age and sex composition of household heads were found to be an important factor that influences the natural resources and livelihood situation of households in developing countries like Ethiopian in general and study district in particular. Accordingly in the study area, sex and age composition of sample household respondents was investigated in the survey**.**

The age and sex distributions of the study area population of three kebeles in Yabello district were analyzed based on the household survey. From the total sample household head respondents, the highest (32.2%) was within the age group of 46-60 years while 24.2% was within the age of 31-45 years and about 17% was found within the age group of 15-30 and the remaining 16.4% and 10.2% found within 61-75 and above 76 years old respectively (Table 4.1 depicts the age of the sample respondents).

Table 4.1 Age distribution of the sample respondents

Age	Respondents in Dikale, Haraweyu, and Dhadim Kebeles			Total	
	Dikale	Haraweyu	Dhadim	Frequency	Percentage
15-30	9	10	11	30	17
31-45	14	15	14	43	24.2
46-60	28	14	15	57	32.2
61-75	17	5	7	29	16.4
Above 76	6	7	5	18	10.2
Total	74	51	52	177	100

Source: household survey

Consequently, from the above table, one can observe that respondents are found in different age groups which in turn are important to understand the cause and consequence of natural resource

depletion and to receive different information regarding the rangeland management techniques from the different age groups with different understanding level.

Table 4.2 Sex of sample respondents

Sex	Respondents in Dikale, Haraweyu and Dhadim Kebeles			Total	
	Dikale	Haraweyu	Dhadim	Frequency	Percentage
Male	59	35	34	128	72.3
Female	17	15	17	49	27.7
Total	76	50	51	177	100

Source: household survey

The respondents' positions in the survey households were accounted for as male 128 and female 49 in three kebeles. Among the respondents' household heads, almost 28% were female-headed and the plan of the research was achieved that helped to understand the labor division of the household. The sex ratio of the respondents was dominated by male respondents'. Out of the total sample respondents, about 72.3% were males while the remaining 27.7% were females. In the pastoral area, females are bear primary responsibility for obtaining fuel wood and water and are the primary gatherers of minor forest produce and thus rely heavily on natural resources.

The working-age population is clear as those aged from 15 to 64. This indicator measures the share of the working-age population in total population as general and the study area in particular because of the labor-intensive nature of pastoral areas. Out of the total participants of the study, about 73.4% were found within the productive age group and hence it is rational that they are engaged in different economic activities that pastoralists undertake to achieve their livelihood goals.

4.1.2 Ethnic group of respondents

Today, no country is homogeneous in terms of race, religion, language, customs, ideas, and ways of life and in addition participation in shared activities in which the common origin and culture are significant components to undertake social development. From the total participants who were involved in the study, the entire 100% were Borana. Subsequently, the results of the study indicate that the study area is characterized by homogeneous ethnic groups and this is a good opportunity to understand the local problems easily in the study area and also has created opportunities for the realization of this research objective.

4.1.3 Marital status of respondents

The personal status of each individual in relation to the marriage laws or customs of a country can be called a marital status. Accordingly, the marital status of respondents in the pastoralist environment has a significant role in the resource utilization and management, and overall situations of pastoralist livelihood, with the purpose of marital status which was included under the household survey and the status of sample respondents in terms of marriage, was investigated as follows.

Table 4.3 Marital status of sample respondents

Marital status	Respondents in Dikale, Haraweyu and Dhadim Kebeles			Total	
	Dikale	Haraweyu	Dhadim	Frequency	Percentage
Married	59	40	36	135	76.3
Divorce	0	4	4	8	4.5
Widow	10	12	12	34	19.2
Total	69	56	52	177	100

Source: household survey

From the above table, the results of the study indicated that about 76.3% of the respondents were married and 4.5% of the totals were divorced and the rest 19.2% were windowed and there was no single in terms of marital status (Table 4.3). This indicated how pastoralists in the area are socially and economically linked to each other. The widow women accounted for about 19%. This indicates that most of the women lost their husbands due to ethnic conflict and other related problems in the areas.

4.1.4 Household Family Size

Family sizes refer to the number of persons in the family and are related to each other by blood, marriage, adoption, or a foster relationship. The sizes of household members in the sample Kebeles are also an important factor to determine the consumption of natural resources by respective households' members. Thus, the family size of each household was considered under the survey data collection.

The numbers of the population in the study area were on an increasing trend. This can be explained hereunder in the table that the average size of household respondents is 8; with a maximum household size of 15 and minimum size 1. Table 4.4 below depicted that about 60% of sample households of the respondents have a family size between 6-10 while 26.6% of them have a family size between 2 and 5; the other 12% have a household family size of between 11 and 15.

Table 4.4 Households' family size of respondents

Family size	Respondents in Dikale, Haraweyu, and Dhadim Kebeles			Total	
	Dikale	Haraweyu	Dhadim	Frequency	Percentage
2-5	15	23	9	47	26.6
6-10	47	30	32	109	61.6
11-15	8	5	8	21	11.8

Source: household survey

Therefore, the study area is highly characterized by the fastest growth of the human population so that it has a large family size. This largest household size may be a serious challenge to achieve food security within a short period of time. The asset-building method also takes a long period of time. This vice versa situation, population growth, and asset building decline, can be only managed by good policy and creation of awareness from the community side. Moreover, when the human population is increasing at an alarming rate, it is more serious to resist the effect of natural resource depletion and when managed with a good policy framework, it can be changed as productive workforces that can easily achieve a goal of their livelihoods.

4.1.5 Educational status of member households of respondents and the members of their households

Table 4.6 shows that there is a high level of Illiteracy rate among the sample respondents which accounts for 77.4% and this was a challenge for awareness creation of rehabilitation activities of the natural resource depletion in the study area. Consequently, there is a need to work hard on the education sector to minimize the threat following the educational background of the respondents and to achieve better food security without depleting natural resources.

Table 4.5 Educational background of sample household respondents

Educational status	Respondents in Dikale, Haraweyu and Dhadim Kebeles			Total	
	Dikale	Haraweyu	Dhadim	Frequency	Percentage
No education	58	40	39	137	77.4
Read and write	4	15	3	22	12.4
Primary education	0	3	2	5	2.8
Secondary education	0	5	8	13	7.4

Source: household survey

The data obtained from the sample respondents indicated that the rate of illiteracy was high among the members of sample households in the study area. Accordingly, 59.2% were illiterates,

14.4% attained primary education, 7.5% attained the first degree, 7.1% attained preparatory, 6.8% attained secondary education, 4.8% were able to read and write and 0.2% attended Diploma. The educational backgrounds of members' households are depicted in (Table 4.6).

Table 4.6 Educational status of member of sample household respondents

Literacy level	Respondents in Dikale, Haraweyu and Dhadim Kebeles N=1317			Total	
	Dikale	Haraweyu	Dhadim	Frequency	Percentage
Illiterates	328	211	241	780	59.2
Read and write	31	25	7	63	4.8
Primary education	64	53	72	189	14.4
Secondary education	44	20	26	90	6.8
Preparatory	45	20	29	94	7.1
Diploma	0	3	0	3	0.2
Degree	51	7	40	98	7.5

Source: household survey

From the above table, it is observed that most of the percentages were explained what was expected from the pastoralists' area as marginalized. But nowadays, the number of undergraduate students is significantly increasing in the area. Respondents explain that undergraduate students lack employment opportunities and back home in the areas. This has an adverse effect on the generation to come into the areas.

4.1.6 The mobility history of respondents' households

The most important characteristic of pastoral societies and their ways of production is supported by mobility. The interpretation of the rationale and importance of pastoral mobility, nevertheless, changes along with the various discourses. This has to be supported by an environment that supports mobility within and even across boundaries.

According to the household survey result, about 60.5 % of the respondents have stayed in their current location for about ten and above years, 28.2 % have stayed six to ten years and 7.9 % of them stayed for one to five years. The result of the survey indicated that households are not moving from place to place rather transhumance movement of livestock during a critical dry period. Among the 177 households that were interviewed, 154 (87%) of them were preferred to stay in their current location. This indicated that some of the pastoralists have already started to settle in a small village town and looking for better livelihood options. The trends indicate that mobility as a production strategy in the area was highly decreased.

Table 4.7 View on mobility plan of respondent households

Do you have a plan to leave this place?	Dikale		Haraweyu		Dhadim		Total	
	frequency	%	frequency	%	frequency	%	frequency	%
Yes	0	0	15	23.1	8	15.4	23	13
No	60	100	50	76.9	44	84.6	154	87
Total	60	100	65	100	52	100	177	100

Source: Field survey

In general, pastoralists in the study area were started to settle in a scattered manner in their respective kebeles. This indicated that if the appropriate and participatory approach of resettlement was implemented, pastoralists are willing to settle. This can be a relief for the rehabilitation and management of the existing depleted natural resource.

4.1.7 The Main Source of Livelihoods Assets of the Respondents Households

Pastoralists in the Borana areas are facing increasing risks of subsistence demands that influence households' characteristics and how they interact with resources at their disposal to meet livelihood objectives. The livelihood characteristics of a given society in one way or another determine the way that societies interact with their environment.

Accordingly, it was found important to dig out information about the livelihood characteristics of sample households under the study. Thus, livestock rearing is the commonly practiced old-age economic system; as the ecological settings of the district are more suitable for animal rearing than for crop cultivation. Pastoralists in the study area keep various livestock types such as cattle, goats, sheep, camel, and equines. Cattle keeping are the most favored one as cattle, besides serving as a main source of livelihood, is associated with some social values as well. That means the pastoralists of the study area are proud of having a large size of cattle than other animal population sizes. However, they do not consider the impacts of a large number of cattle size on the rangeland environment.

As indicated in Table 4.8 below about 33.7% of the sample household respondents stated that the major source of livelihood activities in the study area is animal production and about 33.2% crop cultivation. According to the data obtained from the study animal production as the main source of their economy can take a better share as a means of livelihood and follow by a newly developed economic activity in the area crop cultivation. Based on the data obtained from respondents, the productivity of the cattle and rangelands is highly depleted and households are in the state of livelihood problems or food insecurity status.

Conversely, according to the inhabitants of the study area, some pastoralists, who were pure pastoralists in the past, currently began combining crop farming with animal husbandry and practicing agro-pastoral economic system. Whether it was productive or not, pastoralists attempt to sow crops every year.

Table 4.8 Main source of livelihood of respondents

Main source of livelihood	Respondents in Dikale, Haraweyu and Dhadim Kebeles			Total	
	Dikale	Haraweyu	Dhadim	Frequency	%
Animal production	58	50	52	160	33.7
Crop cultivation	66	45	48	159	33.2
Livestock trade	46	5	18	69	14.5
Petty trade	20	10	6	36	7.5
Others	11	13	29	53	11.1

Source: household survey

As indicated in the above table animal production in the district is the main source of livelihood. Thus, the most important sources of cash for households are the sale of animal products and crops. Crop cultivation was the new trends that might take over the main sources of livelihoods and might shift the pastoral system to agro pastoralism.

Chapter Five

5. Perceptions and Trends of Natural Resource Depletion

As perception is psychological and refers to the way that information is organized, interpreted, and consciously experienced by someone, it is very useful to understand pastoralist perception on the ongoing depletion of natural resources in the study area. As also the trend is changing in a situation over time, research surveys show a trend has been a downward means that natural resource depletion is under a decreasing situation.

5.1. Perceptions of pastoralists about rangeland depletion

Pastoralist community perception plays significant role in rangeland resource management. Based on their accumulated knowledge, pastoral communities' traditional rangeland management practices in relation to their local environments are vital. The household survey, focus group discussion, and key informant interview, helped a lot in understanding the perceptions of pastoralists towards depletion of rangeland resource.

Assessment of pastoralists' perception over the effect of natural resource depletion and pastoral livelihood reveals that effects were clearly known and all of the respondents have fear of depletion and problems associated with it (Table 5 .1).

Table 5.1 Respondent's perception about the productivity of rangelands depletion

Kebele	Rating Scale	Respondents three kebeles	
		Frequency	Percentage
Dikale	Partially	19	27.5
	Extremely	50	72.5
	Total	69	100
Haraweyu	Partially	14	23.3
	Extremely	46	76.7
	Total	60	100
Dhadim	Partially	7	14.6
	Extremely	41	85.4
	Total	48	100

Source: household survey

The frequency and percentages clearly depict the extent of rangeland depletion clearly in the study area. So, this indicates that there is a significant difference between the respondents' perception of the extent of rangeland productivity depletion. This implies that the productivity of rangelands is extremely depleted in three kebeles of Dikale, Haraweyu, and Dhadim. Moreover, approaches to natural resource management despite the little variations among the respondents, the main impacts of natural resource depletion were identified and ranked based on the level of

their impact on the pastoralists' overall social, economic, environmental, institutional, and political setup in the study area.

From the total sample respondents, about 22% of interviewed pastoralists explained that the depletion of natural resource product both in terms of quantity and quality is the primary impacts of rangeland depletion followed by the death of livestock population which is reported by 13% of the total respondents' and ranked as second main impacts of rangeland depletion.

Therefore, the assessment of pastoralists' perception of the effects of rangeland depletion confirmed with research findings and show detailed consequences of rangeland depletion in the study area from the different angles of pastoralists' perception. In general, deaths of livestock, food shortage loss of harvest and reducing price of livestock, an increment of crop price, a decline of rangeland product (quantity and quality) and deaths of household members are the main impacts of rangeland depletion investigated in the study area (Table 5.2).

Table 5.2 Respondent's view about the main effects of rangeland depletion

Impacts	Ranks at			Total		Ranking results
	Dikale	Haraweyu	Dhadim	Number	Percentage	
Decline of rangeland product (quantity and quality)	15	25	12	52	9.1	5th
Death of livestock	71	40	15	126	22.1	1st
Food shortage	50	44	13	107	18.9	2nd
Loss of harvest	55	25	12	92	16.1	3rd
Increment of crop price	36	30	11	77	13.5	4th
Reducing price of livestock	46	35	11	92	16.1	3rd
Deaths of household members	8	10	6	24	4.2	6th
Total	281	209	80	570	100	

Source: household survey

Adversely affected by a number of factors such as bush encroachment, rangelands capacity shrinkage, and recurrent droughts livestock productivity are in declined trends. The grazing resources scarcity in the areas attributed to the invasion of an unpalatable and unwanted bush. Livelihoods of pastoralists in view of respondents have strong implication on livestock feed crisis that created by drought.

