Social, Institutional and Ecological Dimensions of Adaptive Rangeland Governance in the Middle Awash Afar Social-Ecological System, Eastern Ethiopia

By
Abrham Bogale

A Thesis submitted to the Centre for Rural Development

College of Development Studies

Addis Ababa University

in partial fulfillment of the requirements of the degree of

Doctor of Philosophy

in Development Studies

Addis Ababa

December 2019

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

ARG	Adaptive Rangeland Governance
CBRM	Community Based Rangeland Management
EPRDF	Ethiopian People Revolutionary Democratic Front
FAO	Food and Agriculture Organization
GPS	Global Positioning System
GS	Governance System
GTP	Growth and Transformation Plan
I	Interaction
ILRI	International Livestock Research Institute
LULC	Land use land cover
MAADE	Middle Awash Agricultural Development Enterprise
MoFED	Ministry of finance and Economic Development
NGO	Non-Governmental Organization
NRC	National Research Council
NRM	Natural Resource Management
O	Outcome
PA	Peasant Association
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
PCA	Principal Component Analysis
PI	Participation Index
PS	Pastoral System
QA	Quality Assessment
RS	Resource System
RU	Resource Unit
SDPRP	Sustainable Development and Poverty Reduction Program
SES	Social-Ecological System
VIF	Variance Inflation Factor
WB	World Bank

ACKNOWLEDGEMENT

First and foremost, I would like to thank God for providing me the blessings to complete this work. I convey my deepest thanks to my supervisor Dr. Samuel Tefera for giving me professional guidance, friendly advice and encouragements throughout this study period. I am thankful to my co-advisor, Dr. Daniel Temesgen, for his willingness to advise me as well as for his constructive comments.

I would like to express my sincere appreciation to Kombolcha College of Agriculture and Amhara National Regional State Bureau of Agriculture for giving me the chance to pursue my graduate study. I would also like to thank all the management bodies of the College for their hospitality and kindly cooperation throughout my work.

I sincerely thank the Afar pastoralists of Middle Awash valley who responded to all questions with patience and provide me necessary information for this research work both individually and in group. I would also like to thank staffs of Amibara District Office of Pastoral Development for providing me with all the relevant information and kind support during my field work.

My heartfelt thanks go to my mother Emahoy Tiruwork Demisse and to all my family members for their love and consistent encouragement throughout my life. My deepest gratitude also goes to my friends Getachew Tesfaye, Muluken Girma and Addis Sime for all their support and encouragements in all walks of my life including this study.

Finally, I would like to dedicate this piece of work to the memorial of my beloved and unforgettable father Aba Bogale Bodin and my grandparents. Let your soul rest in peace!

ABSTRACT

Rangeland ecosystems generally encompass diverse land resources. Rangelands used for grazing are often complex coupled human and natural systems from which society demands both goods (Livestock) and services (pasture and water). In Ethiopia, rangelands cover approximately 65% of the total surface area of the country, and are often at the nexus of mining ground, wildlife habitat, agricultural lands, and urban landscapes. Based on the field survey conducted from July, 2017 to December, 2018,employing both qualitative and quantitative data collection and analysis methods; the social, institutional and ecological dimensions of the governance system were explored and analyzed. Particularly, the governance structures and institutional arrangements, participation of pastoralists in decision-making spaces, the capacity of pastoralists to influence social-ecological resilience and the impacts of rangeland dynamics on the governance of the Middle Awash Afar social-ecological systems were analyzed. Hence, the findings of the research suggest that the overall governance systems of the Middle Awash Afar social-ecological systems are generally weak and uncoordinated, and hardly fit with the social and ecological conditions. Likewise, the level of pastoralists' participation has been found inadequate to lure pastoral communities towards genuine participation and meaningful deliberation. Besides, the collective capacity of pastoralists and the prevailing external sources of strength that help them to influence resilience have been weakened. Hence, the research suggests that there is a need to envision a third alternative of installing "hybrid institutions" that combines scientific approaches and traditional mechanisms of rangeland governance.

1. INTRODUCTION

1.1 Background of the Study

This section portrayed some of the basic points regarding the Ethiopian rangelands and the way how these rangelands have been governed under the three consecutive governments including the overview of their development interventions. The section also addressed the past and the present pastoral area and livestock development policies and strategies with a particular emphasis given to the situation of the Middle Awash Afar social-ecological system (SES).

1.1.1 Rangelands and Rangeland Governance in Ethiopia

Ethiopian rangelands cover a land mass of 780 thousand square kilometers or around 65% of the total surface area of the country (CSA, 2007). These rangelands are located in the arid and semi-arid lowland areas in the East, Northeast, West, and South of the country. The ecological systems are predominantly characterized by extensive hot drylands with low erratic rainfall and highly vulnerable to the impact of climate variability. Though its bio-geophysical condition is inhospitable and fragile, the ecosystems still provide the livelihood for more than twelve million pastoralists and agro-pastoralists (CSA, 2013). Ethiopian pastoralists living on these rangelands represent different ethnic groups among these the most dominant ones in terms of number of people, livestock and size of areas occupied are the Somali (53%) in the East and Southeast, the Afar in the Northeast (29%), and the Borana in the South and consists of 10% of the pastoral population. Livestock herding is the mainstay of people's livelihood in these rangelands. Of the total livestock in the country it is estimated that the pastoral sector raises 40% of the cattle, 75% of the goats, 25% of the sheep, 20% of the equines, and 100% of the camels (CSA, 2007).

Ethiopian rangelands have been governed under collective common property arrangements by pastoral communities through their customary systems. In Ethiopia, different pastoral ethnic groups have different traditional governance systems. For instance, the Somali are traditionally governed by *Herra* system, the Afar by the *Madaa* system, and the Borana, Guji and Kereyu are governed by the *Gadda* system. The traditional resource governance systems that are mainly based on indigenous knowledge

enabled pastoralists to track and utilize patchily distributed pasture and water resources. This makes the traditional governance system to be the most suitable land use and management system for the majority of these areas as it primarily depend on seasonal availability of pasture and water. Hence, it is through these governance systems that the customary institutions have governed the use, access and protection of the communally owned rangeland resources.

However, recently, the governance of the common property rangeland resources under the customary institution faces a power struggle challenge from the formal governance systems (Fekadu, 2011). In this sense, government bodies denounce the traditional governance system as outdated and that need to be replaced with formal government structure. In doing so, the government introduced formal administrative structures and a variety of reforms including land tenure and land use policies, sedentarization of pastoralists, as well as expansion of commercial agriculture. These were done in the guise of development of the rangelands and modernizing the mobility based livelihood and settlement patterns of the people. Besides, the neglect of culture and interest disputes and pervasive ecological and social uncertainties have been the major challenges encountering the traditional resource governance system and the viability of their mobility based livelihoods.

1.1.2 Overview of Development Interventions in Ethiopian Rangelands

Regardless of the fact that rangelands cover nearly 65% of the total surface areas of the country and pastoralists have significantly contributed in the local and national economic development endeavors, very little development consideration was given to the rangelands and pastoralists until the mid-1960s. In this regard, (Zere, 1987) documented that it was only in the early 60th that the imperial government facilitated the development of water and Livestock market centers in the Borana rangelands. However, the establishment of Livestock and Meat Board (LMB) in 1964 marked the beginning of large scale efforts of the government to develop pastoral areas. To this end, the LMB was founded to enhance the development strategy of the Imperial government to commercialize the Livestock sector and has played a major role in the history of pastoral development in Ethiopia. Particularly, its studies, projects and approaches have influenced the 60th, 70th and 80th pastoral development efforts and

outcomes of the country (Desta, 1996). The development model used by the LMB was Livestock and rangeland resource centered in its objectives and technology driven in its development approaches (Desta, 1996). The First (1965-75) and the Second Livestock Development Projects (1973-81) were crafted by the LMB, and the Third Livestock Development Project (1975-84) was initiated based on the studies of the LMB, with the objective of developing and rehabilitating three vast project areas. These are the Southern Rangeland Development Unit in Borana, Guji and Liben Zone, the Northeastern Rangeland Development Unit in the Afar, and the Jijiga Rangeland Development Unit in the East.

However, the implementation of these projects among other things was affected by insurgencies and the war with Somalia, and its efficiency was also compromised by the Marxist policy of the Dergue regime (Desta, 1996). The same author suggested that all the three projects had failed to improve the livelihood and lives of pastoralists, since the focus of the projects were on the livestock and rangeland rather than the owners of the resources. Moreover, the use of centralized-state-command approaches, lack of understanding of the pastoral systems and an underestimation of the power of traditional institutions are among the key defining reasons identified as responsible for the failure of these projects.

The EPRDF government has introduced pastoral development projects in all the pastoral Regions of the country. Among these, the Pastoral Community Development Project (PCDP) launched in 2003 and served for three consecutive terms of fifteen years period is the major development interventions in pastoral areas. The PCDP was aimed at improving the livelihoods of pastoralists in Afar, Somali, Oromia, SNNP, Gambela and Benishangul-Gumz Regions. PCDP was also given the mandate to strengthen policies on pastoral land use rights, settlement, livestock marketing and public service delivery (MoFED, 2010). Besides, currently, there is a growing interest among research and academic institutions to incorporate pastoralism in their research and teaching programs. For example, Haramaya and Jigjiga University have established Institute of Pastoral Studies. Ethiopian Institute of Agricultural Research has a Dryland and Pastoral Research Directorate.

1.1.3 Ethiopian Government Policies and Strategies in Rangelands

For long, the political, economic, social and territorial institutions of pastoralists have facilitated ownership and management of resources, resolution of conflicts, sharing of benefits and costs, and provisioning of governance, with these, they have sustained the pastoral mode of production and way of livelihoods. Nevertheless, internal factors such as increase in human population, loss of grazing lands and growing competition for declining scarce resources have affected the customary rangeland governance system. Similarly, external factors such as expansion of urbanization that intrudes and erodes the traditional institutions, and increased interest of the state over rangeland that sidelines and undermines the pastoral production system have challenged and compromised the effectiveness and existence of these traditional governance institutions. These among other things necessitate the need for policies and strategies that regulate the use and management of rangelands.

However, unluckily, policies of the Ethiopian governments have been misinformed and inconsistent with prior interests of pastoralists and their institutions. (Kelemework, 2011) explained the situation in that even there are cases where the previous governments aggressively and coercively moved to replace the traditional institutions that resulted in the loss of indigenous knowledge appropriate to govern the fragile dryland ecosystems. Currently, there are commending ongoing institutional efforts, nationally by the Pastoral Affairs Standing Committee in the parliament and globally by Pastoral Advocacy Groups to help the voice of pastoralists be heard. However, the recognition of pastoralism as a viable livelihood and production system is still at odds with the views of government officials. As a result, the policies enacted do little support pastoralism, as a vibrant time tried system of production (Abbink et al., 2014). In this regard, the other daunting situation explained by (Little et al., 2010) is the presence of contradiction between the complex interplay of written policies and what actually happens at a grassroots level in rangelands.