5.2. Approaches to natural resource management

Indigenous natural resource management practices were applied by Borana pastoralists for centuries. Respondents' perception traditional resource management is practiced to save lives of herders. Livelihood diversification, mobility and herd splitting were perceived by the majority of respondents (87 %) considered as the most practiced management systems by pastoralists,

whereas the use of fire (23 %) and putting aside grazing land (32 %) for a dry season of a year grazing reserves were the least practiced in traditional rangeland management practices. Traditional rangeland management practices, out of the total, 73 % of the respondents believed that it would continue to serve the pastoralists in their future rangeland resource use and management.

5.2.1. Perception of sample respondents about the rangeland management practices

The district pastoralists as part of Borana pastoralists have well established traditional system of rangeland and water point management system. The Borana pastoralists in general and study area settlers, in particular, have their own rangeland management strategies appropriate to deal with the erratic rainfall in dry lands. About 45% of respondents stated that they have developed an efficient system of managing their range of resources. However, the majority of respondents stated that at the current time there is no efficient rangeland management system that can fit with the current rangeland use. Accordingly in the area under study, variation was observed regarding the rangeland management system. Table 5.3 below depicted the respondents' information on rangeland management practices.

Table 5.3 Percentage distribution of natural and human causes of rangeland depletion

Kebeles	**Alternative Rating scales**	**Respondents view about rangeland management practices**	
Dikale		Frequency	Percentage
	Yes	3	4.2
	No	68	95.8
	Total	71	100
Haraweyu	Yes	7	12.7
	No	48	87.3
	Total	55	100
Dhadim	Yes	5	9.8
	No	46	90.2
	Total	51	100

Source: household survey

In the survey respondents were asked to give information about the rangeland management practice. In this regards the computed percentage was 95.8, 87.3, and 90.2 respectively in three Kebeles. Therefore, the results of percentage value show that there is statistically significant between the alternatives yes and no and this shows that there are no rangeland management practices under study which can minimize or reduce the current rate of rangeland depletion. Inversely, this indicated that pastoralists have a traditional range management system but nowadays this practice was not put into practice because of the shrinkage of the rangeland.

5.2.2 The most important rangeland management techniques identified in the study area

The district rural pastoralists have long-established traditional rangeland resources management approaches. Thus, indigenous practices of rangeland resources management systems were assessed in the study area. The most important rangeland management techniques that need to be practiced in the study area to improve the current status of rangelands were identified and ranked by sample respondents during the survey which is indicated in the table below.

Table 5.4 Rangeland management techniques ranked by respondents

No	Rangeland Management techniques	Ranks in Dikale Haraweyu & Dhadim Kebeles			Total		Ranking results from most effective to less effective
		Dikale	Haraweyu	Dhadim	No	%	
1	Introducing participatory rangeland management	12	18	11	41	23.2	1st
2	Managing the grazing land through mobility	13	11	9	33	18.6	3rd
3	Destalking	12	8	7	27	15.3	4th
4	Providing supplementary feed	5	3	9	17	9.6	6th
5	Improving traditional rangeland management	15	11	11	37	20.9	2nd
6	Shift the location of pastoralists	5	13	4	22	12.4	5th

Source: household survey

The above table depicts that there is a need to implement different types of rangeland management techniques in the study area. But the most important rangeland management techniques preferred by respondents in the study area are introducing participatory rangeland management techniques preferred by the society in the study area according to the respondents of the sample survey. Improving traditional rangeland management techniques of the pastoralist, managing the grazing land through mobility and destocking, and providing supplementary fed during drought time were also other important rangeland management practices that were ranked following the participatory rangeland management approach by pastoralists.

5.3. Trends of Natural Resource Depletion in the Study Area

Trends in the Borana pastoralist study area are shown considerable erosion of the traditional lifestyle and livelihoods during the last three decades. Pastoralists are more aware of the depletion of natural resources when they discuss the issue of trends. The depletion of the natural resource base in the study area includes a decline of rangeland, water, forest, range access, and biodiversity.

5.3.1. Trends of natural resources in supporting the pastoral livelihood.

Key informants explained that the resources have changed over time. The challenges they face are beyond the natural challenges like drought and heat stress. Pastoralists added that they understand how resources are diminishing throughout the system and how the challenges they face are aggravating. The remaining natural resource could not support the livelihood of pastoralists in the study area.

About 55.4% of household respondents witnessed that the role of natural resource in supporting pastoral livelihood is poor and need to be improved. But about 44.6 % of the respondents stated that there is a moderate contribution of natural resources in supporting pastoral livelihood in the study area (Table 5.5).

Table 5.5 Trends of rangelands in supporting pastoral livelihood

Trends of rangelands in supporting livelihood	Respondents in Dikale, Haraweyu and Dhadim Kebeles			Total	
	Dikale	Haraweyu	Dhadim	frequency	Percentage
Poor	42	31	25	98	55.4
Moderate	35	23	21	79	44.6
Total	77	54	46	177	100

Source: household survey

In general, the current natural resource base cannot support the livelihood of the pastoralist in the study area. Despite having different types of natural resources, there has been a decreasing trend of natural resources over time.

5.3.2. Trends of natural resource depletion in the study area

Pastoralists in the study area tried to invest in rebuilding herds without external intervention on the current resource. As a result, the trend of having large herds is always to exceed range resources. All informants said that shrinking of rangeland is one of the common events of which pastoralists encountered (Table 5.6). According to the respondents' oral history, the district natural resource depletion was very much faster at present than in the past. All respondents believed a hundred percent that natural resources are in decreasing or shrinking trend in the study area and this can be indicated in terms of reduction in annual income, decrease in livestock productivity, and shortage in terms of fire-wood and charcoal.

Table 5.6 View of respondents about the trends of rangeland depletion

Is rangeland depleting (Yes/No)	Respondents in Dikale, Haraweyu and Dhadim Kebeles			Total	
	Dikale	Haraweyu	Dhadim	Number	Percentage
Yes	67	58	52	177	100
Total	67	58	52	177	100

Source: household survey

Due to the fact that signs of downward trends in the condition of the rangelands are being revealed prior to the complete depletion, Pastoralists pointed out that there were no significant differences between these indicators in rangelands depletion. According to the respondents, the most important indicator of natural resource depletion is a decrease in pasture conditions followed by a decrease in livestock productivity. Information regarding the indicators of rangeland depletion is depicted in the table (Table 5.7).

Table 5.7 Indicators of rangeland depletion

Indicators	Respondents in Dikale, Haraweyu and Dhadim Kebeles			Total	
	Dikale	Haraweyu	Dhadim	Frequency	Percentage
Decrease in livestock productivity	14	10	6	30	16.9
Decrease in pasture condition	20	12	5	37	20.9
Reduction of annual income	8	7	12	27	15.3
Crop cultivation failure	10	3	15	28	15.8
Loss of biodiversity	9	10	10	29	16.4
Others	7	5	14	26	14.7
Total	68	47	62	177	100

Source: household survey

Therefore, the data obtained from the sample households survey shows that respondents have identified the indicators of natural resource depletion. Accordingly, the main indicators are a decrease in pasture conditions (20.9%), a decrease in livestock productivity (16.9%), and loss of biodiversity (16.4%). In addition, reduction of annual income and crop cultivation failure are also indicators of natural resource depletion.

5.3.3. Trends of water resource depletion in the study area

With increased pressure on water resources and the fastest population growth, scarcity of resources is the problem in the study area. One key informant said that over the last 30 years, water resource depletion has not met rapidly rising demands in our area. Dabaso Simphire Dima, one of my key informants from Dikale kebele explained that the increased depletion of water

was almost inevitably direct causes to competition and conflicts between communities. However, there is a risk that the better-organized water users and the stronger water users group in terms of cultural and economic power have superior access to the water right systems e.g. Gada People. The poor can lose access to or control of water in various ways, under formal and customary rights systems and this is true for rangeland as well. Key informants agreed that the general trend in water resources in the area was decreased from year to year due to recurrent drought and other related factors.

5.3.4. Trends in Land use and natural resource depletion

Establishing pastoral access rights in a fluid land-use situation is problematic and a source of disputes. Interactions between pastoralists and crop producers occur on many levels. The nature and intensity of these interactions evolve in response to changes in land use and availability. The general trend in low-rainfall areas is the intensification of livestock production, with smaller herds on smaller tracts of land leading a movement away from pastoralism towards agro-pastoralism. Growing populations have led to the overexploitation of the natural resource base in the pastoral area.

Land use for different purposes over a number of years was common in pastoral areas of the Borana low lands. Though, to date trends in land depletion are rising. According to the survey, 46.3% of respondents indicated that overgrazing is the most important cause of rangeland depletion and followed by crop cultivation which accounts for 30% (Table 5.8). Respondents agreed that the land use system of the area is changed with the settlement of agro-pastoralist.

Table 5.8 Perception of respondents about the land use and natural resource depletion

Land use	Respondents in Dikale, Haraweyu and Dhadim Kebeles			Total	
	Dikale	Haraweyu	Dhadim	Frequency	Percentage
Grazing land	28	24	30	82	46.3
Cultivation land	24	13	16	53	30
Unknown	14	12	16	42	23.7
Total	66	49	62	177	100

Source: household survey

5.3.5. Communal and private land use depletion

The conversion of pastoral land to other land uses is accelerating. Pastoralists in the study area lack clear property rights because they occupy customary rangelands that are legally owned by the state, are owned by the pastoral community itself. This land is claimed by other nearby interest groups. Pastoralists face diverse challenges that include, among others, land tenure insecurity. Some government offices have started regularizing rights for privately owned land,

but this is complex to implement in pastoral areas where resources are used and managed communally. The respondents stated that in the study area there was a land that is used communally and privately. Almost 100% of respondents in the (Table 5.9) indicated that land was allocated both privately and communally.

Table 5.9 Frequency and percentage distribution results of respondents about communal and private land use and rangeland depletion

Kebeles	Which one is depleted; communal/private	Respondents in Dikale, Haraweyu and Dhadim Kebeles	
		Frequency	Percentage
Dikale	Communal	47	66.2
	Private	24	33.8
	Total	71	100
Haraweyu	Communal	39	73.6
	Private	14	26.4
	Total	53	100
Dhadim	Communal	33	62.3
	Private	20	37.7
	Total	53	100

Source: household survey

As indicated in table 5.9 in three Kebeles; land depletion is high on the communal than the privately used land. There is also a significant difference between the communal and private lands concerning natural resource depletion. In this regard, since the difference observed was significant, it is assumed that the communal land is at a high rate of depletion than the private land. The result suggests that it is much better to sensitize the pastoralist on communal lands and to create a sense of ownership among the pastoral communities of the study area in terms of conservation and utilization. Respondents also stated that overutilization of communal rangelands was common in the past and continues still today without any action on the depletion issue; everybody may use it as possible as one can use.

5.3.6. Access to rangelands

The availability of natural resources matters; grazing land, and water, among the others are very necessary resources to pastoral livelihood in the study area. Rangelands are fundamental sources of assets to the rural households and communities where many of their activities are directly linked to local level resources endowment such as land, forest, water, and so on. Indeed newly developing crop cultivation plays a significant role in contributing to the livelihood of many pastoral households to secured food through direct production or source of generating income.
Despite the variations in access and ownership, rangelands are the main sources of income and food for all sections of the pastor community. However, respondents stated that there is no

enough accessibility and ownership of rangelands at the private level as land is used communal. The participants of the focus group discussion stated that they need land privately because communal lands are lacking ownership and accountability and they are more depleted than privately used lands (Table 5.10).

Table 5.10 Land ownership information

Owners of the land	Respondents in Dikale, Haraweyu and Dhadim Kebeles			Total	
	Dikale	Haraweyu	Dhadim	frequency	Percentage
Communal	51	40	33	124	70
Government	0	15	0	15	8.5
Others	19	9	10	38	21.5
Total	70	64	43	177	100

Source: household survey

The above table 5.10 depicts that pastoral land belongs to the wider community (70%). Forestlands found in some kebeles belongs to Government and use rights are restricted by law. About (21.5%) land was owned by individuals. This practice leads to the privatization of the communal land to a few better-off.

Chapter Six

6. The Causes, Consequences / Effects of Natural Resource Depletion on Livelihood basis of the Pastoralist

As written on many works of literature, resource depletion is the consumption of resources faster than they can be replaced, and can cause many adverse effects on our environment. Natural resource conditions in pastoral areas are in a serious depletion. The causes of natural resource (rangeland and water) depletion are increased due to population pressure, bush encroachment, shrinkage of grazing land, and loss of wet season grazing lands to cultivation, private enclosures and others which put pressure on natural resource base of the area. Therefore, the causes, consequences, and effects of natural resource depletion on the livelihood basis of the Pastoralist are the key issues and are discussed hereunder.

6.1. The Causes of natural resource depletion

Pastoralists were not historically perceived as having a good relationship with the environment. Accused of overgrazing and desertification, they have been seen as responsible for methane emissions and low feed conversion rates. The most important arguments revolve around overgrazing, land depletion, and the alternative use of rangeland to sustain a broader range of biodiversity (Blench, 1995). Other literature has focused on natural resource depletion and vegetation change caused by overgrazing (Coppock 1994). Key informants explained that the causes of depletion of natural resources in the pastoral area can be cited as; overpopulation (Human and Livestock), expansion of farming land, overconsumption of natural resources (pasture and Water) shortages.

Respondents in focus group stated that natural resource depletion is occurring as a result of the absence of grazing management plans as far as our management institution is weakening, removal of vegetation for fuel wood and farming, and end up in no clear authority of resource ownership. The major indicators of natural resource depletion are enormous. These are a shift in loss of range bio-diversity, species composition, reduction in biomass production, less plant cover, low small ruminant productivity, and soil erosion. Respondents agree that pastoral communities have a realization about the natural resource depletion by assessing their livestock production decrease, forage availability reduction, and traveling in search of pasture and forage for long-distance. All but few causes of natural resource depletion are discussed hereunder as follows.

6.1.1. Climate change

Climate change affects the amount and distribution of pastures and water points. Although the long term effects of climate change are difficult to predict, the most important predictions made

by climate change models are of rising temperatures and changes in precipitation with an increased number of extreme events (Brooks, 2006).

Many respondents agreed that climate change can be observed through our daily life as temperature increases, rainfall decreases, a frequent drought occurred and water point drained. Key Informants agreed that erratic and unpredictable rainfall and longer and more frequent droughts would affect the efficient use of our rangeland resources. One of the main informants from Dikale PA said that the availability and productivity of grazing areas, and the existence of water points, which are critical for livestock survival during the dry seasons, are bound to decline with marked consequences for pastoral livelihoods. Respondents added that climate change is the major challenge facing natural resource development professionals and pastoral communities as the pressures associated with human population growth, land-use change, and water resource become scarce.

The increase in temperature leads to higher evaporation which diminishes the growth of grasses and supports other vegetation types. Respondents agreed with the scientific investigation that the temperature of the area is normally hot but for the past two decades, it is not as normal as before and increasing from time to time even during the rainy season. Metrological data of the area also confirm the idea of the respondents. The annual temperature of Yabello district rages from 18 to $27c^0$. In Yabello district climate strain affects the amount, patterns, and distribution of rainfall. This causes longer dry periods not only the failure and damaging of crops but also livestock resulting in food shortage. High temperature also affects livestock production indirectly by decreasing grazing land. All of the informants of the household survey, key informants, and focus group discussions participants have confirmed that the trends of temperature have been increasing over time in the Borana pastoralist area.

6.1.2. Drought

Drought is generally a situation where there has not been enough rainfall over an extended period of time, usually for a season or more, leading to water shortages and producing a serious hydrologic imbalance. Natural resource depletion is often induced by environmental change (such as crop failure caused by drought, flooding, or an outbreak of insect pests), or by management practices that emphasize short-term gains at the expense of sustainability. All of the respondents stated that scarcity of rainfall is one of the main causes of rangeland depletion in the district. The area receives low annual rainfall which is not sufficient and the problem is increasing from time to time. FGD participants of three research kebeles stated different ways in which this affects resource management. Firstly, fodder availability depends on an adequate amount of rainfall, and resource depletion takes place when rainfall is below the expected amount. Similarly, water for animals becomes inadequate. Secondly, in most cases, the rainfall received is unevenly distributed over space and time. Some areas receive a sufficient amount of rainfall while others receive less or no rainfall at all in some cases. On such occasions, the people

who live in the area with inadequate rainfall are forced to move with their livestock to the area with relatively better rainfall. It is clear that this results in undesirable consequences both on the pastoralists and the rangeland environment.

Because of the fact that pastoral life is vulnerable to natural resource-related problems as they depend on the environmental resources of which rainfall or water and pasture are the two most important ones. This leads to the conclusion that drought for consecutive years can result in depletion of rangelands and creates a serious livelihood problem in the study area. The frequent drought in the many parts of the Borana dry lands and notably in the study area is a prominent factor, which has contributed to natural resource depletion. One of the ladies in FGD from Dikale PA explains that the disaster in the pastoral production systems of our area in the early 2000s showed the great effect of a sequence of dry years after years on our rangeland depletion and livelihood crisis.

6.1.3. Overgrazing

The most common cause of overgrazing is the growth of herd sizes within a given area. Setting stocking at higher density has commonly resulted in a decline in the most palatable perennial species and an increase in less favorable species (Oba, 2001). Overgrazing around settlements is likely to become a much more serious problem in the future as the inevitable trend towards pastoral settlement continues. When livestock density becomes excessive and too many animals are grazed on the same area of land it resulted in overgrazing which leads to the depletion of vegetation, soil compaction, and wind and water erosion.

Respondents in different discussion groups agree that livestock grazing as being the cause of irreversible depletion which prevailed during the past two decades and overgrazing is the most prevalent cause of soil depletion in the study areas. Several participants suggested that overgrazing is a major cause of rangeland depletion in dry lands leading to desertification, as it has been proved by different studies and observations in the study areas. Key informants agreed that traditional controls over the grazing of rangelands break down and the most common cause of overgrazing is the growing of herd sizes within a given area.

6.1.4. Soil Erosion

Soil erosion is a gradual process of movement and transport of the upper layer of topsoil by different agents. With degraded plant cover, soil erosion becomes serious and any chance of restoring the resource becomes remote because of massive topsoil loss. Soil erosion causes resource depletion in the sense that natural resources can be lost due to the erosion of soil.

Key Informants discussed that there is no doubt that pastoral activities are major causes of soil erosion in general. They added that also it is usually the topsoil that erodes first, which means that the potential of the eroded area to produce pasture is greatly reduced. In addition,

respondents agreed that running water is the leading cause of soil erosion because water is abundant and has a lot of power during rainfall time. Wakala Godana, the member of KII asked the group that what are some human activities that increase the likelihood that soil was eroded? He answered by himself by explained that valley area farming, overgrazing, and animal trampling. Farming, overgrazing, and animal trampling activities destroy surface vegetation and increase the potential for soil loss massively. Other respondents agreed that soil loss is a major environmental problem that results in land depletion, productivity decline, and ecosystem instability. These all negatively affect the development of pastoral society areas.

Soil loss due to animal trampling in pastoral area environments mainly occurs through feeding by livestock and free-range production. In the pastoral area, a range of movement for cattle is not limited and the trampling intensity of surface soil is high, with many areas being trampled multiple times. As a result, the grass is eaten, broken, or crushed. Moreover, the heavyweight of the livestock compact the surface soil and leaves many footprints, which decrease soil porosity. During rainfall, the trampled ground has a low soil infiltration rate and easily generates surface runoff to cause soil loss in the area.

6.1.5. Encroachment of bush

Bush encroachment is the suppression of palatable grasses and herbs by encroaching woody species often unpalatable to domestic livestock (Ward, 2005). And it is one of the mounting problems and above all bush, encroachment is becoming the major threat to Borana rangelands. Bush encroachment has been intensifying over the past three decades, which is becoming a serious threat to rangeland, water resource, and the livelihoods of pastoralists. The areas are negatively impacted by bush encroachment, such as biodiversity, groundwater recharge, and land productivity. To restore the invaded areas by bushes, bush clearing activities showed a satisfactory result in Haraweyu PA as FGD participants explained. Those areas are cleared by the support of the IGAD Oromia project.

Encroachment reduces the grass productivity and can make access by cattle difficult, with substantial negative economic impacts on pastoralists. Woody encroachment is usually very difficult and costly than any other shrubs to reverse. The ecological succession in the Borana rangelands indicates that the potential of the grasslands is threatened by bush encroachment in many areas (Alemayehu, 2004). This is true for the study area too, that indigenous shrubs and trees encroach on to former grassland areas and changing them to various forms of shrub grasslands.

Respondents agreed that the density of trees and shrubs increase into thickets or various wood types and reduce the relative amount of grass and therefore livestock production and difficult to managed by fire and human labor. Key informants agreed upon the various factors that have

been found to contribute to the process of bush encroachment. These include the reduction in the frequency of fires.

Figure 1. Bush encroachment photo taken during a field survey in Haraweyu PA, 2020

Source: field survey

6.1.6. Deforestation

Often, deforestation occurs when the forested area is cut and cleared to make way for agriculture, grazing, or for other purposes. It is a great cause of resource depletion. On the one hand, wood is an important material for household use purposes as firewood in the case of the study area. However, even more important, deforestation is often done with the intent to get more land for farming purposes.

The rate of deforestation in the Yabello has been aggravated by a low level of awareness of the local people. Forest clearing in the areas is for fuel wood, charcoal making, wood extraction for construction, and household furniture purposes. Trees and shrubs are important dry-season sources of feed, especially good quality forage, during the dry season in drought time. Respondents reported that forest has a great role in attracting rainfall, conserving soil erosion, use for shades, and feed for livestock in addition to ritual purposes performed by ritual villages.

Respondents in different groups explained that deforestation of big trees like Juniperus procera was very serious and even on the verge to extinct in the area unless serious major was not taken by Government. Because the community believed that those bigger tree forest does not belong to the community but belong to the government. But pastoralists are more concerned about the destruction of the big trees in the grazing land that is cut for charcoal making in the areas. Those big trees are used for shade for animals and used as fodder during drought time.

The respondents attributed the major causes of deforestation in the study area to the following few causes, as farmland expansion, fuel wood, and charcoal making. When the frequency and magnitude of drought are 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 selling firewood, charcoal production, and poles which have a negative effect on the environment and they have dropped out pastoralism once and for all. Deforestation resulted from cutting trees for charcoal-making, poles for construction, and farmlands expansion and further stresses that coping strategies undertaken by communities in times of drought such as firewood and charcoal selling lead to increased deforestation as mentioned here above.

6.1.7. Sedenterazation

As the inevitable trend towards pastoral sedentralization continues in the future, overgrazing around sedentralization is likely to become a much more serious problem in the pastoral area. Sedentralization has had an equally bad record in the study area. The pastoralist population's sedentralization seems to be responding to enormous internal and external strain. Pastoralists and their herd has become more sedentary overall due to many factors in the study areas and this can undermine traditional risk-management tactics based on mobility.

The effects of overpopulation and government policies on agriculture, food availability, and increased poverty have contributed to the sedentralization of pastoralists (Alemaeyu, 2005). Respondents agree with the literature that the sedentralization of pastoralists was started before four decades during the Dergue period and lead to concentration of people, livestock, farming, and other types of land use centered on permanent water supplies. Nowadays sedentralization almost started at the center of every PAs in the Zone as well. These sedentralization sites become centers of over-use of natural resources and subsequently resulted in rangeland depletion and reduced biodiversity. Respondents believed that sedentralization has its strong side, in supporting livelihood and helps for diversification.

6.1.8. Farming encroachment in rangelands

As observed and understood by the researcher, if not well-managed farming encroachment will be the source of conflict among the pastoralist themselves in the Borana low land areas in the near future. Farming encroachment on to land that was traditionally held and grazed by pastoralists has forced them on to increasingly marginal and less productive land. Despite this, some interest groups argue that pastoralists are inherently inefficient and self-destructive and that they should be settled, as are the officials from the highlanders/Agrarian community in the country. Small-scale agriculture and urban employment do not support certainly pastoralist life out of poverty. Besides it causes cultural damage involved in forcibly settling of pastoralists, 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 today (Ayalew, 2001). This is true also for the study area as few PAs are adjacent to the town the productive lands for pasture are already taken by the crop encroachers.

Rain feed agriculture encroachment is one of the increasing problems in Borana rangelands. Farming can be a severe cause for natural resource depletion, specifically the pasture land. In the study area, it was observed that there are attempts that pastoralists went to engage in farming. FGD participants agreed that growing population, the pressure to produce enough food for everyone is huge, and forced some pastoralists to engage in farming activities. This leads to unsustainable opportunistic farming that results in rangeland depletion. Recent encroachment of rain fed cropping into the better moisture pasture land can be understood as a response to increased food production needs. These types of natural resource depletion are widespread in the Borana rangelands, particularly in the moisture areas, where agriculture and pastoralism in the past were in balance with environmental conditions. But due to recurrent drought, environmental conditions were changed to unbalance with each other. The accelerated natural resource depletion should be considered in parts as a reflection of unequal economic development and access to resources at local levels; and also linked with poverty, inadequate resource management, and poor infrastructure.

6.1.9. Information on causes and early warning of rangeland depletion

Rangelands are lands on which the indigenous vegetation is predominantly grasses, grass-like plants, shrubs and are managed as a natural ecosystem. The depletion of rangelands in the pastoral area has greatly been threatened the pastoral livelihoods. The situation of dry lands becomes worsened when coupled with manmade disasters alike cropping. Under this condition making sustainable livelihood is difficult though pastoralists are able to make it possible.

In the dry land environment, livestock production is a dominant livelihood activity. However, pastoralists are unable to produce sufficient food from livestock production only. The shortages of pasture together with scarce rainfall combined with other constraints have challenged the pastoral production system and hence affected remarkable food availability at the household level in particular and at the community level in general according to the key respondents from the study area.

Table 6.1 Respondent's awareness about the causes of rangeland depletion

Causes of rangeland depletion	Respondents in Dikale, Haraweyu and Dhadim Kebeles			Total	
	Dikale	Haraweyu	Dhadim	Frequency	Percentage
Yes	70	50	52	172	97.2
No	1	3	1	5	2.8
Total	71	50	53	177	100

Source: household survey

The above table depicted that pastoralists (97.2%) are well understood and alert the causes of resource depletion in their areas. Key informants explained that the causes are natural as climate change (drought) and manmade (cropping) as well. A few pastoralists (2.8%) believe that it has

happened from big GOD as a misfortune but what was mentioned by others were only the causal agents but said that GOD knows our future.

As one can see from the field survey report, about 64.1% of the respondents use local early warning systems. This system needs to be strengthened and integrated into a modern early warning system. The local early warning systems are more effective than the modern system when it comes to shorter time forecasting.

Table: 6.2 How respondent warned against hazards threatening their livelihoods

How you are normally warned against hazards threatening your livelihoods?	Dikale	Haraweyu	Dhadim	Total	
	Frequency	Frequency	Frequency	Frequency	%
local early warning system	89	65	53	207	64.1
local and national authorities	47	19	10	76	23.5
News media (TV& radio)	8	1	3	12	3.7
Agency, NGOs, etc.	14	13	1	28	8.7

Source: Field survey

About 47.9% of respondent households have identified bush encroachment as one of the major risks that are affecting indigenous coping mechanisms of Borana pastoralists. Key informants interviewees agree that rangeland will be degraded in the future than ever because of bush encroachment. Consequently increased grazing pressure, which is the result of climate change and other factors are accelerating bush encroachment into grasslands.

6.2.The main cause of rangeland depletion

Rangeland depletion can be occurred through a diverse disaster as natural (drought) and manmade (farming). Respondents were asked to differentiate the main causes of range depletion as human or natural.

6.2.1. Human Population Pressure

Even a number of superficially natural causes can have wholly or partly indirect human causes (bush invasion, forest fires, floods, landslides, and droughts). Pastoral livestock production systems in Borana that have existed for centuries are now threatened by climate change, demographics change, open rangeland shrinkage, etc. Respondents in KII confirmed that overpopulation is the main cause of natural resource depletion like rangelands in the study area. Add that we consume many products that are made from natural resources every day. Livestock foraging can determine rangeland dynamics that population densities of grazing animals and their intensity of grazing is increase.