During the Imperial time uncultivated land in Ethiopia was conceived as “no-man's land”. Owing to this view most of the state farms, big agricultural investments and national parks were established on the fertile rangelands at the expense of pastoralists. In general, taking away of grazing lands from pastoralists and reassigning it to other

non-pastoral investments were part of the Imperial government policies. It was done under the cover of developing rangelands and uplifting pastoralists from backward nomadic life style to kind of modern sedentary livestock-crop farming. This reflects the perception and position of the Imperial government that consider pastoralism as backward production system that needs to be modernized. Of course, this view has been continued and shared by the consecutive governments as explained bellow.

The succeeding military socialist government decreed the 1975 proclamation which led to the nationalization of rural lands and limited pastoralists to usufruct rights only. The proclamation authorized the government to have unrestricted and uncontested power to further intensify and establish new state farms, national parks, state forests and state controlled ranches that all encroached upon rangelands. According to (Kelemework, 2011) though the Dergue government was much worse, has some similarities with the Imperial government in its approach to rangeland development. Particularly, the development policies of both the Dergue and the Imperial governments were solely focusing on the rangelands and the livestock but not on improving the livelihood of the people. The Dergue government went further to control the economic and market involvement of pastoralists by institutionalizing a quota system. As a result, each pastoral associations has to supply a given number of animals at a given period at state fixed prices to the state run livestock enterprises to feed the urban consumers and for export to earn hard currency.

The EPRDF government policy documents, including the constitution clearly show that there is clear departure from the past in terms of recognizing pastoralists' traditions, economic rights, and way of life. The constitution's article 39, 43, 45 and 92 in general stated the collective right of pastoralists to self-government, economic development and communal land. In line with these articles the major policy changes has been made by the EPRDF government that deal with governance and participation in pastoral matters. These are securing the constitutional right of pastoralists to free land for grazing and cultivation, and the right not to be displaced from their own land. It also includes the decentralization of power to the District level to ensure participation. The formation of pastoral institutions both at Federal and Regional levels were also decreed even if their implementations are far from realities and yet unclear.

Unlike the previous regimes, the current ruling front has attempted to incorporate pastoral and rangeland development in its five-year national development plans and issued policies and legislations concerning pastoralists both by Federal and Regional governments. For instance, in the 2001 Rural Development Policies and Strategies (RDPS) paper, pastoral development was addressed through the short and medium term strategies that focus on reducing mobility. In the long term, sedentarizing pastoralists by developing irrigation, implementing settlement programs, and changing their way of life. The RDPS paper also underscored the need to prevent natural resources degradation through consultation with pastoralists and emphasize the use of their indigenous knowledge.

Moreover, the overarching Sustainable Development and Poverty Reduction Program/SDPRP (MoFED, 2010) recognized the lack of clarity on the strategy for pastoral development in the national development plans. Hence, it redesigned its pastoral development strategies in a way that prioritized voluntary sedentarization of pastoralists in areas where there are adequate water sources to support irrigation and other infrastructures. The strategy also puts forward the provisioning of mobile social services for those who continue to be mobile pastoralists. The Plan for Accelerated and Sustained Development to End Poverty (PASDEP) strengthened and continued the initiatives started during SDPRP that prioritized water development and environmental protection. In the Growth and Transformation Plan (GTP) of pastoral development, major priority was given to the development of water and infrastructure facilities along with improving animal breeds. It also has emphasized veterinary service, marketing system and promoting voluntary resettlement in areas that are convenient for irrigation development (MoFED, 2010).

The EPRDF government also considered rangelands as areas of special problems which need special measures and support that are deemed appropriate to local conditions. Thus, the government established a department in the Ministry of Federal Affairs that coordinates and facilitates development in pastoral areas along with a Directorate in the Ministry of Agriculture to provide extension service. It also has formed Pastoralist Affairs Standing Committee in the Parliament which oversees pastoral development activities in the country. Regional Pastoral Development Bureaus and Offices also have been established in Regions where pastoralism is the major production system.

However, the most preferred and ecologically informed option of pastoralists to mobility with large stock and the keen interest of the government in sedentarization and expansion of commercial farming are still contradictory each other. These coupled with the lack of clarity of policies and strategies in rangelands resulted in increased livelihood insecurity and ecological problems. Therefore, as (Flintan et. al., 2013) identified the overall policy environment for pastoralism still exemplifies many misconceptions about pastoralism and its importance to Regional and National economic development.

1.1.4 The Situation in the Middle Awash Afar Social-Ecological Systems

The Afar have gone through a situation very similar to that of the other pastoral groups in Ethiopia. Prior to their political incorporation in 1905 into the Ethiopian state, the Afar are said to have lived in self-contained and self-supporting pastoral communities (Markakis, 2011). Even after their incorporation, the Afar land remained outside the effective control of the state until the country was set to function under the centralized administration of the Emperor in 1944 (Gamaledin, 1993). Research reports also contend that just after the Italian aggression the Ethiopian government began to recognize the political and economic importance of the Afar territory due to its strategic location at the entrance to the Red Sea and its high potential for irrigation farming in the valley (Gamaledin, 1993). Hence, in 1962 the Awash Valley Authority was established with the unmatched authorities of managing development in the valley. It includes large scale mechanized enterprises run mainly by foreign investors in collaboration with the state, establishment of state farms through negotiation with the local people, coordination and financing of settlement and other schemes (Ali, 1994). As mentioned by many researchers it was at this historic juncture that the story of development interventions and the misery of the Middle Awash pastoralists began.

In fact, the Imperial government development interventions in the Middle Awash Afar were part of the much broader development strategies that most developing countries adopted during the 1950s and 1960s. The government thus adopted and designed an industry focused economic development strategy taking into account the global economic order of the 1950s and the 1960s. Accordingly, large scale commercial farming was established with the aim of supplying raw materials to the "*would be*

"grown domestic industries and to produce surplus food for the factory labor forces that were projected to grow with these industries. While implementing the envisaged commercial farms, the Allideghi plain and the flood plains of the Awash Riverine were among the areas that catch the eyes of the designers of the strategy. As a result, more than 70,000 ha of the dry season grazing lands of the Middle and Lower Awash Valley were appropriated and converted into large scale irrigated commercial farms.

The establishment of the Awash National Park in 1966 and the Middle Awash Agricultural Development Enterprise (MAADE) in 1968 also evacuated large number of pastoralists from their prime grazing lands. However, the loss of grazing lands was exacerbated when the military socialist government (Dergue) came into power in 1974 (MAADE, 2005). The Dergue promoted a rapid expansion in state owned irrigation farm including expansion of MAADE from 300 ha in 1968 to 13,116 ha in 1985 by clearing more lands. It is also noted that the land reform policy that includes villageization program of the military socialist government had displaced pastoralists in the Middle Awash. In general irrigation based commercial farms during the Imperial era, state farms during the Socialist government and privatization of land through lease by EPRDF attributes to the scarcity of grazing lands.

These policies driven changes in natural resource use and management in the Middle Awash Afar have had significant ramification on the livelihood of the people and the pastoral system of production, including the institutions governing the use and management of resources (Sandford, 2006). These changes of the state policies in the Awash Valley created violent conflicts and confrontations between the Afar and the state itself. It also adversely affected inter clan and inter-ethnic relations (Sandford, 2006). By and large, these changes have contributed considerably to the vulnerability of the Afar to drought and famine and the resultant human and livestock losses. The 1973/74 great famine that took the lives of a third of the Afar population and the loss of a fourth of the livestock is a typical example portraying the negative consequences of government interventions and its ill-conceived development policies and strategies (Kelemework, 2011).

To summarize, pastoralism in the Middle Awash Afar is currently under profound pressure so much so that pastoralists have become incapacitated to bear even the basic needs of human existence. In this connection, (Flintan, 2013) identified this situation as the outcome of many interrelated factors. These are appropriation of rangelands for non-pastoral uses, recurrent drought, policy related problems, population growth, and increasing insecurity of tenure. These and other key problems affecting the Middle Awash Afar pastoral commons will be briefly explained in the subsequent problem statement section.

1.2 Statement of the Problem

The Middle Awash Afar SES have been experiencing rapid population growth, expansion of commercial farming, encroachments of rangelands with invasive alien plants and settlement areas, recurrent drought, and the ensuing land use land cover change over the past fifty years. This has mainly resulted from the combination of anthropogenic and natural processes (PFE, 2010). The impact from these changes is generally manifested through degradation of rangelands, dwindling of pasture and water resources, increased resource use conflicts, the weakening of the livelihoods of pastoralists and their capacity to withstand shocks. It also has been manifested through the breaking down of the traditional governance institutions and unsustainable use of natural resources that will further threaten the integrity of the ecosystem to support livelihoods in these areas. In recognition to these problems, (Flintan et. al., 2013) suggests that the need for research informed measures that address the root causes of the problems such as degradation of natural resources and rangeland encroachments of different kinds.

The impact of climatic change induced recurrent drought, population dynamics caused by in migration of non-locals and out migration of youths, and the growing resource use conflicts due to losses of herding lands for non-pastoral investments have not been addressed yet (Flintan et. al., 2013). Moreover, the impact of large and small scale irrigation farms on the traditional system of rangeland governance and its allied institutions has not been adequately studied (Desalegn, 2011).Likewise, (Robinson, 2015) argued that inappropriate policies, uncoordinated and weak governance systems that marginalize the customary institutions and the pastoral system of productions have

undermined the social-ecological resilience of pastoralists. This situation has been manifested in the study area in a way that many pastoralist households now regularly require emergency relief. This is a clear sign that the adaptive capacity of their SES has been eroded. In this regard, however, there are very few research documents available for policymakers and practitioners. Especially, research conducted based on landscape SES approach is very limited.

The implications of overgrazed land, escalation of conflict and land cover change in the study area are partly manifested by invasion of *P. juliflora* (Shiferaw et. al., 2019). The plant is originally from Central America introduced to control erosion and desertification in the horn of Africa. The rate of spreads of the invasive plant species is high and its impact on the ecosystem of the study area is yet to be investigated (GIZ, 2014). Furthermore, the influx of settlers and investors to exploit farming could further trigger more challenges on trees, water and other rangeland resources and fasten the rate of land use cover changes (Vaz et al., 2017). These changes in land cover coupled with population growth and shift in livelihood practices have further contributed to the fragmentation of the rangelands and breakdown of traditional institutions. However, so far very little has been studied about the impacts of the drivers of LULC dynamics including invasions of *P. juliflora* and its ramifications on the rangeland governance approaches (Le Maitre et al., 2014).