Respondents emphasized that population growth and densities have increased pressure on natural resources such as rangeland and water. Human population growth is a driver that strongly influences the use of natural resources. Without engaging the pastoralists in the process of managing natural resources is not possible. FGD participants also stressed that most causes of serious land depletion arise from misuse of land by people who are under great pressure from a harsh environment. Some form of pastoral grazing is the most efficient way to use most of these lands and sustain traditional cultures. There is little potential to increase livestock production by numbers in the area. Because most Borana rangelands are now stocked at above its grazing carrying capacity,

6.2.2. Livestock population pressure

Livestock keeping has been the essential source of livelihood in Borana for many hundreds of years. With the continuing population density increase also the livestock population grows. More houses and roads are built and the grazing lands diminish. According to the respondents, the livestock population is one of the decisive factors affecting rangeland productivity. If a number of livestock population densities in a given area are imbalance with available resources, it obviously causes rangeland depletion. The problem of rangeland depletion due to the cattle population is one of the cause's pastoralists currently facing in the study area. This is so partly because of an increase in the number of livestock and partly decreases in rangelands resources and inverse increases in the number of animals per area.

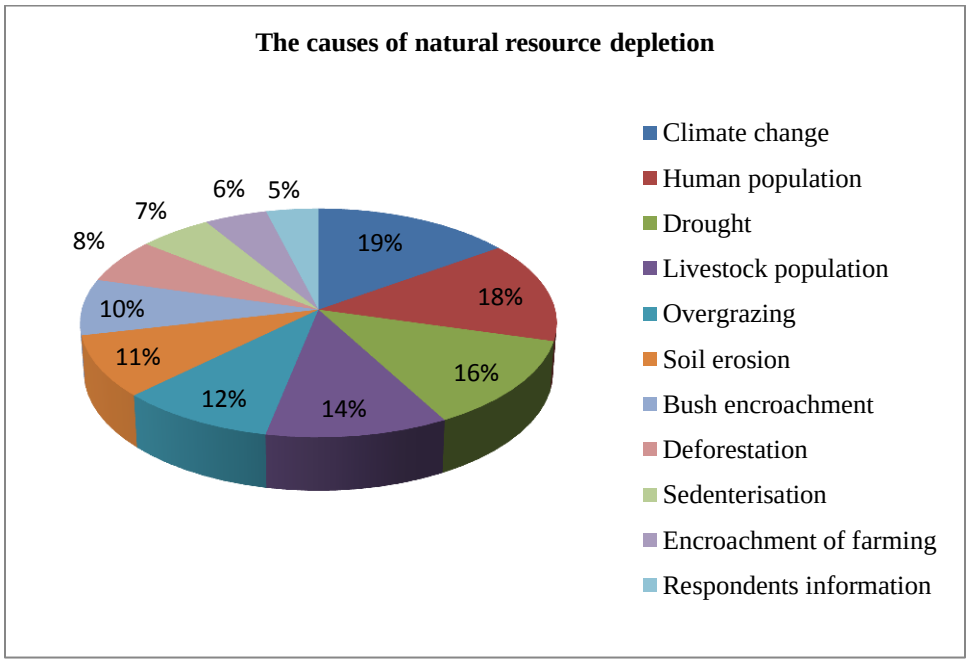
According to the survey conducted in the study area, the livestock density is not constant over a given area because of frequent mobility caused by variation in resource scarcity and availability problem. But what is important here is that district pastoralists keep multi-species livestock type of which some are grazers and others are browsers.

Table 6.3 Summary of causes of natural resource depletion as ranked by respondents

Causes of natural resource depletion	Respondents in three kebeles			Total		Rank
	Dikale	Haraweyu	Dhadim	Frequency	Percentage	
Climate change	15	12	12	39	22	1
Recurrent drought	12	9	9	30	17	3
Overgrazing	9	8	7	24	13.6	4
Bush encroachment	8	5	6	19	10.7	5
Sedentralization	7	4	5	16	9	6
Agriculture (rain feed)	5	3	3	11	6.2	7
Information on depletion	3	2	1	6	3.4	8
Population (Human and Livestock)	12	10	10	32	18.1	2
Total	71	53	53	177	100	

The above table summarizes pastoralists' views on the causes of depletion of natural resources in their respective areas. Pastoralists are more awarded of the factors causing resource depletion and ranked as above. Accordingly, climate change (22%) and population (human and livestock) 18.1% are ranked as the main causes of natural resource depletion respectively. Pastoralists clearly understood the condition of the resources and also which areas of the resource might need some specific management.

Figure 2.The causes of natural resource depletion



Source: Field survey

6.3. The Consequence of Natural Resource Depletion on Livelihood Assets of Pastoralists

6.3.1. Rangeland depletion

Literature reviews show that pastoralist livelihood, in general, has three pillars namely, natural resources, livestock, and people. In the study area, rangeland depletion is caused by cattle trampling, soil erosion, overgrazing, highly erosive rainfall, and opportunistic cropping are some of the major causes of depleting rangeland. To build the productive assets of rural communities rangelands, in ways that sustainably increase livestock productivity and restrain depletion of fragile lands and ecosystems. The impacts of climate change become serious on natural resources (rangeland and water) and then reflect on livestock and people's livelihoods.

Respondents confirmed that climate change 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. People's awareness and understanding of natural resources depletion were being raised as all through special communication means.

6.3.2. Water resource depletion

Pastoralists distinguish between water from natural sources and water that is accessible through wells, boreholes, artificial basins, and cisterns in their areas. Natural depressions areas are accessible to all members of the section owning the land during the rainy season. In all other cases, the water resource is controlled by the groups responsible for maintaining it. In recent times, individual ownership has begun to surpass collective ownership, and controlled water resources are seen as a source of cash income. At the same time, new wells and boreholes have been constructed throughout the area. Some good owners also have tankers and sell water to pastoralists in remote pasture areas. When rainfall declines, the cisterns may empty and the animals start to dies because of lack of alternative water resources that can be reached and they become more vulnerable to stress.

Respondents explain that water resource depletion in the pastoral area is due to poor farming practice, deforestation and cattle trampling. This is the major causes to the destruction of natural water catchment areas. Pastoralists lack access to clean water because of the groundwater depletion. Water shortage in the study areas can be seen as mainly contributes to livelihood food insecurity. KII disagrees with the increasing trends of water selling from a cistern or newly dug wells are illegal and out of the culture of the pastoralist society.

6.3.3. Livestock Holding and Production Decline

In the Borana Pastoral areas data indicates a decrease in livestock numbers in the areas but a change in livestock holding patterns, with livestock wealth concentrated in fewer households, and most households owning fewer or even no livestock. The livestock holding status of respondent households has shown a decreasing trend over time. 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 is decreased.

Table: 6.4 Livestock holding status of respondent

Livestock holding status of respondent households	Dikale		Haraweyu		Dhadim		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Increasing	4	5.9	20	35.1	19	36.6	43	24.3
Decreasing	64	94.1	30	52.6	31	59.6	125	70.6
No any change	0	0	7	12.3	1	1.9	8	4.5
No Idea	0	0	0	0	1	1.9	1	0.6
Total	68	100	57	100	52	100	177	100

Source: Field survey

The above table indicates that about 70.6% of the respondents have confirmed about the decreasing trend of reality. Pastoralists in the study areas are rearing different species of livestock like goats, sheep, camels, and others. Nonetheless, the livestock holding status of respondent households has shown a decreasing trend over time.

Table: 6.5 Causes for decreasing livestock holding status

Causes for decreasing livestock holding	Dikale		Haraweyu		Dhadim		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Recurrent drought	25	35.2	17	32	15	28.3	57	31.8
Conflict	11	15.5	7	13.2	10	18.7	28	15.8
Livestock selling for different purpose *	28	39.5	21	39.7	20	37.8	69	39
Livestock looting	2	2.8	1	1.9	5	9.5	8	4.3
Disease outbreaks	5	7	7	13.2	3	5.7	15	8.6

Source: Field survey

(* Indicates livestock sell to buy HH food consumption, deposit money in the bank, construct a house in town, send children to school).

Pastoralists agreed that the major causes for decreasing livestock holding were livestock selling for different purposes* (39%), recurrent drought (32.2%), conflict (15.8%), disease outbreak (8.5%), and looting (4.5%). A household-level survey in the study area, selected respondents over a decade, shows trends in livestock asset holding dynamics of more than 177 households in which the nature of shifts in their status between 2002 and 2019 is revealed. The preliminary result indicates that almost all who were poor back in 2002 have remained poor; and more than 71 percent middle wealth households slipped into poverty; while 37 percent previously wealthy stock owners slipped to join the middle wealth group.

In the study area, the productivity of the livestock is decreasing over time due to climatic impacts and other compounded factors. The FG discussion conducted in Dikale kebele with respondents group confirmed that previously the productivity of livestock was high and could meet the household members' consumption needs even during a dry period. The focus group discussion participants agreed that leave alone during peak dry month the households are not in a position to get enough milk from many cows during good rain time when pastures are expected to be available.

Borana pastoralist, poor, middle, and rich households are relying on grain purchase during all seasons of the year for their consumption regardless of the number of livestock they have owned. This clearly showed how the production and productivity of livestock are declining in areas due to climatic and other compounded factors such as shrinkage of rangelands, lack of rotational grazing' system, population pressure, etc. This clearly indicated that most pastoral households of the study area are facing food shortages during the drought period.

6.3.4. Mobility Increase

To ensure the survival of the herd, pastoral mobility is an important means for pastoralists. To fully understand pastoral mobility consequences it is, therefore, necessary to address mobility is often regarded as an important characteristic of pastoral societies. Mobility which is one of the basic features of pastoralists to adapt climate change is currently cannot be employed in the study area. Pastoral mobility implies that they can move to areas with enough pasture for their livestock and assume to support their livelihoods.

According to the survey result, 87% and 65 % of the respondents' households have a plan to stay in their current location without moving to other places in the future. Household survey result indicates that different external factors have inhibited mobility.

Table: 6.6 External factors affecting household mobility

External factors that inhibit mobility	Dikale		Haraweyu		Dhadim		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Recurrent drought 3	15	21.1	11	20.8	14	26.4	40	22.7
Lack of water and pasture at a place intend to move 1	23	32.4	15	20.3	18	34	72	28.9
Population pressure 2	19	26.9	13	24.5	11	20.8	43	24.1
Inappropriate settlement 4	10	14	9	17	8	15.1	27	15.4
Policy of the country 5	4	5.6	5	9.4	2	3.8	11	6.3

Source: Field survey

External factors identified that have affected households' mobility in the study district were lack of water and pasture at a place intends to move (28.9%) and population pressure (24.1) are major impacts that have been identified by the respondent households. Some factors are also significant effect in inhibiting pastoral movement.

Due to the loss of mobility, the rotational grazing system has been affected and resulting in environmental depletion. Cullis, (2017:7) confirmed that reckless development of water in wet season grazing areas has resulted in permanent settlement, and year-round grazing has affected mobility. The focus group discussions participants of Haraweyu kebele have identified that bush encroachment, expansion of farmlands, and inappropriate development interventions are other factors that affected their mobility.

6.3.5. Expansion of Communal Enclosure

The original objective of making communal enclosure by the pastoralist is to preserve pasture for vulnerable animals during a critical dry period. According to respondents, the practice of enclosure had been introduced from highland neighboring areas to Borana by the name of crop

farming. Then Borana has adapted enclosure as communal property and property right transfer to private owner illegally. The enclosures can be made at the village level. And the group of villages can use communal grazing land and enclosure if necessary. Enclosures can be fenced through mobilizing labor by villagers.

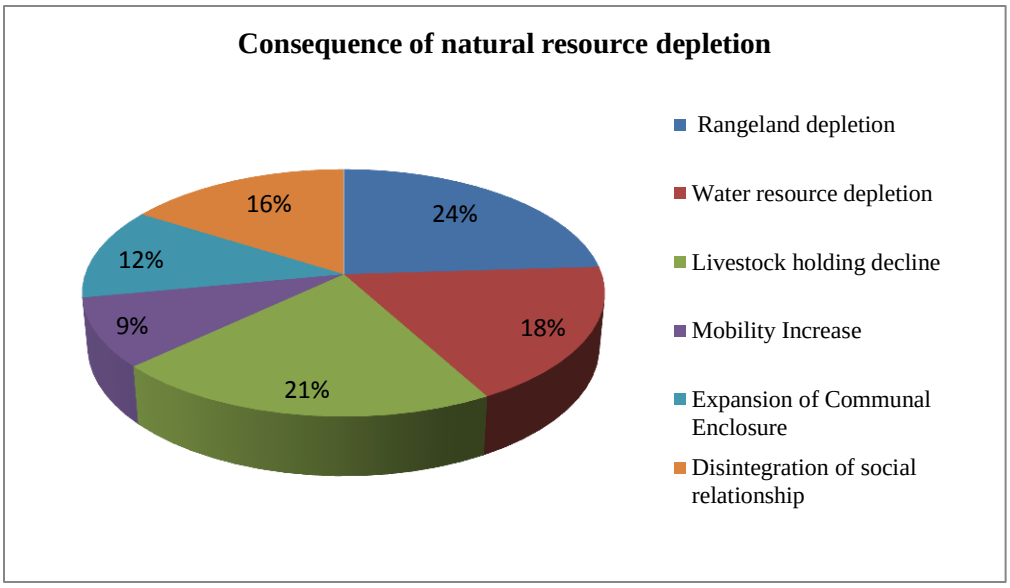
Enclosures have their oral rules and regulations that users set to agree on how to conserve and utilize. These rules and regulations are enforced by customary institutions that are responsible for the rangeland management body. By name of farmland, some pastoralists have grabbed rangeland and introduced private enclosure. The researcher can clearly argue that the interest behind expanding opportunistic farmlands in Borana pastoralist areas is one means of land grabbing which favors the sense of individualizing the communal rangeland. This is the consequence of the frequency of recurrent drought increasing over time and as rules and regulations of communal enclosure have been weakened. The community is forced to graze the communal enclosures out of its original period and objectives.

6.3.6. Disintegration of social relationship

People who have recurring interactions and have connections that exist between pastoralists are perceived by the participants to have personal meaning. It is commonly known that pastoralists are settling and live in social naturally. Due to bush encroachment which is mainly the result of continuous grazing of a particular site and climate; splitting of herds and families which were indigenous coping mechanisms and have been used by Borana pastoralists become under question nowadays.

A respondent expressed that the expansion of farmlands can be seen has disintegrating of herds and families which disrupt the regular interaction of the community as general and separated family as particular. From household survey results, conducted in Yabello district three study kebeles respondents' have practiced separation of herds and families as coping mechanisms to changing conditions forcefully. Even if the contribution of climate change (drought) has a higher share in affecting the separating of herds and families into different locations, other factors like inappropriate settlement, water development, etc. have also negative influence. Drought has a severe impact on natural resources which in turn affect social relationship and interaction.

Figure 3.Consequence of natural resource depletion



Source: Field survey

6.4.The Effect of Natural Resource Depletion on Livelihood basis of the pastoralists

6.4.1. Effects on Rangeland

The impact of natural resource depletion has been affecting the rangelands seriously and there-by threatening the livelihoods of the pastoralists. Literature indicated that before a few decades Borana rangeland was one of the best open savannas rangeland in East Africa. Recently due to natural resource depletion, the open savanna rangeland is covered by thorny invasive bushes species that affect the rangelands. The focus group discussions participants have identified invasive bush species as one of the major threats related to natural resource depletion.

The impacts of natural resource depletion have affected the settlement patterns of the pastoralist community, which, in turn, affects rangeland through disrupting the long-established grazing pattern. The focus group discussion participants witnessed that before two decades there were only a few scattered villages in their areas but currently more than needed and overcrowded villages established without considering customary rangeland management systems. In addition to natural resource depletion, population pressure is the other factor that has been affecting rangeland productivity in study areas.

6.4.2. Effects on livestock assets

Livestock is central to the livelihoods of pastoralists in Yabello district who rely on them for income mainly from sales of its products. The majority of rural households keep livestock; the

rural poor, those living in rural areas are more likely to keep livestock. All other livestock, such as cattle, sheep, goats, and longer-lived production animals are to be considered as assets for pastoralists. Livestock production in study areas is based on natural resource availability. This poses a challenge in finding the balance between the increased livestock population and the depletion of natural resources. Avoidable losses of pastoral livestock are excessive in study areas. These losses have direct impacts on the food security and livelihoods of pastoral households, especially poorer households, and limit the extent to which pastoral areas can supply animals for domestic, regional, or international markets.

Conditional on keeping livestock, one would expect poor households to keep smaller herds than better-off households. But most important assets owned by the pastoralists in the study area are their livestock. The fact that pastoralists are coincides with the fact of being owner and herder of livestock. It is through the possession of animals that the full personality of the pastoralists is realized from birth to death. Wealthiest and having respect in the community can be realized by having a huge number of livestock. However, the cumulative effect of the dramatic change in the size of grazing lands and loss of strategic pasture and water areas has already led to a severe decline in the size of the individual livestock holding and eventual leads to pastoral destitution. Concerning livestock assets, poorer households are more likely to keep small ruminants than richer ones. Richer are more likely to keep large ruminants. Though, the likelihood of keeping both livestock either small or large ruminants is varied widely by pastoralists.

6.4.3. Effects on food security

Poor rural households trying to ensure their food security is, above all, interested in minimizing risk. Food security is crucially dependent on natural resources: land, soil, water, and biodiversity. The uses of natural resources by pastoralists go beyond primary food production as in pastoralist areas food insecurity remains high. That insecurity is made even more acute by the increasing scarcity and depletion of natural resources.

Periodic drought is a characteristic of the lowland pastoral productions. Low productivity of livestock is a consistent problem faced by pastoralists. Even in climatically normal years, there are localized parts of the lowlands that suffer from drought. The drought of 2015/16 was one of the worst impacts of drought in recent years, which has claimed thousands of animal lives in Borana. Governments have an important task in setting the institutional and regulatory framework to feed the pastoralists in the areas that hit by recurrent drought.

6.4.4. Effects on Water Sources

The major causes of water resource depletion due to the destruction of natural water sources are poor farming practices, deforestation, and livestock trampling Water is communal property

among the Borana pastoralists. The major water sources available in the study areas are perennials wells, boreholes, cisterns, and open ponds. The access to these water sources is through the existing traditional system of management. Permanent water source which bridges the dry period water gap in the study area and has forced the people to overcrowd around water sources and resulting in rangeland depletion as the size of rangelands has shrunk.

The intensity of the rainfall in a low land is very high. Accordingly, flooding becomes one of the serious problems that have affected different water sources in pastoral areas. This forces the community to mobilize existing resources to rehabilitate damaged sources of water according to their tradition. It is through existing tradition that the community has been digging or rehabilitating their major water sources. But, due to inappropriate development interventions, such tradition becomes weakening nowadays.

6.4.5. Effects on soil

In arid grasslands trees and shrubs have been found to improve the nutrients status of their close surroundings and other shrub communities. The important elements that support plant growth are found in the topsoil. As a function of a distance from the trunks in the open ground, the sub-canopy soil, the content of elements declines gradually.

Respondents agree that rangeland depletion increased soil erosion and it is one of the main drivers of land depletion in pastoral landscapes. Soil resources in many pastoral landscapes are rapidly being depleted by increased erosion, contributing to widespread land depletion, which threatens food, water, and livelihood security in the area.

6.4.6. Effects on biodiversity impoverishment

The effect on biodiversity was negative because native species in Borana arid rangelands are adapted to very heavy grazing pressure. Diverse vegetation gives a greater guarantee of fodder under different climatic conditions and seasons, pastoralism particularly reliant on biodiversity and rangeland. According to the convention on biological diversity of article 20 biodiversity is the variability among living organisms. The ecological complex of which biodiversity is part is from all sources of inter alia, terrestrial, marine and other aquatic ecosystems. This includes the diversity within species, between species and of ecosystems s whole.

Key informants agree with the literature concept that the diversity of species in the area constitutes a natural heritage and life support system for every livestock and all people. The diversity of plants in the area is not as of before. The rangeland areas are invaded with unwanted thorny bushes. Even some important species are disappearing. This is largely due to human activities including over exploitations of biodiversity, habitat depletion, and climate change.

Respondents concluded that conservation of biodiversity in the rangelands area involves the cooperation of different stakeholders.

6.4.7. Effects on the rangeland ecosystem

Ecosystems in which cultivation, forest management, or grazing are dominant activities are at present often negatively affected by human-induced causes, most importantly by land use and land-use changes. The decline in the quality and quantity of natural assets like soil, water, and biodiversity is the most direct effect of desertification in the pastoral areas. Changes in the natural vegetation dominated by the grass layer leading to dominance by a woody cover and increase in unpalatable forbs are considered as a threat to range conditions (Oba et al; 2000).

FGD participants also agree that overall woody vegetation reduces grass cover through increasing the competition for available water and nutrients and reducing the reaching the grass layer. Our ecosystem/surroundings are not supporting our livelihoods and livestock. An increase in woody plant encroachment and herbaceous biomass production is negatively correlated with the pasture production. Those negative effects are caused and affect us because of human-induced action. Rangeland ecosystems are often valued differently by different stakeholders interested in livestock production and unique for pastoralists. The roles pastoralist play in supporting subsistence households around the area, and the evident problems that arise when biodiversity is undermined and the range can no longer respond to extreme conditions.

6.4.8. Effects on loss of forest cover

Resource depletion, in particular, deforestation (bigger and tall trees in pastoral context) leads to a loss of forests. Pastoralists culturally managed the important tree species for the fodder and shades for livestock and human being. Respondent discussed that in the study area a significant number of natural forest cover are already been cleared. Deforestation which includes the depletion of soil erosion, loss of biodiversity, increased flooding, and droughts have a devastating effect as explained by pastoralists.

Pastoralists explain confidently that forests are everything for us: fire, food, fodder, shelter and so many other uses. Forests are many important species that attract browsers and other livestock for shelters. Deforestation and forest degradation significantly continue to take place at alarming rates, which contributes to the ongoing loss of biodiversity and important tree species. Communities that live within forest areas are directly on forest biodiversity for their lives and livelihoods. Pastoralists are using products derived from forest resources for food, fodder, shelter, energy, and medicine and income-generating activities to complement their livelihoods.

6.4.9. Effects on extinction of palatable species

As a result of resource over exploitation and habitat depletion due to the changes in the living conditions of animals, some species may go extinct on the earth. FGD participants discussed that Borana grasslands are known to be a habitat for thousands of animals. Deforestation is progressively destroying ruminant forest habitats and overgrazing grassland. Practices such as the production of charcoal and farms encroachment have led to a drastic reduction in the number of grassland species for instance the bigger fodder trees. The effects on plant species diversity as some well palatable species are expected to be more severely affected and even extinct by livestock.

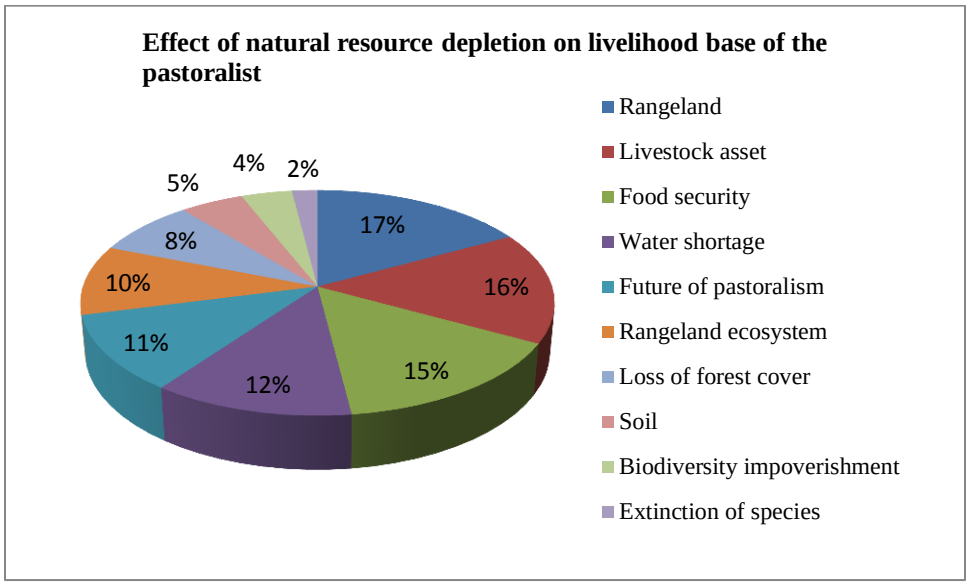
A common element of many perennial species, defined as an extinction-prone perennial species, is palatable and supports much livestock. Such a species can become locally extinct on a landscape in grasslands that experience both a variable rainfall, in which drought is characteristic, and sustained heavy grazing. The changes in the temporal and spatial patterns of grazing in human-influenced systems have created the possibility of local important palatable extinction.

6.4.10. The Future of Pastoralism in the View of Respondents

Pastoralist societies are taking a number of measures to secure their future. Respondents narrate that the Pastoralist area is often undervalued, even ignored by national governments, some are known for increasing levels of destitution and food insecurity and the risk of drought is worsening. Drought depletes all the resources on which pastoralists depend: water, pasture, livestock health, and milk, meat, and crop yields. However, pastoralist livelihood systems are becoming increasingly vulnerable. Human populations are rising, the climate is changing and markets are setting ever-higher barriers for access. In the pastoral areas competition for scarce resources is increasing, infrastructure is poorly developed, education and literacy levels remain very low. With all this mess we, the pastoralists, have in risk to be continued as pastoralists in few coming decades.

Larger numbers of livestock causing overgrazing and range depletion as pastoralists requires increased livestock populations. United Nations Office, considered some of the choices pastoralists may make over the next 20 years in order to adapt to changing circumstances. Four possible scenarios were envisaged to take into account the special nature of the lowlands, their natural resources, international markets, economy, and governance.

Figure 4. Effect of natural resource depletion on the livelihood base of the pastoralist



Source: Field survey

Chapter Seven

7. Indigenous Coping and Controlling Mechanisms of the Natural Resource Depletion

7.1. Indigenous Coping mechanisms to Natural Resource Depletion

The pastoralists have an indigenous mechanism of coping with the risks of feed and water shortage during the dry season and drought years. When grasses become depleted from the rangeland, pastoralists cut the leaves and branches of trees and feed to their animals. Pastoral people have developed a variety of strategies to cope with the fluctuations in forage and water availability associated with climate change (Barton et al, 2001:13). In the Borana pastoralist area, policy-driven symbolic programs have limited understanding of pastoral economic systems and little has been understood about local coping strategies, vulnerability to climatic shocks, and their resilience (Getachew, 1995:260). The coping strategies of subsistence herders often involve destructive practices and the notion of sustainability is far from their minds as they eke out an existence at the margin of society.

KII explains that our local coping strategies and 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. According to respondents drought in Borana lowlands is a common phenomenon and communities have established an indigenous system that is capable of responding to the depleting resources. The household survey result indicated about 88.6 % of the respondents has practiced indigenous coping mechanisms for disasters. Borana pastoralists have developed and practiced different types and forms of indigenous survival to cope with recurrent drought. Among, other things, mobility between rotational grazing, herd diversification, splitting of herds and families, strategic settlement pattern, and traditional supporting system are worth mentioning. Among the coping mechanisms that have been practiced by respondent households, the main one can be discussed as follows.

7.1.1. Livelihood diversification

Borana pastoralists are combining livestock production with non-pastoral activities including agriculture, wage labor, and trade to diversify their livelihood. Rural families construct a diverse range of activities and social support capabilities in order to survive and to improve their standards of living. The outcomes of the different coping were measured in terms of household participation in a variety of livelihood coping strategies, appointed above such as livestock trade, petty trade, sales of forest products, urban labor seeking, and children education as a source of income for future. The outcomes of the different coping were measured in terms of household participation in a variety of livelihood coping strategies, appointed above such as livestock trade,

petty trade, sales of forest products, urban labor seeking, and children education as a source of income for future.

The study verified evidence that households with greater livestock holdings frequently sold livestock in order to purchase grains to supplement their food supplies. Others relied on reducing expenditure in order to save the remaining herds, sought employment outside the pastoral system, requested the support of friends and relatives, or used cash savings from sales of livestock and farm produce. Among the destitute households, the periods of drought stress increased their participation in the sale of forest products such as firewood and charcoal. Members from each household would intend to participate in all the activities simultaneously in order to diversify their livelihood.