Furthermore, the deliberate and unaware portrayal of pastoralists as backward production system has not been changed. In this aspect, (Fekadu, 2010) indicated that government intervention and policy advice is still based on stereotypical representations of pastoralist areas as backward and hotbeds of violent conflicts. Hence, the long term development interventions are based on the assumptions that consider sedentary lifestyle as desirable outcome for pastoralist. In this case, however, (Mohammed, 2004) explained the situation as the ensuing of the clashes of civilizations between the highlander ruling elites versus pastoralist lowlanders. With this he suggested that the need for further investigation on whether the situation created a gap in the governance of rangelands as well as its impact on participation of pastoralists.

Moreover, the approaches of successive governments towards rangeland development have been criticized by many authors. For instance, (Flintan et. al., 2013) identified that the disruption of grazing rights, ill-informed policy formulation and increased confrontations with pastoralists are some of the problems for the failure of the statutory governance systems. These problems have meant in some cases leaving pastoralism behind forever and push to pursue another livelihood strategy (Roy and Kerven, 2013).To respond to these problems the same authors suggested that the need for putting appropriate governance framework in place based on inquisitive inquiries of the realities on the ground. On top of these, inadequate knowledge and its application, narrow political and economic interests are the other bottle neck problems for the governance of rangelands (Rijke et. al., 2012).These problems also have been described as inadequate investigation of the problems and the lack of adaptive governance frameworks that allows making choice in response to the changing social and ecological conditions.

In recognition to the aforementioned problems, many scholarships have begun to identify key factors influencing rangeland governance for a particular SES which relates to the structure and processes of participation in decision-making at different levels. However, in Afar pastoral setting very little has been done with this regard. Much of the academic literature still examines single level governance solution while the challenge is growing more complex (Flintan et. al., 2013). Therefore, this research explores the above stated problems of the Middle Awash Afar SES having the following general and specific objectives through the lens of adaptive governance framework.

1.3 Purpose and Objectives of the Study

1.3.1 General Objective

The research examines how the governance systems and institutional arrangements in rangelands can enhance the adaptive capacity of pastoralist communities to influence resilience, identify factors that determine participation of pastoralists, and explorethe impact of land use land cover dynamics on pastoral system of resource governance in the Middle Awash Afar SES.

1.3.2 Specific Objectives

- To identify the governance structures and institutional frameworks that address the challenges of securing adaptive rangeland governance;
- To assess the change in governance and the capacity of pastoral institutions to influence resilience of their SES;
- To investigate the impact of land use land cover change on the pastoral rangeland governance of the Middle Awash Afar SES;
- To assess the level of pastoralists' participation at different rangeland management activities and decision-making processes.

1.4 Scope of the Research

In a nutshell, the ontology of social-ecological interactionism explains that everything is connected to everything else. Hence, it is very difficult to study all the interconnected phenomena at once. Thus, this necessitates the need for delimiting the scope of the research; if not, it presents a challenge for investigation. Fortunately, however, not everything or every connection is important to study the desired construct of a given research. In other words, it is not a must to understand and make value judgment to all the connections and linkages that a particular phenomenon had with other things. Therefore, the value judgment that I made in delimiting the scope of this research is primarily depends on the nature and key defining characteristic elements of the construct of the research as well as the scale of analysis to be undertaken.

Therefore, the scope of this research is limited to investigating the rangeland governance systems of the Middle Awash Afar by considering a couple SES of the Allideghi grassland ecosystem and the Middle Awash Riverine ecosystem. More specifically, the research focused on pastoralists' participation and the role of their institutions in matters that affect their livelihoods and their adaptive capacity to influence social ecological resilience. It also explores the governance systems of the study area including the social and biophysical elements of these particular SES. Moreover, the study set out to identify the way in which the different kinds of governance frameworks and institutional structures that are in place and how they interact each other. It also identifies how these affect the collective capacity of

pastoralists to govern the scarce and dispersed rangeland resources in adaptive and sustainable manner. To this end, the resilience and complex adaptive system theory suggests that SES is made up of smaller systems and is itself part of the larger system. Therefore, the key elements of the adaptive governance of the Middle Awash Afar SES such as their social networks, values, institutions, rangeland resources as well as the existing governance systems were addressed. But delineating the boundary of any of these smaller or larger SES is beyond the scope of this work. Regarding resilience, the research is limited to investigating the collective capacity of pastoralists and how their institutions help them to build resilience of the SES. However, there is no any attempt to investigate any other aspect of the resilience.

1.5 Significance of the Research

Over the past decades, much of the academic literature on rangelands has been based on the recognition that the arid and semiarid rangelands where most pastoralists live are typically governed by non-equilibrium dynamics (Briske et al., 2017). This view has contributed to the idea that traditional mobile pastoralism is a sustainable form of livelihood and an adaptation to the non-equilibrium dryland ecosystem (Scoones, 1995). However, proponents of sedentary farming argued "pastoralism as wastage of resource and causes of environmental degradation and conflict".

Therefore, this research, by furthering theory related to the adaptive rangeland governance system, exploring the roles of institutions in pastoral governance system, and by assessing public participation among pastoralists will contribute to the debate over pastoralism versus sedentary crop farming. The research will also contribute to scholarship on social-ecological resilience (Robinson, 2012), particularly, on the capacity of stakeholders and their institution to knowingly build resilience. Moreover, the findings would contribute in providing relevant information for the Regional policy makers and Development Planners of these particular SES. Through providing relevant information the study will also help to develop locally acceptable and adaptable governance frameworks so as to minimize the problem of securing adaptive rangeland governance in the study area.

1.6 Philosophical Foundation of the Research

Since this study is a dissertation research work for the philosophy of doctorate, somewhat I need to indicate and say few points on the scientific origin of the work and its broader category in sciences. To this end, the theoretical starting point for this research work is complex adaptive system theory (Folke, 2006) which relays on and integrates non-equilibrium ecology and resilience theory. The non-equilibrium ecology and resilience theory have transformed rangeland ecology and management by challenging the traditional assumption of ecological stability and linear succession dynamics. The theories suggest that ecosystem dynamics are strongly influenced by disturbance, heterogeneity, and existence of multiple stable states (Briske et al., 2017). For instance, the non-equilibrium persistent model indicates that plant production and livestock numbers are seldom in equilibrium in pastoral system because reoccurring drought maintains livestock number below the ecological carrying capacity. However, contemporary research has demonstrated that livestock are often in equilibrium with key dry season grazing resources. Likewise, the resilience theory describes how ecosystems can be dynamic (Curtain and Parker, 2014), but still persists as self-organized systems (Ostrom et al., 2014).

Nowadays, the concepts of complex adaptive systems have been gaining influence in contemporary scholarship, such as for example; natural resources management, poverty reduction, political ecology and sustainable development. The dominancy of the concept has been primarily from its power to explain evolving phenomena and unpredictable changes that complex systems can undergo. Its dominancy is also partly due to the failures of conventional paradigms or linear assumption in helping to explain complex systems.

In this vein, the ontology of the complexity paradigm explains that structural patterns in society and in the physical world are real and affect smaller scale phenomena. This paradigm can also be expressed in terms of panarchy (Allen et al., 2014).This explains that complexity allows for multi-dimensional causality which operates at different levels of organization and dynamic structures. Besides, scholars of complexity thinking argued that individuals, social structure and the ecosystem are all influence and reply each other in an ongoing dynamic process of self-renewal (Ostrom et al., 2014).

Environmental Scholars influenced by complexity paradigm also argued that social-ecological interactionism entails an assumption of multi-dimensional causality. However, scholars having reductionist perspectives explain phenomena in terms of some predetermined category of causes, whether it could be social structures, socio-political power, cultural frames, or utility maximizing individuals.

The ontological arguments on social-ecological interactionism, in turn, have implication for epistemology of the complexity paradigm. The epistemology of the complexity paradigm assumes, understanding the institutional or organizational processes of dynamic systems emanates from understanding the nature and process of the change (Vallega, 1998). Hence, he suggested that it is by understanding the processes that we can understand the system.

1.7 Organization of the Research

The dissertation is organized into eight main chapters. Chapter one is an introductory part embodying background of the study, including cursory overview of Ethiopian rangelands and rangeland governance, policies and strategies, and development interventions in Ethiopian rangelands with particular emphasis on the situations in the Middle Awash Afar SES. It also presents statements of the problem, purpose and objective, Scope and limitation, significance of the study, philosophical foundation, and organization of the research. Chapter two reviews the theoretical insights and empirical evidences that are related to the major themes of the research. Its subsequent sections explicitly discuss the key concepts and definitions adopted by this research, and some of the scholarly debates over the pastoral commons. It also elucidates the theoretical background of the research with its empirical evidences.

Chapter three presents an overview of the analytical framework of the study. It embodied the theoretical framework providing a general structure that can hold or support theory of the research. It represents the theory that explains why the problem under study exists and the conceptual framework that outlines the specific direction by which this research has been undertaken. Chapter four elucidates the details of the research methodology of this dissertation work. In general, it describes and summarizes the study area, research design, sampling design and technique, data collection and

methods of analysis. The succeeding chapters present the findings of the research, each chapter corresponding to one of the four specific objectives. These chapters are structured much like academic papers in that they present the research findings and analysis, and discussions supported with relevant theory and literature when necessary.

Chapter five presents the governance assessment results of the Middle Awash Afar SES. It provides an overview and description of the identity of the governance system and the SES of Middle Awash Afar. It also presents the indicator based assessment results, such as assessment of the governance processes, assessment of the governance capacities, and assessment of the governance outcomes. Chapter six depicts the findings of institutional governance dynamics and the capacity to influence resilience. The subsequent sections explain the existing traditional leaderships and governance transitions along regime change. The rest two parts present the analysis of factors influencing resilience from within the system and out-side the system. That focuses on the social and institutional dimensions and certain attributes of governance functions.

Chapter seven considers the analysis of land use land cover (LULC) Change using Data generated through GIS techniques and discusses its impact on the governance of rangelands in the Middle Awash Valley. Chapter eight presents the analysis and discussion of the assessment results of participation of pastoralists in local level decision-making processes in the context of SES framework for adaptive rangeland decision-making. The remaining chapter nine and ten provide summary, conclusion and recommendation, and list of references used respectively.

2. REVIEW OF LITERATURES

2.1 Concepts and Definitions

The intent of this sub-topic is not to provide an in-depth explanations or definitions of the under mentioned concepts but to provide a cursory overview, to refresh the readers of this document with the key concepts that are used throughout this research work.

2.1.1 Institutions, Governance, and Adaptive Rangeland Governance

Communally owned rangelands like any other common property resource regimes share two basic characteristics, such as excludability and subtractability (Ostrom et al., 2014). Hence, exclusion of unauthorized users and ensuring the rights of legitimate users to subtract their fare-share necessitate the need for having customary or statutory forms of enforcement mechanisms that enable rangelands to be managed on a sustainable basis.