7.1.2. Herd diversification

Pastoral peoples have been rapidly not only diversifying their economies but also diversifying their herds. Poor households mainly specialize in one particular livestock species. Rich pastoralists preferring to diversify to take advantage of the different, often complementary roles each species can play to spread risks from recurrent drought. Respondents said that strategies relating to species diversification vary; there are advantages in owning a variety of species so that, whatever drought events occur, there were survivors like goats and camels which browsers on trees. Within species, herd diversification takes place during a drought. Productive animals, particularly females receive priority treatment near the settlement. But the bulk of the herd is sent to find pasture further in other remote areas. The diversification of income and the engagement in temporary paid labor are indirect means of restocking. Money gained in other sectors can be channeled into pastoralism, particularly after a drought when animal numbers are low and prices high.

Traditionally Borana is cattle keepers. They value cattle more than other types of livestock both culturally and economically. Due to climatic change keeping of other livestock species by neighboring communities like Gabras 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 species together. Managing different species of animals can help pastoralists to take the advantages of mixed nature of ecosystem. The focus group discussion participants also recommended that, to cope up with current climatic condition, Borana pastoralists need to focus on goat, camel and sheep. 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.

7.1.3. Making Communal Enclosure

The enclosure of open rangeland and its allocation to individuals or groups is a part of many livestock development activities. It is a long tradition that most Borana pastoral communities reserved parts of their grazing land for use at different uses. They spread out uses over time as an indigenous coping mechanism, particularly during the dry season. Where to enclose, size of the enclosure, and whose livestock that can access the enclosure is the responsibility of traditional institutions governed the decision to enclose or reserve communal land. Respondent's stated that communal enclosures are helping pastoral communities to cope through the provision of grazing reserves, reduced animal losses, improved health and animal productivity, easier livestock management and livelihood diversification from various income-generating activities. KII mentioned that some people are increasingly establishing private grazing land which restricts access by others. In previous times, there were area enclosures commonly used by the whole community. But this day, some people fence their enclosure and do not allow others to use it.

According to focus group discussions, a communal enclosure is one of the major indigenous coping mechanisms being practiced by the local community to reduce the effect of climate change and drought. This is in line with the establishment of communal enclosure in the settled areas as a coping response to declining grazing resources (Oba, 1998b:58). From the household survey result, about 87.1% of the respondents have confirmed communal enclosure as environmentally sound, applicable to practice, and viable to cope with the current climatic condition. But 12.9% have agreed with the practice that the richest people were taking the lions to share in enclosing vast areas. Communal enclosures are established at village or cluster levels and reserved for vulnerable animals that cannot trek long distances to search pasture. According to focus group discussions, barriers like an expansion of farmlands, inappropriate settlement, inappropriate development interventions, and bush encroachment were identified as major factors affecting communal enclosure.

7.1.4. Herds Splitting

Splitting the household and livestock into groups of different herd sizes for the duration of the drought period is the common practice as a coping mechanism in Borana rangeland. When the access and availability of pasture and water were in serious problematic conditions, during a dry period time, pastoralists split their herds and families into different localities. The splitting of herds and families depends on the types and conditions of animals and labor availability and a requirement for those particular animals in a particular location. The splitting of herds and families are risk reduction mechanisms that have been practiced by pastoralists.

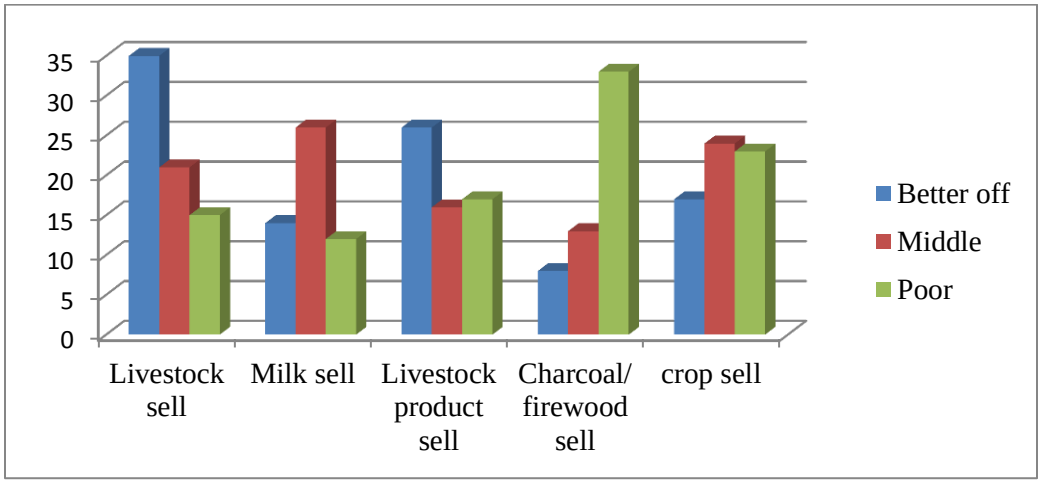
The household splitting of herds reduces the stress faced by pastoralists and their cattle during the drought by lowering the average total daily distance and time traveled by cattle. According to respondents pastoralists split their herds and families into different locations and have

contributed to high population pressure. Accordingly, about 71.3% of the respondent households have been practicing splitting of herds and families as one of the adaptation strategies to reduce climatic impacts.

7.1.5. Engaging in Alternative Sources of Income

Many pastoralists in the study area are engaged in various small-scale activities as self-initiated and promoted and supported by donor projects (cooperative, self-help group, etc.) as alternative sources of livelihood. Several forces are pushing pastoral households of Borana to diversify their income sources. Respondents agree that the current resource base is inadequate to support livestock numbers needed to sustain a purely pastoral system and so the need to avail alternative livelihood options is mandatory. Individuals who drop out of the pastoral production system require necessary and urgent action to sustain in the system. The diverse initiatives are underway to help pastoralists cope and prosper, as a growing number of people in the dry lands unable to remain within the pastoral production system. These people either engage in small-scale activities to gain alternative sources of livelihood. Diversification is also increasing with sedentarisation, both forced from loss of access to grazing lands and drought-related destitution. Proactive sedentarisation of individual households already started to enter into new economic opportunities. Pastoral households, at least received income from livestock sales, milk sales, sale of other livestock products, charcoal/firewood, and crops main sources of household income across livelihood strategies.

Figure 5.Proportion of earning income from various sources across livelihood strategies.



Source: Field survey

Pastoralists have traditionally led a lifestyle geared towards subsistent production. The major asset and also the primary source for sustenance is livestock. The above table depicts that pastoralists (better-off, middle, and poor) in the study area are engaged in a number of alternative livelihood activities, include; selling milk, firewood/charcoal, animal products, farming, and

retail shop activities. In most cases, women do play a very important role as family pillars for economic well-being. In the study area, most socio-economical activities are carried out by women. Almost most of the respondents agreed that more than 80% of the pastoralists are engaged in alternative sources of income-earning activities.

7.1.6. Social Supporting System

Social strategies are considered critical because they provide not only a safety net during disasters but also contribute to the resilience of pastoral societies by allowing pastoralists to rebuild herds after disasters. Some respondents mentioned that there were better-off (rich) households who were trying various livelihood strategies besides the indigenous coping mechanism such as crop production; building or buying houses in urban areas for rent and get additional income; fattening oxen and saving money in the bank. Traditional asset redistribution of livestock restocking and transferring milk cows from rich households to the poor were the old indigenous social supporting system in the Borana pastoral area culture.

A few participants said that some households earned income from forest products, from which they could produce gum to make money that would help them to cope with the effects of drought. People use cattle as a source of cash food and cloth, to send their children to school and as their means of generating household income. Drought has impoverished most of the households and degraded their capacity, worsening their vulnerability. KII argued that some of the community members have stayed in the pastoralism because of the strong community traditional long-lived supporting system.

7.1.7. Hay-Making

In many study areas, where drought is likely to happen and access to pasture is reduced, haymaking is an important component of the system before a few years. But nowadays, it is an adaptive mechanism of feeding livestock during the dry season. Hay-making coping mechanism ensured that the economic burden of herd loss would not fall on single households. Cut and carry system of grass during the rainy season and making hay for dry season use is not a common practice in Borana pastoralist areas. Some forage could be conserved in the form of hay at the end of the main rainy season. Hay production in the study area is most common today because the number of herds is not managed with the existing rangeland.

Borana pastoralists have been practicing an open grazing system for livestock grazing outside the home. For newborn calves and weak animals, women are making hay when pasture is available and feed them during the critical period. Hay-making during the dry season was encouraged among the Borana nowadays to cope with natural resource depletion effect. By realizing the importance of it, most Borana pastoralists have been practicing haymaking to feed animals

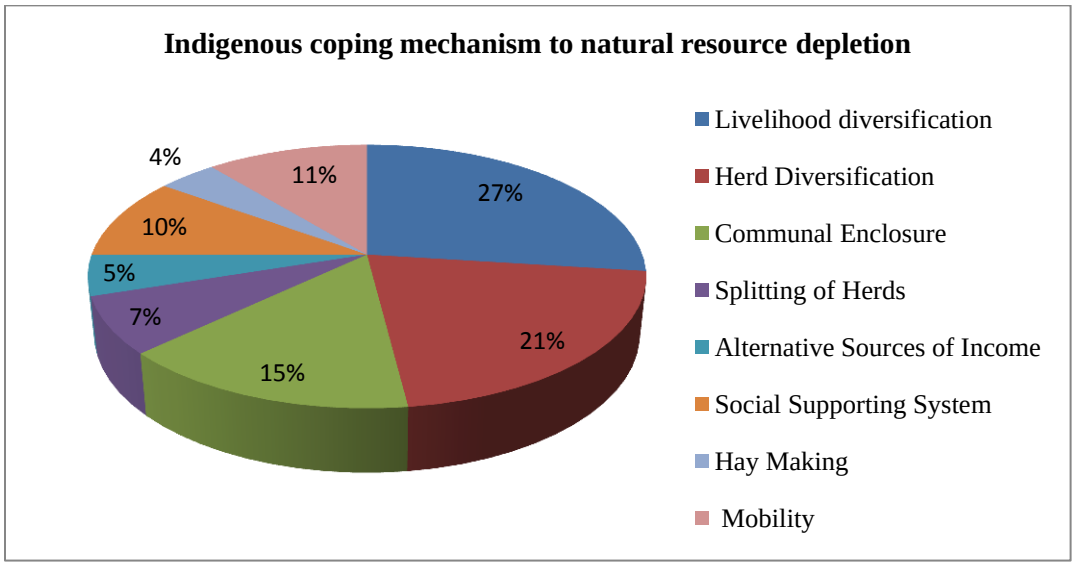
during critical drought time. According to the household survey result, about 58.2% of the respondents have been practicing haymaking as one of the local adaptation mechanisms for natural resource depletion.

7.1.8. Mobility

Livestock mobility facilitates opportunistic grazing management strategies as a coping mechanism by Borana pastoralists to employ and counter environmental variability in rangelands. Respondents provide an idea on mobility is that it is a system of production and resource management strategy and exploits the inadequate rangeland resources of dry land in order to feed an ever-increasing human population in these from livestock products. It is a way of life and a production system that is practiced in dry land environments where climatic conditions cannot offer sufficient support for livelihoods.

KII state that mobility is one of the indigenous coping mechanisms that have been practiced by pastoralists. The hinders that were identified in the area were the imposition of 'modern' institution on customary one, expansion of farmlands, inappropriate settlement, banning of fire application, depletion in the potency of customary leaders, and bush encroachment are among the many. Concerning mobility Borana land divided into four grazing regions. Those regions/ areas are Liben grazing area (Eastern land area), Dire grazing area (The central Land area), Malbe grazing area (The southern parts), and Gomole grazing area (The northern parts). In the past pastoralists were freely move within these grazing regions but today leave alone the movement between grazing regions; it is too difficult to move within the PA level as the KII group explained it.

Figure 6. Indigenous coping mechanism to natural resource depletion



Source: Field survey

The above figures summarize the Borana indigenous coping mechanism to natural resource depletion in the study area as perceived by respondents.

7.2. Designed strategies to reduce natural resource depletion

7.2.1. Sensitization and awareness creation

Rangeland depletion endangers the livelihoods of many pastoral communities in Borana land. Despite the threat of land deterioration from climate change, there are many reasons that land users do not take action to reduce land depletion. In these times awareness creation is a key factor in the success of natural resource management implementation in the area. People need to be educated that they understand their aggregate impact of their contributions to natural resources depletion on how their daily practices put pressure on scarce natural resources. To encourage people to preserve and restore the natural environment by getting involved in conservation efforts, the main purpose would be to create awareness.

According to the household survey result, about 80.2% of the respondents indicated the need-aware the entire communities to take steps by themselves to rehabilitate the depleted resource of their respective areas while 19.8 % of respondents strongly need outside support from Government and NGO for rehabilitation work of the depleted rangeland and community mobilization can be taken by them.

7.2.2. Recognize Pastoralism as a way of life and Production System

Pastoralist communities in the Borana area live in isolated, remote, and underdeveloped areas. These areas are often known by conflict-prone, food insecure, and associated with high levels of vulnerability. Service provision is usually less-well developed than in other areas and with low health and education. Population growth is also driving force in Borana pastoral areas and in some cases, increasing levels of vulnerability and destitution. This all cumulative factors contribute to the marginalization of the pastoralist by the central Government.

Rights to use and control natural resources have important implications for food security and sustainable development. KII argues that the Government has to accept and develop pastoralism as a way of life and as a production system. Ethiopian Government did not accept and recognize pastoralists, the human being, pastoralism, the way of life, and production system, in history. Pastoralism needs support from multi-sectoral, coordinated approaches that combine to protect and develop human, social, financial, natural, and physical capital. Implicit as a principle is a concept of supporting livestock-based development while simultaneously, improving basic services and relevant infrastructure.

7.2.3. Indigenous mechanism to restrain resource depletion

Borana pastoralists have managed their natural resource like pasture and water by using their own knowledge and experiences without any external support and interference for about hundreds of years. This indigenous natural resource management system is based on an interaction between plants, grazing animals, and the local communities with non- living elements of rainfall and soil playing a key role. In this system, the role of herders is to manipulate the herd's mobility in accordance with available fodder and water resources (Oba 1998:3). Borana has a strong set of natural resources governing indigenous institutions that are said to provide them with coherent internal governance (Watson, 2003). Access to and use of resources is shaped by a variety of overlapping institutions, regularized practices, set of rules and organizations and decision-making practices.

Key informants explain that the traditional administrative structure framework within Borana's social structure controls the management of pastures and water resources. This structure as an institution has the capacity to restrain natural resource depletion in their areas.

7.2.4. Understanding the importance of strategic mobility

Mobility has social, economic, and cultural reasons and consequences that pastoralists developed through years of experience which kept them strong in the face of natural and ma-made harsh environments. The Ethiopian Government agenda is explicit in its support to pastoral strategic mobility. It thought that mobility is the basis for efficient use and protection of rangelands, and, that mobility is basic to appropriate resource usage. But the principle is not reflected in the practical strategies of the framework, such as securing access to rangelands for pastoralists through supportive land tenure policies and legislation, and further development of regional policies to enable regional movements and livestock trade.

Respondents in KII argue that the Ethiopian Government is paying attention to pastoralism in general and its mobility in particular. Pastoral areas are backward in all development undertakings. Pastoralists and their resource (livestock) are abandoned the opportunity for development. The mobility of pastoralists, which is centered on their animal's resource, is necessitated by environmental and natural resource conditions. Therefore, Government has to understand and plan the development of pastoralists and clearly understand the importance of pastoral strategic mobility and support it with the policy framework.

7.2.5. Strengthening Pastoral Rangeland Governance

Many traditional pastoral range governance systems have been replaced or are on course to be replaced by government policies. Most pastoralists manage their rangelands communally, benefiting from the greater flexibility and seasonal resource access. Rangeland governance

responds to a common threat to Borana pastoralists via reduced access to traditional rangelands due mainly to land appropriation by non-pastoral actors for a different purpose. The governance issue is central to securing the future of pastoralists. Strengthening the customary institutions of pastoralists is very crucial for the governance of their natural resource.

It is further known that in Ethiopia, the processes of government decentralization provides opportunities for supporting locally-appropriate land tenure arrangements in highlands. But this does not apply to pastoral land. However, policy needs to protect pastoral rangelands from commercial ventures whereby pastoral land is designated to private companies by the central government. In part, such appropriation is influenced by misperceptions of pastoral rangeland as non-productive or even vacant land.

The pastoralists may not be aware of their rights under national constitutions and legislation, and therefore, are not always well-equipped to engage in government. This problem shows the need to build capacities and understanding both in government and within pastoralist communities. Local pastoralist committees are available in pastoral areas, indicating the need for more Para-legal workers who are trained in pastoral land administration.

7.2.6. Strengthening the role of Indigenous Institution

Customary indigenous institutions and social arrangements are central to enabling pastoralists to manage depleting resource conditions that include pasture and water. There is a traditional pastoral indigenous institution whose role in natural resource management has recognized.

In the study area, pastoralists rise that issues of equal and secured access to pastoral resources, and representation on all structures that are responsible for pastoral resource development and administration should be addressed. This is of vital importance for gender balance because many indigenous power structures in pastoral communities do not allow sufficient women's participation in dealing with issues related to access to resources. In addition, the empowerment of indigenous institutions in the administration of pastoral resources should be emphasized and strengthening in pastoral development.

7.2.7. Early Warning System

This topic looks at the role of community-based early warning systems (CbEWS) in empowering communities to prepare for and confront natural hazards. While empowering, good lessons have been learned from their use in areas prone to sudden-onset disasters, however, in pastoralists' communities of the Borana where drought has a slow onset, disaster is a major hazard and the lessons learned on CbEWS are far fewer.

Climatic uncertainty and associated risk are high in pastoral areas and this has led to several efforts to develop systems for early warning of impending stress or disaster, including climatic shocks and livestock disease. The CbEWS allow livelihood stress to be detected before lives are threatened, although effect depends on how these early warnings are used and responded towards. However, to date CbEWS have not always been effective, providing either the wrong type of information or at the wrong time to allow an effective response.

Effectiveness of early warning and response depends on the institutions responsible, which is determined particularly by connectivity to pastoralists on the ground both for effective monitoring and for effective communication. Strengthening adaptive capacity requires an awareness of the implications of a threat, knowledge of the options for reacting effectively to the threat, the means to implement a chosen strategy, and the freedom and right to pursue the chosen course of action.

7.2.8. Strengthening Risks Management Capacity

The increasing risks of disasters in pastoral areas are environmental mismanagement, and limited regulatory and enforcement capacity risk of disaster is a necessary first step reducing vulnerability. The risk management capacity strategies should be focused on increasing awareness, improving disaster management planning, and developing preparedness, early warning and response, and recovery plans and programs. Respondents said that the lack of recognition and the increasing influence of the Government are weakening traditional institutions, the leadership they provide, and risks the resource management capacities of pastoralists in terms of rangeland management.

The worsening effect of natural disasters, especially droughts, is contributing to the increasing levels of destitution in pastoral areas. Risk-based approaches to managing drought, such as drought cycle management, were developed many years ago but have not been institutionalized yet. Emergency aid responses to drought are still dominated by food aid. The policy aims to promote risk management rather than the emergency response for pastoral areas.

7.2.9. Decreasing deforestation

Pastoralists have to takes initiatives in reducing the depletion of natural resources. Importance of programs conserving forest resources should aimed at educating people about forest sustainably directed as a way of focusing on the long-term strategies associated with environmental depletion.

The trends and driving forces of deforestation plus traditional practices regarding forest use in Borana pastoral areas, Southern Ethiopia, combined with field survey observation indicated changes in forest cover of the areas. Household interviews and group discussions with

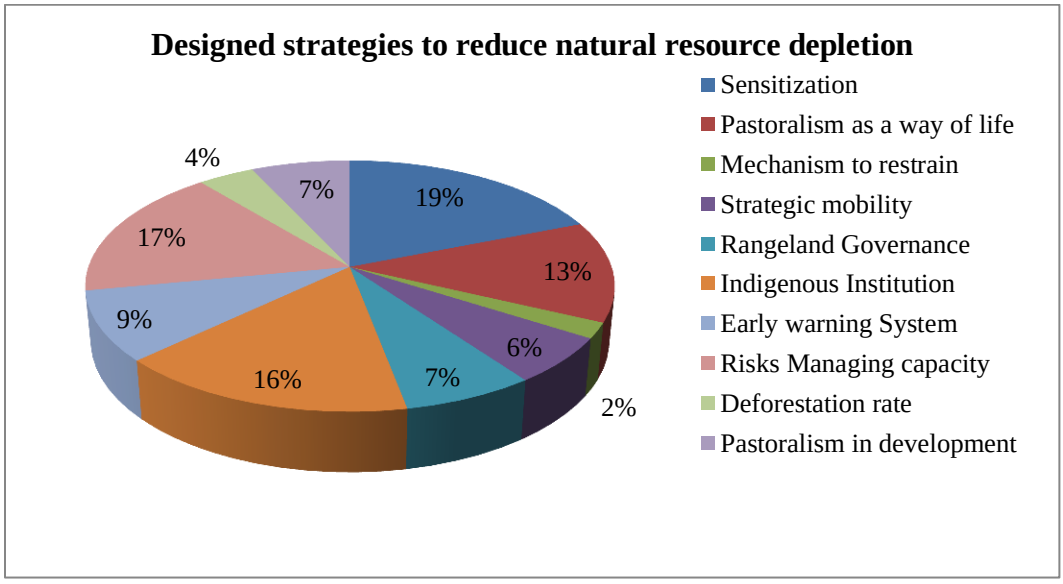
experienced and knowledgeable persons were also employed. The results show a serious decline in forest cover of the areas. The change was greatest on the hill parts of the forest area. Population growth has resulted in the loss of forests to build houses and infrastructure. A study result indicates that almost 91% of the respondents agreed that forest in the pastoralist area of Yabello district, i.e. the remnant patches, are heavily under serious condition.

7.2.10. Recognize the role of pastoralism in development

Pastoralism makes considerable economic contributions to Ethiopia, but these contributions are not always fully understood in the national development policy of the country. Borana pastoralists supply very substantial numbers of livestock to domestic, regional, and international markets. Pastoral production systems of Borana are highly adaptive, constantly responding to market and climatic trends.

Respondents explained that Borana pastoral areas are under low levels of basic services, of which health and education are particular concerns. Pastoralism is the dominant livelihood of our system. It makes use of scarce vegetation and water resources available in hostile and marginal arid and semi-arid lands, to produce meat, milk and other animal products. It helps to protect and safeguard certain natural resources existing in their ecosystems. Yet, pastoralists live under enormous strain and constitute the most vulnerable segment of the population. The government has to secure, livelihoods, protecting, improving lives and rights of pastoralist communities to control the depletion of the pastoral area's natural resources.

Figure7.Designed strategies to reduce natural resource depletion



Source: Field survey

In summary, according to respondents the main controlling mechanisms for reducing in natural resources depletion were, sensitization and awareness creation (77.3%), recognize pastoralism as a way of life and production system (74.7%), an indigenous mechanism to restrain resource depletion (55%), strengthening pastoral rangeland governance (82.1%), strengthening the role of the indigenous institution (89.6%), etc. as viewed on the figure above.

The three main controlling mechanisms among the others mentioned here above are, strengthening the role of the indigenous institution, as it works to conserve the resource for more than a century properly, strengthening pastoral rangeland governance and sensitization and awareness creation are related to work has to be done on pastoralist mindset.

Chapter Eight

8. Summary, Conclusions, and Recommendations

8.1. Summary

In Ethiopia, natural resources in arid and semi-arid rangelands are the basis for the livestock production system known as the pastoral production system, which is under enormous threat. Traditional coping mechanisms are reported to be failing due to increasing environmental and rangeland depletion and lack of national policies to minimize or solve the problems. Pastoralism is changing continually from time to time. In the face of demographic trends, reduced access to a natural resource (grazing land and water), and climatic changes, pastoralists are becoming increasingly vulnerable.

Borana pastoral areas are known for increasing levels of destitution and food insecurity, and the impacts of drought are worsening. The Borana area is also well known for its livestock resources. The quality and productivity of livestock are very low due to a lack of appropriate consideration. Traditional range management practices have deteriorated, and indiscriminate water development has led to the depletion of some wet season grazing areas. Bush encroachment is also a serious problem. Grazing land has been taken away from pastoralists for other purposes, such as farming and expansion of urbanization of small towns. Increasingly in the Borana pastoralist, people's livelihoods, and more specifically their food security status, are at risk because the productive capacity of the natural resource base is declining in both quality and quantity. The resource base no longer provides enough food, clean drinking water, or sources of income. A number of factors contribute to processes of resource depletion strain, including population pressure, deforestation, livestock pressure, overgrazing and climatic stress, and other factors. The rural poor, especially women and indigenous people, are particularly affected because they may be landless and rely on common property resources or may not have secure rights, limiting their access to and control over productive resources. In the area situations of scarcity, declining livelihood security, and limited ownership and access can contribute to conflict over natural resources, further aggravating problems of depletion.

In the study area, the vast majority of respondents felt that their production system was under increasing strain. The 177 households studied indicated that traditional pastoralism could no longer support their community livelihoods. It is important to note that most rural households have substantial knowledge of sustainable resource management practices, including techniques to preserve soil and diverse varieties of local plants to minimize their risks. People also rely on a variety of strategies to survive in these harsh environments, combining reliance on natural resources with migration to other areas for seasonal employment and income-earning activities that are not based on natural resources (e.g. sale of crafts).

Most of the problems associated with natural resource depletion are people and livestock problems. Without engaging the land users themselves in the process it is impossible to conserve the natural resources. Most cases of serious depletion arise from people who are under great strain from a harsh environment misuse natural resources.

8.2.Conclusions

Pastoralism can be seen as a system that proactively manages risk. Many pastoralists seek reliability in highly risky environments: they accept the variability of productive inputs and modify their herding and social systems appropriately. To management natural resource systems sustainably, it requires the following integration: coordinated action by groups or communities at the local level; locally adapted resource-conserving technologies; and supportive external government and NGO institutions working in partnership with resource users. Many pastoralists invest their wealth in social capital, capitalizing on periodic good fortune to ensure that they have long-term insurance through elaborate systems of obligation and reciprocity. Poor development policies as those who are marginalized by the policies seek to improve their situation (or at least make sure that the situation of others does not improve at their expense). The highest burden being among African nations as drought is one of the most challenging shocks, affecting the lives of millions of pastoralists. Pastoralists' property rights have been in retreat for several centuries in the world. Pastoral and non-pastoral communities' livelihoods have been seriously threatened by the invasive woody species. Community-led initiatives are a good start for addressing their eradication. However, inefficient removal techniques or harmful practices, such as the use of toxic chemicals by some communities, can increase the threat to human and animal health—as well as place a continued burden on communities.

Yabello district pastoralists have decreasing access to basic socio-economic services and infrastructure that limited access to the natural resources on which their livelihoods depend. From the findings of the study, pastoralists recurrently affected by various challenges and disasters, including drought, livestock disease outbreak, rangeland degradation, and resource-based conflict and other factors. These put them at risk and are factors that push some pastoralists out of the pastoral system. At the same time, factors that pull pastoralists in dry land areas away from seeking their livelihood in pastoralism and attract them to cities and rural towns include better access to basic social services and to casual jobs and a general perception of better opportunities in urban areas. Successful implementation of controlling mechanism to natural resource depletion and livelihood activities may depend on effectively advocating raising awareness on a select number of issues. Refer back to the strategies described in chapters 6 and 7 for specific examples of natural resource depletion causes, consequence and effect, an indigenous coping mechanism, and controlling mechanism of natural resource depletion.

A national policy on the introduction, control, and removal of invasive species is essential to reduce the impact on communities and economies. In the area of natural science research, there is also a need to conduct research which response to the problems and interests of pastoralists and their related resource. Specific research areas should be identified locally, in a participatory manner with pastoralists, and so was vary by location.

These figures provide above are important background for a discussion of natural resource depletion, its cause, effect, and future trends as well as, coping mechanisms and designed strategies to reduce natural resource depletion. They show that in general pastoralism is under strain concerning natural resources base and livelihood security.