These customary or statutory norms or rules enforcement mechanism are named as institution with a set of arrangements that define the conditions of access to, and control over a range of benefits arising from communally used and collectively managed natural resources. Based on this conceptualization of common property regimes, substantial works have been undertaken by many researchers, such as the development of the original design principles set by (Ostrom, 2010).Particularly, it emphasizes on issues of understanding the “rules of the game” enabling access to and management of resources (Ostrom et al., 2014). These principles also have been instrumental in thinking about the development of multi-level governance to support natural resource management (Briske et al., 2017).

Therefore, in this study, institutions are defined as established organizations or norms with sets of arrangements and defined responsibilities for overseeing access to, use and management of natural resources (Bennett et al., 2013). Owing to the fact that rangeland regimes generally consist of diverse institutional arrangements that could be translated into grazing and water use rights, rules enforced by customary authorities, and self-organizing social institutions (Ostrom et al., 2014).

In this vein, governance could be understood as a multi-dimensional concept that has several meanings, a range of elements and contexts. Hence, for this research, the

definition of governance set by IUCN Social Policy Program was selected for its clarity and specificity on the governance of rangelands. It could be read as, “Governance is the norms, institutions and processes that determine how power and responsibilities are exercised, how decisions are taken, and how citizens participate in the management of natural resources" (IUCN, 2009). Explicitly, defined as the interactions among structures, processes, rules, norms and traditions that determine how people in societies make decisions and share power, and exercise responsibility and ensure accountability.

Besides, the growing number of failed governance attempts to deliver efficient, reliable, and optimal ecosystem goods and services has led to the call for more adaptive governance regimes capable of dealing with the inherent complexity and uncertainty of SES (Briske et al., 2017). Adaptive governance is thus a continuous problem solving process (Plummer and Armitage, 2007) by which institutional arrangements and ecological knowledge are tested in a dynamic and self-organized process of learning by doing (Folke et al., 2005). This approach suggests a fundamental paradigm shift from a linear understanding of SES for controlling its variables to understanding the dynamics of the complex SES (Ruhl, 2011). The adaptive governance approach gets dominance over the other in dealing with the governance of rangeland (Green et al., 2015). This is mainly for its promises to deal with uncertainty, participation, institutional arrangements, collective learning, and social networks (Huitema et al., 2009).

It is also very important to note that there exists a clear distinction between government and governance. In that government refers to the organization, while governance is a set of social functions which can be performed by the government but also by a variety of organizations and other actors, and by networks, institutions, norms and values working individually or in combination (Raik and Decker, 2007). A framework for assessing governance therefore must encompass both the social functions that are being carried out and the processes and means by which those functions are carried out.

2.1.2 Social-Ecological System and Resilience

Over the past twenty-five years, science has witnessed an ontological shift in understanding human-nature relationships. Years after (Fikret Berkes and Carl Folke, 1998) introduced the concept SES scholars have started to use SES to refer to linked

system of people and nature. The term emphasizes that humans must be seen as a part of, not apart from nature that the delineation between SES is artificial and arbitrary. Scholars have also used concepts like socio-environmental systems and coupled human-natural systems. Both refer to a backlash against the features that were common in past scientific studies. The current version of SES signifies the re-integration of thinking about studying humans as an integral part of the biophysical world. The studies of SES also have increasingly focused on interdisciplinary in its approach that have changed scientific perspectives from narrow, reductionist views to a more holistic type of questioning and problem-solving. The other most important shift is SES approaches moved away from the past traditional equilibrium-based models of disciplines such as economics and ecology towards a more dynamic and non-equilibrium based analysis (Briske et al., 2017).

Both the ecological system and the social system are considered complex systems in themselves, and their interactions contribute further to making these systems more complex (Berkes et al., 2003). Complexity was described by (Gunderson et al., 2002), as the variety of structures and processes that occur within a system. For example, any attempt to manage one part of natural resource would cause surrounding resources to adapt around this management intervention. This event possibly would change the performance of the whole ecosystem and eventually affect people thereby the SES will adapt to the change. Hence, SES is not only complex, but also resilient and shaped by changes or disturbances that make it both complex and resilient (Briske et al., 2017).

Therefore, in order to understand and respond to the dynamics of these complex systems, resilience perspective has emerged, which focuses on the complex relationships between ecosystem and social dynamics (Folke, 2006). It includes systems thinking, and the systems thinking provide a framework for viewing SES as one system continually adapting through cycles of change (Walker & Salt, 2006).Hence, resilience has been defined as the capacity of a system to absorb disturbance and reorganize while undergoing change, but retain its essential function, structure, identity, and feedbacks (Walker and Salt, 2006). SES literatures argue resilience as a useful characteristic that determines the health of the ecosystem and the degree to which the system builds its capacity to learn and adapt.

2.2 Theoretical Debate on the Pastoral Commons

Much of the past and present day practices, research outcomes, and policy interventions have been influenced by the theoretical understandings, and academic discourses and debates. Thus, below are the major academic debates and discourses that most influenced the governance of the pastoral commons all over the world and shaped most of the outcomes as well as repercussions of institutional changes.

2.2.1 Rethinking the Tragedy of Commons

The 'commons' include natural resources such as pastureland, wetland, forest, irrigation water and fishery. These by their physical nature are not owned by individuals but are shared by group of users, such as for example, pastoralists in rangelands. Over the period between 1954 and 1968 scholars developed a number of models regarding the commons, till Hardin's landmark work had been published. Hardin's influential article published in Science on the *"Tragedy of the Commons*" is one of the most often cited scientific papers written in the second half of the twentieth century. The article paves the way for scholarly extensive debates on communally owned and used resources.

Hardin's assumption in developing the theory was pasture open to all, based on metaphor in a small village found in England. His analysis was alarmed by the untapped rapid population growth of the village and the assertion that each herdsman will try to keep as many cattle as possible on the common. He suggests that as utility maximizing individual, each herdsman seeks to maximize his gain by adding more animals. However, this utility creates overgrazing by one more animal in order to increase the profit by one animal. Therefore, each herder strives to maximize his profit margin from adding additional animals while the costs are shared among other users. As a result, each and every rational herdsman sharing the commons concludes that the only sensible course for him to pursue livestock herding is to add other animals, therein, lays the tragedy of commons (Hardin, 1968). Based on this assumption Hardin concluded that the commons have come to imply inevitable resource degradation and freedom of commons brings ruin to all since the benefits accrue to individuals while the costs are collectively shared.

To avoid this tragedy of the commons Hardin suggested two collective solutions. These are either privatization or government control as a solution to which rights to entry and use could be allocated. Then, the major policy innovations of many governments of this era were influenced by Hardin's recommendation. Through which they legislatively transferred resource ownerships from their previous property rights regimes to government ownership (Campbell et al., 1986). Conversely, empirical research since 1968 has shown that the transfer of property rights were sometimes disastrous for the resources they were intended to protect instead of improving (Ostrom et al., 2007). For instance, the rejection of existing indigenous institutions coupled with weak capacity of the government to monitor resource boundaries and harvesting practices led to the *de facto* open access conditions (Ostrom, 1990). Therefore, one of the two recommendations that government ownership was a universally applicable solution to the tragedy was seriously challenged by these historical experiences. However, the decline of the commons system was the result of a variety of factors having little to do with Herdin's suggestion (Ostrom, 1990). Some of these factors were widespread abuse of the rules governing the commons.

Therefore, the communal system is not an example of an inherently flawed land use system as is widely supposed by Hardin but of a policy which succeeded admirably in its time (NRC, 2002). The theorists on common pool resources also often take their point of departure in criticizing Hardin's notion of "*the tragedy of the commons*" that proposed common property arrangements would bring ruin to all (Hardin, 1968). However, an important contribution developed in the common pool resource literature is that individuals can create institutional arrangements that can provide the mechanism whereby individuals can transcend and overcome tragedy of the commons situations. It also has been proved that not all common property resources are subject to such a 'tragedy' and was not overexploited (Ostrom, 1990).

Later on, scholars such as (Ostrom, 1990) after analyzing different situations of common property resources, come up with the idea of rejecting the simple one-to-one relationship between property rights regime and outcome postulated by Hardin. They also identified that Hardin's thesis overlooked the important role of traditional institutional arrangements that provide for exclusion and regulation of use, and undermine the capacity of the people to construct and enforce rules and norms that

constrain the behavior of individuals. In this connection, the other major drawback identified was what Hardin described is not a common at all but what is nowadays called an unmanaged CPR (Hyde, 2010). Besides, empirical studies on sustainable resource management indicated that more solutions exist than Hardin suggested and several recent volumes summarize a growing and rich body of evidence relevant to common property resource governance (Ostrom et al., 1990).

Hence, the wrong assumption and suggestion of Hardin's thesis particularly its ramification on the governance of pastoral commons has led to the development of the anti-thesis to the tragedy thesis. Hardin's thesis has also been challenged by institutional writers who emphasized the wider effectiveness of self-regulating common pool resource institutions (Agrawal et al., 2001). To this end, Ostrom's influential work, posited eight design principles that are displayed by successful common pool resource institutions (table 1).Scholars of reflexive institutionalism also challenged the tragedy of commons thesis by emphasizing the robustness of collective management institutions and their capacity to influence actors' behavior.

2.2.2 Collective Action and Actors in the Governance of Communal Rangelands

Recent scholars have found that collective action can be harnessed to sustainably manage common property resources, contrary to the longstanding hypotheses that without effective external regulation and privatization members will intentionally overgraze the land in an attempt to collect the resource before some other user manages to do so (Hardin, 1968). This scenario has been highly influential in policymaking for common property resources at larger scales, often resulting in the establishment of highly centralized or privatized management systems (Ostrom, 1990). However, in the past decade empirical evidence has been forwarded that local user groups are capable of governing such resource collectively. Which is often considered as a prerequisite for the development of community based institutions and the devolution of authority that is deemed required to prevail from central to local (Ostrom, 1990).

Common property resources, however, are typically property held in common and managed collectively by a group of people (Gebremedhin et al., 2004).As such they are communally managed and may have rules and norms regarding access and withdrawal. Communal grazing as common property resource can include extensive tracts of land

upon which pastoralists migrate and smaller patches of land in a sedentary community (Bekure et al., 1991). Despite the type and size of communal grazing land, communities have the choice of either competing to appropriate as much of the resource as possible or collaborating through collective action to manage the resource (Gebremedhin et al., 2004). Ever since the publication of 'the tragedy of the commons', scholars have explored the determinants of collective action, discovering many cases in which societies are able to successfully manage common property resources (Agrawal, 2001).

Much of the previous analyses of the efficiency of natural resource governance have failed to recognize that resources often have multiple actors that comprises different (sub)-groups of users who are characterized by their resource harvesting systems. For example, the same grazing land can be used by hunter-gatherers, pastoralists, and firewood collectors and other stakeholders who directly or indirectly benefit from the ecosystem (Swallow et al., 2004). The authors further explained that some resource uses are complementary each other, others are competitive, most are somewhere in between. Some groups of resource users are mutually exclusive, others are overlapping, most are somewhere in between. In this regard, (Yayneshet and Treydte, 2015) indicate that communities differ in their ability to harness collective action to sustainably maintain communal resources. However, the successfulness of collective action depends on the behavior of actors that forgo short-term self-interest in favor of the longer-term group outcomes (Rudd, 2000).

Recently, commons' scholars pointed out that successful commons governance can be best achieved when: (i) use of resources can be monitored by community members; (ii) community members maintain direct communications and increase their trust of one another; (iii) outsiders can be excluded from using the resources at relatively low cost; (iv) users are able to monitor and enforce their collectively set agreements by themselves, and (v) internal and external changes affecting the resources stock such as economic and social factors are moderate(Ostrom, 2009). Hence, local institutions can play important roles, in achieving the sustainability of resources through setting boundaries that restrict resource use and rotational grazing pattern that allow resource regeneration. Besides, (Ostrom et al., 2014) in her empirical research into the management and governance of local common property resources had identified eight design principles underlying successful collective action and long term institutions.

Table 1: Design principles underlying successful long-term institutions

Design Principle	Explanation	Function
Clearly defined Boundaries	Individuals with rights to withdraw resource units from the CPR & boundaries of CPR are clearly defined	Enables participants to know who is in and who is out of a defined set of r/ships and thus with whom to cooperate
Congruence	Rules specifying the amount of resource products that a user is allocated are related to local conditions and to rules requiring labour, materials	Enables the local rules-in-use restrict the amount, timing, and technology and/or quantity of resource unit to be harvested
Collective choice Arrangements	Participation by all affected individuals in deciding on and modifying operational rules should be possible	Enables most individuals affected by res. regime participate in making & modifying their rules governing their commons
Monitoring	Either local users or persons accountable to the local user are responsible for monitoring the biophysical conditions and compliance with collective decisions	Enables users to keep an eye on resource conditions as well as on user behavior
Graduated sanction	Sanctions should be graduated to reflect the severity, frequency, and context of resource use violation depending on the seriousness and context of the offense	Enables users who violate rules-in-use are likely to receive graduated sanctions from other users, from officials accountable to these users, or from both
Conflict resolution Mechanisms	Low cost & readily available conflict resolution mechanisms must exist to mediate conflicts among resource users and between users and officials	Enables users and their officials have rapid access to low-cost, local arenas to resolve conflict among users or users & officials
Min. recognition of right to org.	Users must have recognition of their own rights to organize institutions	Enables users to devise their own inst. that are not challenged by external authorities, have long-term tenure rights to resource
Nested enterprise	Appropriation, monitoring enforcement, conflict resolution & gov't activities are organized in multiple layers of nested enterprises	Enables to understand governance activities that are organized in multiple layers of nested enterprises

Source: Based on (Ostrom 1990, 2009)

2.2.3 The Debate over Rotational Grazing and Pastoralists Adaptive Capacity

The other debating issue is whether traditional pastoralism is still a viable livelihood strategy or a fundamentally different livelihood system is needed, as it may no longer be feasible to restore sustainable pastoralist systems. In this regard rangeland scholars argue that pastoralism is a viable and the most prominent livelihood strategy to support life in harsh dryland ecosystem and to make best use of the patchily distributed rangeland resources. On the contrary (Sandford, 2006) argues against the former in that he promotes the idea of replacing pastoralism with other livelihood strategy that he believes feasible and superior over it such as sedentary mixed livestock-crop farming. (Briske, 2011) delve more into the nuances in this debate and they caution against concluding that reduced mobility necessarily implies the end of pastoralist systems.

Another issue relates to the collective capacity of pastoralists to adapt to climate change and other stressors. Some critics see pastoralist systems as weakened and fragile system on the verge of collapse that could not withstand and respond to the changing parameters of the SES, while others argue pastoralists are the most capable of adapting and responding to stressors such as climate change, given their ecologically informed patterns of resource use and the concomitant traditional institutions.

Besides, in an attempt to search for meaningful lessons out of the debate over the pros and cons of rotational grazing, the US rangeland professional forum examined the origin of the debate and major reasons for its persistence across decades. In that the forum recognized the rotational grazing debate persists because rangeland profession has not yet developed management and research frameworks capable of incorporating the social and biophysical components of complex adaptive systems. Hence, they recommend moving beyond the debate whether or not rotational grazing functions just by focusing on adaptive governance. That integrates practical knowledge as well as social and biophysical knowhow to provide a more comprehensive framework for the management of rangelands (Briske et al., 2011).

Generally, the 51 years since Hardin's essay have yielded new paradigm shifting perception of commons governance, many scholars have confirmed that the approaches employed to govern the pastoral commons in the global south still frequently fails. This is due to the struggle to dominate one another as well as the inadequacy of the knowledge base and its application or due to the phenomena outside the control of the governance institutions. In this course, the evolution of collective action and the rational choice theory of Ostrom have shade light to the contemporary understandings of common property resources and also framed the adaptive governance approaches that this research has chosen to follow.

2.3 Theoretical Insights and Empirical Evidences

This sub-section presents review of literatures both on the theoretical basis and empirical evidences demonstrated by previous scholars pertaining to the governance of rangeland SES, with a particular emphasis given to issues related to the objectives of this study.

2.3.1 Adaptive Governance of Rangeland Social-Ecological Systems

Adaptive governance is a concept from institutional theory that focuses on the evolution of formal (government) and informal institutions for the management and use of shared resources (Tamanaha, 2015), such as common pool natural resources and environmental assets that provide ecosystem services. The concept encompasses both the efficiency and adoptability of potential institutional arrangements, contributing to a clearer understanding of option for addressing different types of market and institutional failures (Ostrom, 2005). Although there is a general lack of consensus in how scholars have advanced adaptive governance, the concept has emerged from the amalgamation of the application of ecological systems theory to natural resource management and the study of self-governing institutions led by Elinor Ostrom (Hatfield-Dodds et. al., 2007).

Adaptive governance analyzes the different aspects that build up multilevel governance and how all these aspects help build resilience for the vast social and ecological challenges (Briske et al., 2011). Many scholars emphasize the need for new, flexible and integrated forms of governance that deal with uncertainty of the SES (Termeer et al., 2013). Hence, the adaptive governance literature deals with uncertainty, enhance learning and self-organization, and support cross-scale institutional linkages and participation as attributes of governance (Hurlbert and Diaz, 2013).

A systematic literature review of adaptive governance research conducted on the past two decades has revealed a vibrant debate on a variety of empirical and theoretical approaches (Karpouzoglou et al., 2016). In their review the authors identified that the particular strength of adaptive governance is that it provides a theoretical lens for research that combines the analyses of governance capacities. Such as adaptive capacity, scaling, knowledge and learning as well as addressing the complexity of broader social contexts within which people make decisions and share power (Briske et al., 2011). Besides, its practical applicability in recent years there has been rising operational and policy interest in the adaptive governance of SESs (Rijke et al., 2012) particularly, in areas where complex and persistent economic, social and climatic turbulence are common. Examples include distinct complex decision-making arenas, such as the governance of adaptation to climate change and natural hazards (Djalante et al., 2013) water governance (Cosens and Williams, 2012), and the governance of rangeland SES (Boyd and Svejcar, 2009).

The governance of rangeland SES in this case is a system of governance in an increasingly uncertain world that needs to be collaborative, flexible and addresses the inherent characteristics of dryland ecosystem (Boyd and Svejcar, 2009). Adaptive governance of rangeland SES is thus about connecting actors and institutions at multiple organizational levels to enable ecosystem stewardship in the face of uncertainty (Briske et al., 2017). These actors tend to be connected in social networks and can provide leadership and trust that help manage conflicts, anticipate and prepare for uncertainty and change (Boyd and Folke, 2012). Though it has a more explicit focus on preparing for surprise, the institutional prescriptions concerning polycentricity, experimentation, spatial fit and participation largely resonate with the theoretical and empirical insights from the traditional governance literature (Huitema et al., 2009).

(Boyd and Svejcar, 2009) learning from their extensive research ascertained that rangeland management is particularly well situated for the application of Adaptive governance as it has identifiable spatial management units (pastures), clear management objectives (pasture productivity), reducible uncertainties related to management impacts, and modeling system dynamics that can capture the uncertainties of the dryland ecosystems. Rangeland SES thus can be described as complex adaptive system that evolve through interaction between the social and natural sub-systems (Folke, 2006). It is also the interactions among the physical components, the governance system and the users of the rangeland ecosystem (Ostrom, 2009). Hence, changing conditions in the social and/or physical context of the SES influences the effectiveness of the governance system to serve specific purpose, for example, rangeland productivity.

2.3.2 Adaptive Governance and the Collective Capacity to Influence Resilience

The sustainability of rangelands development that are characterized by uncertainties and change of the ecological landscape and social organization can be usefully explored through the lens of resilience. In this case exploring resilience means exploring the capacity of the system to cope and adapt, and the conservation of sources of innovation and renewal (Lebel et al., 2006). However, interventions in SES with the aim of influencing resilience directly deal with issues of governance for instance, the investigation of who decides, what should be made resilient to what, for whom is resilience to be managed, and for what purpose (Lebel et al., 2006).

The kinds of governance attributes that are explored through the lens of resilience are those considered to be part of good governance of the social-ecological systems, including credibility, accountability, legitimacy, participation, deliberation, empowerment, social justice, and organizational features such as being multilayered and polycentric (Ostorm, 2010). In this vein, governance could be understood as the structures and processes by which societies share power, shape individual and collective actions (Robinson, 2011), including rules, regulations, negotiation, conflict resolutions, and other decision-making processes that ensures sustainability through participation.

These governance attributes manage resilience of the SES through building capacities of the system for self-organization, adaptation, and learning. For example, participation builds trust and deliberation leads to the shared understanding needed to mobilize and self-organize (Ostrom, 2010). Institutional arrangements having multiple Centre of authority (polycentric) and different layers (multilayered) contribute to the adaptive capacity by improving the fit between knowledge, action, and the condition of the SES in ways that allow societies to respond adaptively at appropriate levels (Lebel et al., 2006). Authorities who earn their legitimacy through discursive means, questionable and pursue just distributions of benefits and involuntary risks (accountable) enhance the adaptive capacity of vulnerable groups and society as a whole.

Therefore, the capacity of the society to manage resilience through self-organization, adaptation, and learning generally resides in actors' behavior, their social networks and institutions (Armitage, 2009). The capacity for self-organization means that a system has ways to maintain and re-create its identity, able to buffer the impacts of other systems, and persist by itself (Holling, 2001). The ability to learn and adapt implies that a system can get better at pursuing a particular set of management objectives over time and adapt when the context changes (Folke et al., 2005). The capacity to cope with uncertainty requires readiness to learning, an anticipation of changes, and the ability to accommodate interventions as experiments for adaptive management (Armitage, 2009).