8.3. Recommendations

The aim of this study is to analyses natural resource depletion and its effect on pastoral livelihood in three Kebeles in Yabello district. The findings of the study could be used to suggest a number of action points and policy measures that could minimize the natural resource depletion problems and livelihood insecurity and would bring sustainable livelihood and resources conservation elsewhere in the pastoral areas of the country. As can been seen from the results of this study, the natural resources and pastoral livelihoods are under serious strain and threatened by different factors and conditions. The causes, effects, and trends that are affecting these resources and livelihoods are diverse and risks, coping and controlling mechanisms also tried to elevate the sort of attempt to overcome the problems. Therefore, the following research-based solutions are recommended that need to get due attention by all concerned bodies and policymakers for future actions and plans.

- Pastoralism is under strain mainly because of the rapid growth of the human and livestock population that lead to an over-exploitation of natural resource (rangeland and water). This needs the attention of government officials and planners on patterns of land use so that policies and a number of measures become necessary to prevent depletion of natural resources and deterioration of livelihood base of the pastoral communities.
- Natural resources depletion, insecure livelihood, and its effect need to be seen as a normal incident but efforts must be exerted on strengthening response capacity and training in areas linked to the improved and diversified livelihoods and natural resource depletion management.
- Attention must be given to finding alternative sources of livelihood, in addition to addressing the factors that are pushing them out of rural areas while at the same time putting in place a long-term natural resource development plan.
- Strengthen the livelihoods of people dependent on depleted natural resources by introducing more sustainable NRM practices and help them diversify into other activities.

- Emphasis is placed on using natural resources to address biological, political, and legal factors contributing to food and livelihood insecurity while interventions should start with an analysis of people's strengths rather than their needs.
- National research bodies, with links to implementing agencies and government, can contributes much to current knowledge and understanding of NRM in particular through research on the effect of NRM on the socio-economics in pastoral areas, and the management of invasive species in these areas.
- Development policies that fail to address the needs and aspirations of the various stakeholders properly can aggravate existing strains. In particular, policies that increase inequality or discrimination are likely to result in increased environmental stress, livelihood deterioration and brought negative effects of climate change to rural pastoral households in this district so as to inform practitioners and policymakers to take appropriate measures to address the problems.

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Appendixes

Data Collection Tools

Good morning or good afternoon! My name is Sara Arero Sasure. I am from Addis Ababa University department of livelihood and development studies. I am currently conducting master's thesis on the title pastoralism under strain: Natural resource depletion and its effects on the pastoral livelihood in Yabello Woreda, Borana Zone, and Southern Ethiopia. Thus I appreciate your cooperation to give me your time for the success of the research project. I want you to participate in discussion or interview. Are you volunteers to participate? Your name is not mentioned in relation to the information you provide. The information you give me is used only for the purpose of this academic research. You have right not to answer the question/questions if you do not want to do so.

APPENDIX I

HOUSEHOLD SURVEY QUESTIONNAIRE

Region _____ Zone _____
District _____ Kebele _____
Olla/Village_____ Date of interview _____

Name of data collector _____

I. Personal information

1. Name of the respondent _____
2. Position in the household_____
3. Sex A. Male B. Female
4. Age _____
5. Ethnic group A. Borana B. Guji C. Gabra D. 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. Mobility history and household demographic information

1. Members of household

Please fill the following table
Table I

S/N	Name of household members	Age	Sex		Husband (tick)	Wife	Child	Others specify	Literacy level (write A to H)
			Male	Female					

A) Non literate B) Read and write, C) Primary 1st cycle (grade1-4), D) Primary 2nd cycle (grade 5- 8), E) High school education (grade 9-12), F) Certificate, G) College Diploma and H) University graduate

2. 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) _____
3. Where were your families living prior to moving to the current location?

_____

_____

4. Why did you leave your previous location? (If moved)

_____

_____

What were your specific reasons for choosing your current location?

_____

_____

5. Do you have a plan to leave this place? Yes _____No_____

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

_____

_____

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

_____

_____

8. What are the factors that determine your household mobility? (Multiple responses possible)
    a) Pasture condition
    b) Availability of water points
    c) Distance of water points
    d) Conflict in the area
    e) Disease out breaks
    f) Others specify_____

9. What are the external factors that inhibit your household 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_____

10. Please prioritize the most three external inhibiting factors that hinders your mobility
    a) _____
    b) _____
    c) _____

III. Household sources of livelihoods (Tick)

1. What does your family sources of livelihoods from? (Multiple responses are possible). (Tick)
    a) Animal husbandry_____
    b) Crop cultivation_____
    c) Livestock trade_____
    d) Sale of fire wood and charcoal _____
    e) Beekeeping _____
    f) Sale of blacksmith items _____
    g) Income from traditional healing service _____
    h) Hunting and gathering _____
    i) Begging _____
    j) Free relief aid _____ (from whom? _____)
    k) Petty trade _____ (in what? _____)
    l) Permanent employment _____ (where/amount? _____)
    m) Causal labor _____ (where? _____)
    n) Rental house in town _____ (Amount per month _____)

o) Remittance _____ (from whom _____)
p) Pension allowance _____ (Amount per month _____)
q) Food for work _____ (by whom?) _____)
r) Credit _____ (from whom? _____)
s) Other _____ (specify _____)

2. From Ques.no 1, Please prioritize 1 up to 5 your major alternative sources of income to cope with effects of natural resource depletion except livestock husbandry which isn't alternative to pastoralists

a) _____
b) _____
c) _____
d) _____
e) _____

3. How do you see major alternative sources of income from question number 2, in relation to sensitivity to natural resource effects?

a) Highly sensitive b) Less sensitive c) No any relation with natural resource depletion
d) Others specify _____

IV. Livestock holding information

1. 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 _____

2. From livestock species you have which one can cope with natural resource depletion of your locality? Prioritize in order of withstanding depletion shocks.

a) _____
b) _____
c) _____
d) _____
e) _____

3. If you have livestock, what are the main feed resources of your livestock?

a) Communal grazing land b) Private owned pasture land c) Hay/ silage
d) Specify/ Other_____

4. How do you see your livestock holding status from last ten years to date? (From Gada Liban Jaldessa to Kura Jarso (which is underway?)

a) Increasing b) Decreasing c) No any change d) I have no idea
e) Others specify _____

5. If your response to question number 4 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 household 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_____

6. From possible causes of decreasing your livestock holding status of number 5 rank the major causes of your own.

a) _____
b) _____
c) _____
d) _____
e) _____
f) _____

V. Crop production information

1. Do you have cultivated or farm land for crop production?
   a) Yes b) No
2. If you have cultivated land what is the size of your land either in (timads) or hectares_____
3. 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 _____
4. 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_____
5. If your response for question number 4 is decreasing in production, what were possible causes for decreasing in production? (Multiple responses are 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 _____
6. How did you engaged in crop production?
   a) Intentionally b) As opportunistic c) I do not know how I engaged
   d) Others specify _____
7. 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

1. Do you have veterinary services in your locality? A. Yes B. No
2. If no, how long does it take you to reach the nearest veterinary service? Walk for single trip.
3. Do you take your animals to vet service when they get sick? A. Yes B. No
4. If no, why you don't take them to vet service? (Multiple responses are 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 persorll1el are not available most of the time at their work place
    f) Others specify_____

5. How long does it take you to reach the nearest (livestock) marketing center? _____hours walk single trip.
6. 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 _____
7. 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_____
8. How long does it take you to reach the nearest human health facilities? _____ Hours walk single trip
9. Do you visit the human health center when you or your family members get sick?
    a) Yes b) No
10. If your response to number 9 is no, what are possible reasons? (Multiple response are possible)
    a) The service is too expensive
    b) There is no drug and other facilities at the center
    c) I prefer traditional treatment
    d) Health technicians are not available most of the time
    e) Other specify_____
11. What type of schools is 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
12. Among the school types available in your locality which one does you prefer to send your children? Why? _____
13. Do you send all your school age children (>=7 years old) to school?
    a) Yes b) No
14. If your response to number 13 is no, what are the reasons? (Multiple response are possible)
    a) Far distance from school
    b) Educational curriculum does not 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 _____

15. 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) Unprotected spring g) Scoop wells (Adadi)
h) Others specify _____

16. 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) _____

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

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

a) Yes b) No

19. 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 natural resources depletions

1. How do you see the change in pasture for last ten years?

a) Increasing trend b) Decreasing trend

2. Inwhat way do you observe the patterns of rain fall in your locality for last ten years?

a) Increasing trend b) Decreasing trend

3. 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

4. If the response for question number 3 is increasing in frequency of drought from time to time, what possible effects did you face? (Multiple response are 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 _____

5. From natural resource depletion affects you have faced in question number 4, please rank the major climatic effects on your livelihoods.

a) _____
b) _____
c) _____
d) _____
e) _____

6. In your Opinion which segments of the community has affected by natural resource depletion? (Multiple response Possible)

a) Children b) Women c) Disabled people d) Elders
e) Others specify _____

7. Please rank the above segments of the community according to degree of harm to natural resource depletion

a) _____
b) _____
c) _____
d) _____

8. 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 _____

9. 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

10. How you are normally warned against hazards threatening your livelihoods?

a) Through the '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 coping strategies/mechanisms

1. Did you practice any coping mechanisms to overcome effects of natural resource depletion for last ten years?

a) YES b) No

2. If your response for question number 1 is yes, what coping mechanisms you have been practiced? (Multiple response are 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 _____

3. From the above coping mechanisms of question number 2 please rank five (5) of them which do you think environmentally sound, applicable to practice and viable to cope with natural resource depletion under Borana pastoralist condition.

a) _____
b) _____
c) _____
d) _____
e) _____

4. What are the mediating institutions that positively facilitate the natural resources depletion effect coping mechanisms of question no.3 you have practiced? (Multiple responses are possible).

a. Traditional institutions
b. Government structure
c. NGOs development interventions
d. Others specify _____

5. What are the other non-climatic factors that contributed to natural resource depletion? (Multiple response are 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 _____

6. What are the barriers that negatively affecting traditional coping mechanisms of Borana pastoralist in overcoming effects of natural resource depletion? (Multiple responses are possible)

a. Imposition of modern institution on traditional one
b. Inappropriate settlement pattern without considering traditional grazing system
c. Regionalism that affecting pastoral movements
d. Banning of fire application for traditional range management
e. Depletion inpotency of traditional leaders

f. Devaluing indigenous traditional knowledge
g. Inappropriate development interventions
h. Poor policy focus on pastoral development
i. Bush encroachment
j. Others specify

7. 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!!

Appendix II

KEY INFORMANT INTERVIEW GUIDING POINTS

Part I: Perception on effects of natural resource depletion on livelihood assets.

1. How do you perceive and determine natural resource depletion?
2. What are the major natural resource depletion causes that have been threatening the livelihoods of the Borana pastoralists?
3. How do you see the trends and magnitude of this/ these causes?
4. What are the major natural resource depletion consequences that have been straining the livelihoods of the Borana pastoralists?
5. What are the major livelihood assets of the Borana pastoral community?
6. In your opinion what is the trend of these livelihood assets in terms of supporting households' food security?
7. How this natural resource depletion causes and consequences affect the major livelihood assets of the Borana community?

Part II: Local coping mechanisms to withstand natural resource depletion and other factors that aggravate its effects

1. In your opinion what local coping mechanisms the community has been practicing in withstanding effects of natural resource depletion?
2. What are the barriers that have been affecting these local coping mechanisms?
3. Among local coping mechanisms that have been practiced by local community which do you found to be effective under current existing conditions? Why?

4. In your opinion which segments of the community members of the Borana pastoral community highly affected by natural resource depletion related vulnerability(s)? Why?
5. Which livestock species can relatively resistant to current natural resource depletion condition? Why?
6. How do you see the economic viability of those species to improve the living condition of the Borana pastoralists?

Thank You!!

Appendix III

FOCUS GROUP DISCUSSION GUIDING POINTS

1. Do you think that Natural Resource (range land and water) depletion is currently a problem to the Borana rangeland? If yes, what do you think is/are the factors cause this problem? What do you think is the solution?
2. In your opinion what are the natural resources depletion related hazard that have been affecting the pastoralist community in your kebele?
3. What are the effects of these hazards on livelihoods of Borana in Yabello pastoralists?
4. What are the trends or historical time line of these hazard and major events happened on pastoralist community of Borana due to hazard?
5. What do you think the role of government and other development actors in minimizing the effects of natural resource depletion on pastoral livelihoods and to strengthening traditional coping mechanisms?
6. Inthe context of natural resource depletion effect on pastoralist livelihoods, Please give your opinions on the following elements. Strengths, limitations, opportunities and threats of Borana pastoral community to cope effects of natural resource depletion on their livelihoods.
7. Do you think that the number of animals is in balance with available range resources?
8. What do you think is the problem if a high number of animals graze over a small area of grazing land?
9. Do you think that pastoralism survives in the future? If yes, what are favorable conditions or hope to do so? If no, what do you think is the reason?
10. Is/Are there any fundamental changes or improvements that development interventions brought about?
11. Are there any other issues that you think are relevant for my research, but I have not discussed during the discussion?

Thank You!!

The Checklist

This Checklist was be used to gather information during informal discussion with different groups, household and individuals

1. What are the effects of natural resource depletion observed in the area?
2. Justify the trend of depletion since 20 years onwards?
3. Could you justify the trend of availability of water resources for both human and livestock populations since 20 years onwards?
4. Discuss on the availability of grazing land for livestock population?
5. What are the causes of conflict between tribes, clan and peoples of the area?
6. Could you justify the trend of livestock production of the area since 20 years onwards?
7. Discuss and justify the trend of farming practices of the area since 20 years onwards?
8. List types of mobility? Discuss on its importance's? For how much time they have stayed on the place where they have moved to?
9. What are the roles of changing of herd composition?
10. How the communities are conserving grazing land and protecting their livestock from starvation?
11. How the communities are efficiently managing water resources of the area?
12. How the communities are managing conflicts between tribes, clan and between individual people?
13. What are the roles of charcoal burning? From which tree species it's producing?
14. What is the role of Gada System/structure in managing water, grazing land, and conflicts of the area?
15. Are all community members having an equal chance and access to the available range resources?
16. Can individuals claim exclusive right over range resources? If yes, on what grounds they can claim? If no, why?

Observation Guidelines

The following points were help to scan the environment as observation guidelines as the researchers travel in the research Woreda, kebeles, and villages.

a) Local coping strategies/mechanisms
b) Social services situation
c) Crop production condition
d) Livestock holding information
e) Household sources of livelihoods
f) Mobility history and household demographic information
g) Grassland current condition
h) Local coping mechanisms to withstand natural resource depletion.