Empirically, in an effort to identify factors influencing resilience different authors have begun to investigate the elements that comprise adaptive capacity. For example, in considering collective action in relation to CBNRM identified three main elements that are important to build adaptive capacity. These are capabilities (competency and skill

sets), focus (clear goals and direction), and willpower (attitudes, views and commitment to CBNRM). Another authors also hypothesized that the capacity to influence resilience is primarily determined by the absolute and relative amounts of social and natural capitals, and dictated by the prevailing institutions and governance systems (Walker et al., 2006). Furthermore (Briske et al., 2017) suggested that cross-scale and cross-level linkages are important element of the adaptive capacity. Moreover, (Folk, 2006) suggested that among other things the most prominent concept in the literature on social-ecological resilience is that neither social systems nor ecological systems can be adequately understood without understanding the linkages between them. Another authors identified the kind of social phenomena that contribute to the resilience of the SES. In that (Adger, 2010) noted that persistence and sustainability of institutions while (Berkes et al., 2009) identified social and institutional memory. (Folke et al., 2003) added that resilience is enabled by diversity of institutions and livelihood options, and diversity of types of natural resources that an economy relies upon.

In addition to the resilience of the SES the other very important features of the adaptive governance of rangelands are the nature and dynamics of its biophysical components, and the adaptive decision-making processes. Understanding the interactions between different actors (users' system) including their participation, and the resources system including the rangeland dynamics are fundamental to govern rangelands sustainably. The following section presents review of related literatures of these rangeland dynamics particularly land use land cover change, and the engagement of the main actors (pastoralists) in adaptive decision-making processes.

2.3.3 Adaptive Rangeland Decision-Making

The complexity of natural resource management in rangelands is increasingly recognized and requires adaptive decision-making at different levels (Claassen, 2011). In recognition to the complexity of the system, thus recent scholarship has begun to identify factors of critical importance in adaptive rangeland decision-making that relate to the structures and processes of participation. This involves institutions at various levels, approaches to decision-making, and ways in which the main actors of rangelands at various levels are involved in decision-making processes. Likewise, (Lubell et. al., 2013) identified key factors contributing to participation of pastoralists in adaptive decision-making processes.

Moreover, (Lubell et. al., 2013) suggested that deliberative participation by pastoralists could allow them to influence decision-making and enable problem solving to generate legitimate, adaptive and resilient solutions. Another author suggested that participation could strengthen both the effectiveness and the acceptability of public decision-making and will contribute to overall pastoralist empowerment (Fauchald, 2012). Participation can also help pastoralists to assume greater responsibility over their land and natural resources. Increasing participation also recognizes the role of pastoralists as stewards of natural resources and effectively governs and manages those resources (Falleth, 2009). This could include the responsibility to maintain and protect governance regimes and to ensure fairness distribution of benefits from pastoral land within the community.

According to (Pearson and Gorman, 2010) participation in decision-making aims at making the best uses of land resources through negotiations between different interests, based on equity, efficiency and sustainability. Thus, pastoralists' participation at different levels of decision-making activities such as planning, implementation, monitoring, and contributing in decision-making processes is regarded as the pillars of sound rangeland governance practices. Another author stated that genuine decentralization involving devolution of political and administrative control to the lowest levels of governance, whereby local authorities have the mandate to formulate by-laws and operational plans for their respective areas within the overall national policy frameworks could enhance participation.

The same author further suggested that the decentralization processes provide for more active participation of local communities in decision-making that directly impact their lives and livelihoods as well as provides opportunities for District authorities to respond more effectively to the felt needs and priorities of their constituents. Besides, (Fekadu, 2010) suggests that though policy and legislation promote participation of all stakeholders, rangeland users remain a significant minority in practice. Policy and legislation also fail to pay sufficient attention to traditional management mechanisms and actively seek to override them, weakening their strengths and effectiveness and introducing harsh and punitive rules and regulations.

A case in Uganda also revealed that many pastoralists are not aware of the importance of playing a role in decision-making activities, for instance, the author learnt that

pastoralists have even elected agriculturalists in order to relieve themselves of the burden of attending meeting instead of taking care of their herds (Tenga et al., 2008). Plus, (Lubell et. al., 2013) suggested the use of adaptive decision-making framework that entails moving from a situation of lack of awareness to making concrete choices among known options. This is consistent with the overall decision-making process that involves experiential learning along with the development of heuristics (Lubell et. al., 2013) and place based expertise (Briske et al., 2017) that function to guide decisions.(Brunson, 2012) also suggested that rangeland management programs in SES context are best understood using an adaptive decision-making framework which emphasizes how the sustainability of herding operations depends on their collective capacity to adapt to the changing parameters of SES. As rangeland governance is part of the portfolio of management strategies that pastoralists employ to achieve their goals and manage risk in the face of uncertainty and complexity (McAllister et al., 2009).

Nowadays, according to (Briske, 2011) adaptive rangeland management programs are playing larger roles than they have in the recent past as strategies for helping pastoralists adapt to the dynamics of complex rangeland systems. This reflects a growing awareness of the idea of ecosystem services among diverse set of rangeland management stakeholders, including range scientists, environmental groups, government officials and pastoralists in developed countries (Briske et al., 2011). However, the awareness is at its steady stage in developing countries particularly in sub-Saharan Africa. For example, the complex rangelands of the Middle Awash Afar SES have been traditionally managed by indigenous Afar people using their own institutions with much external interventions and internal challenges which significantly affected the rangeland SES and the collective capacity of pastoralists and their institutions (Robinson et al., 2014).

2.3.4 Land use/cover Change and Rangeland Governance Activities

Land use land cover dynamics are parts of the environmental change and affect ecosystem processes and services worldwide (Msoffe et al., 2011) that are caused by various socio-economic and biophysical drivers. In pastoral systems, the major causes of change might fall into two lines of reasoning such as, land fragmentation and reduced access that are caused by factors including changes in land tenure systems, population growth and in/out migration, infrastructure development, agricultural

policies, agricultural expansion and intensification, and changes in legal and political institutions (Reid et al., 2014). Secondly, it is attributed to climate change and variability that alter vegetation and water access in arid and semi-arid areas thereby forcing changes in the climate dependent production system (Scholes et al., 2018).

(Groom and Western, 2013) also suggested that sedentarization of pastoralists and range fragmentation due to changing land tenure policies have led to restricted livestock mobility resulting in all season grazing that exerts pressure in certain grazing patches thereby leading to range degradation. Livestock loss due to factors such as declining land productivity, shrinkage of grazing areas, restricted movements, and the recurrent droughts has resulted in increased poverty and vulnerability of pastoral households and erosion of their resilience to future shocks (Moyo et al. 2013). In this connection, (Moyo et al. 2013) added that many factors could have impact on pastoralist decisions to the use and preface of rangelands. These further imply changes in vegetation cover and disruptions of the traditional governance systems and institutional arrangements such as for example mobility and land use flexibility (Reid et al., 2014).

Nowadays, major LULC changes have been observed in Afar rangelands due to invasion of *P. Juliflora* (Shiferaw et al., 2019).This significantly affected biodiversity and ecosystem services (Vilà and Hulme, 2017), thereby, it impairs the rangeland governance institutions and the overall livelihood activities of pastoralists (Haregeweyn et al., 2013). To this end, many authors suggested that LULC changes including invasion of *P. juliflora* significantly affect pastoralism in East Africa where the rangeland cover more than half of the total land surface area and support extensive livestock production (Nkedianye et al.,2011; Bekele and Kebede, 2014). Likewise, (Berhanu and Beyene, 2015) explained that the dominant pastoral livelihood strategy of this region that are characterized by herd mobility on and patchily distributed pasture and water has been severely affected by LULC changes and its consequences.

Likewise, since 1970s, in Ethiopia particularly on the rangelands of Middle Awash SES, major changes have been observed (Tsegaye et al., 2010; Haregeweyn et al., 2013). In that the long-term changes include declining proportions of grazing reserves, indigenous woody vegetation, and water availability (Tefera, 2014). These dynamics in turn created negative impact on pastoral livelihood in the Middle Awash SES (Almaz

and Coppock, 2015). These resource dynamics also have consequently impacted on livestock assets which traditionally provide food and cash income and serves as sources of pride in the society.

Another author also argued that LULC changes have significant impact on the governance of rangelands given that pastoralism is a system of managing livestock and rangelands for economic gain and ecological sustainability with their culture inseparable from their production and governance systems (Allen et al., 2011). In extending this argument the (Tefera, 2014) has revealed that pastoral land use is, to a large extent, an adaptation to ecological and climate variability that utilizes natural vegetation covers. However, due to external factors particularly socio-economic and political pressures, these rangelands are obliged to include cropland and other non-pastoral land covers types (Davies et al., 2016).

On the other hand, (Braat and Groot, 2012) suggested that decisions regarding the future use of ecosystems need to consider the aggregate costs and benefits to meet the welfare of the current and future generations. This indicates that an effort in sustaining the ecosystem service requires an understanding of the SES and the dynamics of the link between human activities and the ecosystem we rely on (Braat and Groot, 2012). Therefore, understanding the ecosystem services of a given SES and their spatial dynamics could contribute towards considering ecosystem services for policy goals and designing appropriate governance and institutional frameworks (Niquisse et al., 2017).

3. CONCEPTUAL FRAMEWORKS OF THE STUDY

The conceptual framework used for this thesis has been developed based on the SES framework that is originally developed by (Ostrom, 2009) and integrated with the adaptive decision-making framework of (Lubell et al., 2013) as explained bellow.

3.1 Conceptual Underpinnings and Rationale for Applying the Framework

The fundamental misunderstandings of past polices regarding rangeland resource issues necessitate fundamental change in thinking and practice of rangeland governance (Ostrom, 2009). These misunderstanding were partly emanated from the assumption that human-nature interfaces are linear, controllable and can be managed independently (Holling et al., 2002). However, recent research findings suggested that natural and social systems exhibit marked differences in their thresholds and behave in nonlinear ways in a given SES that are coupled and complex systems (Folke, 2007). That is why in the previous decades there has been growing interest in the governance of complex sustainability issues and hence, adaptive governance of SES has evolved as analytical framework for understanding natural resource governance (Briske et al., 2017).

Adaptive governance of SES is a new mode of governance that connects multiple actors and institutions at different organizational levels to enable ecosystem governance in the face of uncertainty (Hurlbert & Diaz, 2013). The institutional prescriptions concerning polycentricism, participation, learning and spatial fit largely resonate with the theoretical and empirical insights from the traditional governance literature (Huitema et al., 2009). In this connection, (Briske et al., 2017) argue that adaptive governance is a leading approach to successfully meet the challenges of changes in rangeland SES by fostering effective management and use of shared assets that provide ecosystem services. Others delve the harmonizing community based and government institutions that work together in adaptive governance to improve the management of natural resources (Nelson et al., 2008).

To this end, varieties of factors operating in various contextual issues influence adaptive governance through the promotion of adaptive institutions. These as illustrated in the framework diagram include polycentric systems, informal networks, social

capital, learning and adaptation, leadership, conflict resolution, nested and variety of institutions, knowledge base and stakeholders' participation. In this regard, (Foerster, 2011) indicates that for adaptive governance to properly work it needs adaptive institutions as its main integral part. Since adaptive institutions are necessary to move towards sustainability outcomes and make the governance system to cope with uncertainty and complexity.

Since the research focuses on the governance of rangelands SES, the adaptive decision making framework and the SES framework to be integrated and used are the most appropriate framework. The framework can be used for assessing the capacity of the governance system to influence resilience. It is also used for evaluating the processes, capacities and outcomes of the governance system, as well as for analyzing stakeholder participation and LULC dynamics. This is mainly due to the fact that the framework integrates existing theories of adaptive decision-making and NRM activates. In addition to these, the appropriateness of the framework is due to having a rich conceptual approach in addressing the above mentioned concepts (Lubell et al., 2013).

3.2 Application of the Framework for SES Governance of Rangelands

To analyze the governance of rangeland SES, a range of interdisciplinary frameworks exists that provide different perspectives and emphasizes on the characteristics of the SES. Thus, for this adaptive rangeland governance research, the SES framework emphasizing self-organization (Ostrom et al., 2014) and adaptive decision-making framework (Lubell et al., 2013) were adopted and modified to fit into the actual situation of the study area. The self-organization or Ostrom's SES framework was chosen because of its implicit focus on the analysis of governance institution (Poteete et. al., 2010).It is also due to its proposition of a set of workable variables that have a direct bearing on the governance of pastoral commons. Moreover, the framework allows for the analysis of different degrees of specificity due to its nested conceptualization in different tiers (Binder et al., 2013).In this case; it is also used to guide analysis on the capacity of the governance system to influence social-ecological resilience. Generally, for the highest level of analysis (Ostrom et al., 2014) proposed to include four sub-systems embedded in a broader social, ecological and political settings. Such as, the governance system (GS) and the managers (pastoral) system (PS)

entailed within the social compartment. The ecological compartment entails the resource system (RS) and the resource units (RU) with the interaction of these sub-systems (I) at various spatial and temporal scales to produce outcomes (O).

In the course of developing the framework for this work the original framework of Ostrom has been amended. For example, users were changed into managers in order to reflect the realities of resource use and governance of the pastoral system in the study area. The other modification is on the key explanatory variables used for the analysis of this dissertation. Another major amendment made in the development of this framework is the integration of the adaptive decision-making framework. This is mainly incorporated to guide the analysis of pastoralists' participation in decision-making spaces in the context of a social-ecological framework. The other bold reason for the integration is due to the fact that rangeland management activities are best understood by employing an adaptive decision-making framework. It also emphasizes how the sustainability of herding operations depends on the capacity of pastoralists to adapt to the changing parameters of the SES in which their resource systems and livelihoods are depending on (Brunson, 2012).

The adaptive decision making framework integrates theory of agricultural decision-making (Diffusion theory) and theory of planned behavior (Sorice et al., 2011). Diffusion theory treats pastoralists as rational actors, who depend on social networks to acquire information about the costs and benefits of various management strategies and practices. The theory of planned behavior analyzes the link between management goals and practices. Including the amount of control pastoralists have over decisions and how social values affect goal formation. The framework argues that economics, psychology, and social networks operate simultaneously as components of the SES. In addition, it addresses the importance of time horizons in affecting how pastoralists think about adapting their management strategies (Lubell et al., 2013).

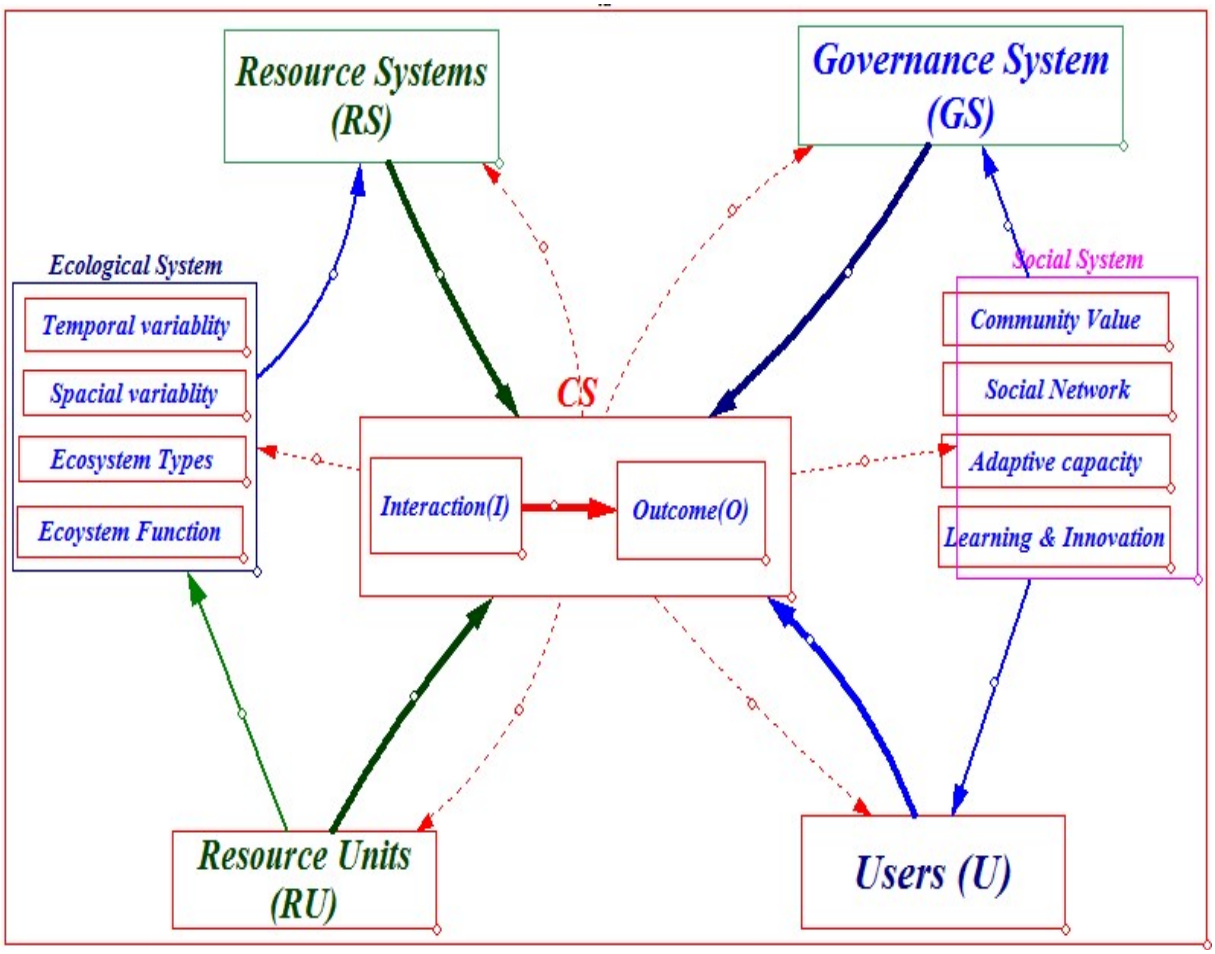
3.3 Applying the Framework to the Context of the Study Area

Like any other communally owned and collectively managed resources the governance of rangelands of the Middle Awash Afar SES is analyzed based on the general framework for analyzing SES. The modified framework characterizes and analyzes the adaptive rangeland governance system based on the following building blocks or

subsystems. Accordingly, pastoralists are considered as the main actors (Managers).Their relationship with the resource systems and units, and the local governance system are considered as Interaction. In this study the resource system consists of water sources, vegetation covers, livestock, built up areas, and productivity of the system. The resource unit includes mobility, pasture regeneration rates, interaction among resource units, economic value, and spatial and temporal distribution of resources. The governance systems include the collective identities of the system, such as government organizations, traditional governance institutions, network structure, property rights systems, traditional and constitutional rules, monitoring and sanctioning processes.

Moreover, generally, the SES encompasses the social system and the ecological system which overlap with the above mentioned subsystems. The social components include economic forces, public policies, community values, and social networks that connect pastoralists to other actors. The ecological system includes spatial and temporal variability of pasture and water that affect the health and productivity of rangelands. The dynamics of these SES parameters vary over space and time, operate at multiple spatial scales and feature high levels of uncertainty (Ostrom et al., 2014). The SES and its functions are influenced by external societal and environmental factors such as government policies, climate variability and invasion of rangelands with invasive alien species. Since the area is identified as the major commercial agriculture production and expansion sites of the country, pastoral livelihoods and their traditional rangeland governance practices are highly influenced by government policies and strategies.

Figure 1: Analytical Framework of the Study



Note: The Brocken line indicates the feedbacks and the arrows indicate direct causal loop.

Source: (Lubell et al., 2013; Ostrom et al., 2014)

4. METHODOOGY

4.1 Description of the Study Area

The study was conducted in Afar National Regional State, Ethiopia. Afar National Regional State is one of the nine administrative regions in Ethiopia and comprises five administrative zones, 32 Administrative Districts (Woreda), 28 towns, and 401 Rural and Urban Sub-Districts (Kebele). Geographically, the Afar Regional State is located in the north-eastern part of the country. The total geographical area of the Region is about 270,000 km^2 (CSA, 2007). It is geographically located between $39^o34'$ and $42^o28'$ East Longitude and $8^049'$ and $14^030'$ North Latitude.

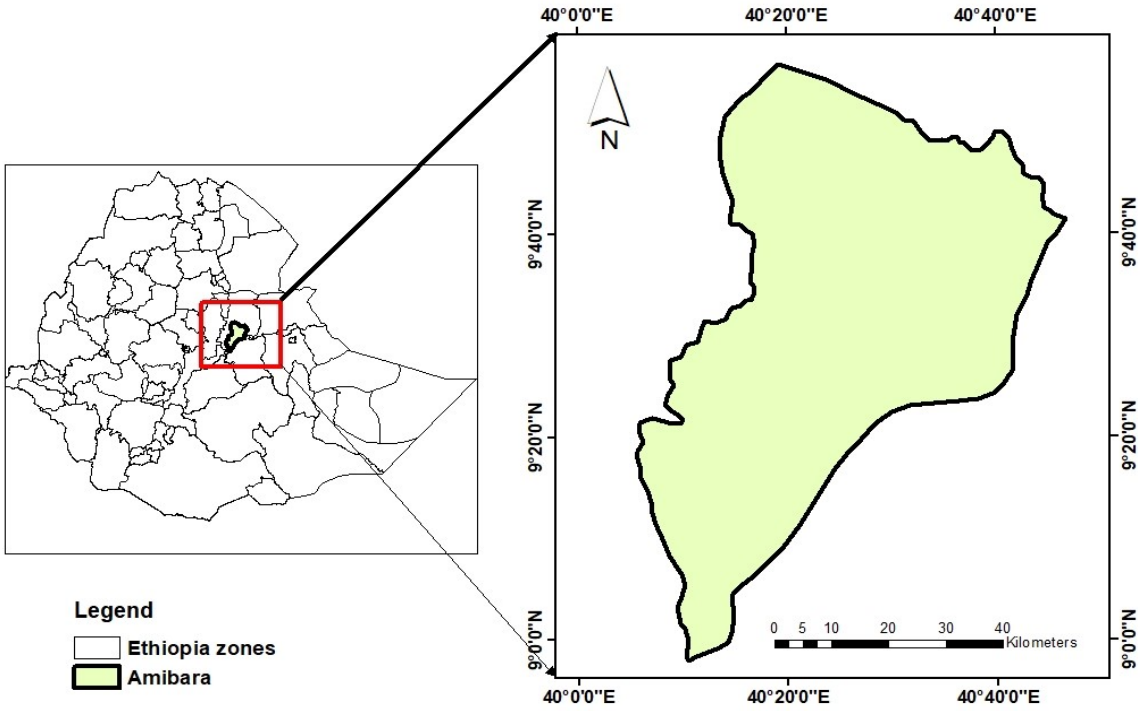
The Region shares common international boundaries with the State of Eritrea in the Northeast and Djibouti in the East, as well as Regional boundaries with the Regional States of Tigray in the North-west, Amhara in the South-west, Oromia in the South and Somali in the South-east. Semera is the capital of the Region, which is located at 435 km north east from the capital Addis Ababa. The altitude varies from 116 meters below sea level (Danakil depression) to 1600 meters above sea level while the average annual rainfall registered for 11 years was 187.9mm having erratic and uneven pattern of distribution. Average temperature ranges from 25^0Cduring the dry season (September-March) to48^0C during the rainy season (March-September).

More specifically, the study area encompasses the Allideghi grassland ecosystem and the Awash riverine ecosystem which in combination form a coupled social-ecological systems of the Middle Awash Afar. Administratively, these SES mainly fall under Amibara District of zone 3. The District is bordered on the South by Awash Fentale, on the West by the Awash River, on the Northwest by Administrative Zone 5, on the North by Gewane, on the East and South-east by the Somali Region and Oromia Region respectively. Towns in Amibara include Awash-Arba, Awash-Sheleko, Melka-Sedi and Melka-Were.

As of the (CSA, 2007) census, the District has a total population of 63,378, of whom 32,086 are urban and 31,194 are rural dwellers. The District has a total area of 2,008 square kilometers with a population density of 31.58 person/km and an average number of 4.6 persons per a household. Muslim is the dominant Religion (68.86%) followed by

Orthodox Christians (21.2%) and Protestants 9.18%.Agro-ecologically, the District falls under the general category of (Semi)-arid with average annual rainfall of 360mm, a temperature between 25 and 35^0c, and the altitude ranging from 720 to 1100meter above sea level. Pastoralism is the mainstay of people's livelihood although agro-pastoralism, petty-trade, and employment are also practiced.

Figure 2: Map of the Study Area



4.2 Sources and Methods of Data Collection

Both primary (Household data, focus group discussion, key informants interview and own observations) and secondary data (including journal articles, books, reports, newsletters, policy and other relevant documents) were used. Structured, semi-structured questioners and PRA techniques were used as methods of data collection. The key informants were mainly selected from elderly pastoralists, clan leaders and experts working at zonal and District level. In order to guide the semi-structured interview and the discussion, and capture the views of the respondents checklists were developed. Structured questionnaires were also developed and administered to individual household representatives using Open Data Kit (ODK). Local development agents who are knowledgeable about the study area and fluent in Afar language were selected and trained to conduct the surveying work.

4.3 Sample Size and Sampling Technique

Multi-stage sampling technique was used. First, Sample District was selected from among the five Zones of the Region purposively. Second representative Kebele from the sample District were selected, each Kebele representing pastoralists. Third, sample households were identified from the list available at each Kebele using simple random sampling techniques. A total of 210 samples, 24 key informants and 4 focus group discussions (FGD) were conducted. The total sample size for the survey questioners were determined based on the actual field condition and distributed to each sample Kebele with probability proportionate to the number of households in each Kebele. Specifically, for the quantitative data the size of samples was determined by using the formula developed by (Cochran, 1977). This is mathematically presented as;

$$n = z^2(p*q)/e^2$$

Where n is the sample size, z is the standard error associated with the chosen level of confidence (90%), p is estimated proportion in the population, q is equals to (100 – p), and e is acceptable error. Therefore, n is the total number of samples collected from the five selected Kebele as shown in the following table.

Table 2: sample frame and sampling size

S.No	Sample Kebele	Household No (N)	Samples taken (n)
1	Allideghi	443	38
2	Andido	438	37
3	Angelele	534	45
4	bediluale	650	54
5	Kala'at Burri	408	36
	Total Number of sample HHs taken		**210**

4.4 Methods of Data Analysis

After the data has been collected and organized into an appropriate form; case study methods, descriptive statistics and econometric modeling were used for the analysis. Remote sensing methods of data Collection and analysis and governance assessment framework were also used. More specifically: -

4.4.1 Case Study Method

The case study method was mainly employed to summarize the social and institutional issues affecting the capacity of pastoralists to influence social-ecological resilience. It was also employed to assess the governance system of the study area. This includes a range of customary institutions and government mechanisms for planning and decision-making and to reveal the patterns of coordination and communication between them.

4.4.2 Governance Assessment Framework

The research primarily employed case study methods conducted in the Middle Awash Afar SES during the period of August 2017 to May 2018 to assess the governance system of the Middle Awash Afar SES. A governance assessment framework (GAF) developed by ILRI was used in order to shape the qualitative data collected through group discussions and key informant interviews. The GAF was also used in order to facilitate both the data collection and analysis work (Robinson, 2015).

The GAF Particularly helps to characterize and analyze the governance systems and the kind of governance frameworks and institutional structures that are in place, and to characterize the SES of the study area. Accordingly, three focus group discussions were carried out that mainly forwarded question on four of the eight descriptive questions. Such as; (1) Characterizing the SES; (2) Identifying priorities (objectives & interests of the people) and values of the stakeholders; (3) characterizing the governance system (key mechanisms and strategies used for governance, and key decisions being made that affect the SES). Generally, the GAF employed eight descriptive questions to describe the identity of the SES and the governance system. In order to assess the governance processes, capacities and outcomes sixteen evaluative indicators were used (Robinson, 2015). Scores of "1", "2", "3" or "4" were given for each evaluative indicators based on normative justifications of governance assessment frameworks and criteria set.

To represent the diversity of possible viewpoints of participants selected from different groups, particularly, to ensure that different stakeholder groups and types of organizations get represented. Nonetheless, it was not possible to include women both in group discussions and key informant interviews for traditional reason. The interviews and focus group discussions were transcribed, and the transcripts analyzed using

qualitative analysis software NVivo. The basis of the analysis is the governance assessment framework developed by ILRI landscape level governance assessment framework (Robinson, 2015).

4.4.3 Remote Sensing Methods of Data Collection and Analysis

To collect the data and test hypotheses regarding LULC dynamics and its impact on the governance of rangelands in the Middle Awash Afar SES, remote sensing techniques were employed.

4.4.3.1 Remote Sensing Data

In order to generate the designated data for the land use land cover change, ERDAS Imagine 2014 product of Landsat 5 for the year 1987, 1992 and 2010, and Landsat 8 for the year 2018 were used. Four different image collections were generated for the four study periods. All having 30 m spatial resolution and consisting of the red, blue, green, and purple bands. The collections consist of pixels captured in the months of July for the year 1992, 1986, 2010 and 2018.

4.4.3.2 Field Data Collection, LULC Classification, Validation and Dynamics

For the classification of the LULC types, reference data were collected as well as for training and validation of each LULC type in the study area. Reference data for the year 1986, 1992, 2010 and 2018 were collected from aerial photographs captured during the respective years and directly from the field using a handheld GPS. The GPS points collected from the field survey were mainly used to locate the dominant land use land cover types of the study area, as depicted in table 2.

Table 3: Description of the LULC classes used for change detection

LULC Classes	Descriptions
Grassland	Areas dominantly covered by grasses with scattered trees and shrubs, it could be of annual or perennial grasses or herbs
Bushland	Areas dominantly covered with trees less than 20 meters height with dense canopy
Woodland	Areas dominantly covered with trees higher than 20 meters
Wetland	Permanently covered with rivers, marshlands or other water bodies
Cropland	Land prepared for growing crops including, areas currently covered by crops and/or land under preparation

Prosopis land	Areas covered with *P. juliflora*, characterized by dark evergreen leaves and closed canopy cover throughout the year, and stands forming deep thickets with a minimum height of 3 meters
Bareland	Areas with essentially no vegetative cover, some very scattered acacia trees or areas with very little vegetative cover (excluding agricultural fields with no crop cover), where the soil exposure is clearly apparent
Settlement land	Any built up area that is found in the study area including residence, public buildings and farm structures with roof cover

The LULC classifications were carried out using the field reference data set for calibration of a Random Forest (RF) classifier in R open source software (R Core Team, 2017).Accuracy measures such as Kappa coefficient were calculated (Cleugh et al., 2012). As a result, the Kappa coefficient was found to be 87. Following the classification work, LULC dynamics were calculated for the four study periods using cross-tabulation (Zewdie and Csaplovics, 2015) and the percent changes were calculated for each LULC type over time (Temesgen et al., 2018). In addition, net area gains and losses between the consecutive study periods and net area changes from the initial 1987 to the final 2018 were calculated (Zewdie and Csaplovics, 2015).

4.4.4 Descriptive Statistics

Descriptive statistics such as mean, standard deviation, percentages, and mean square were used to summarize, interpret and conclude the results.

4.4.5 Econometric Methods

The econometric methods were employed to test hypotheses regarding pastoralists' rates and levels of participation in rangeland management and decision-making activities. Key variables affecting participation of pastoralists such as, actors' characteristics, time horizon, social network connections, social values, group membership, political affiliation, and social status were summarized.

Regarding the decision of choosing the type of econometric model to be used, linear regression model and principal component analysis (PCA) were selected for its simplicity (Lubell et. al 2013). Concerning the type of variables to be used, agricultural decision making and rangeland management frameworks, particularly theory of diffusion of innovation was used to guide the analysis. These theories argue that among

other things, economics, psychology, and social networks operate simultaneously as components of the broader SES in shaping the behavior of pastoralists. Previous research works and reports of different rangeland management program intervention in the study area were also considered to validate the findings.

To test hypotheses regarding levels and rates of pastoralists' participation in rangeland management activities, structured questioners were developed and administered to 210 individual respondents. These respondents represent the views, opinions and positions of their respective households. The questioners were designed based on previous research works and pretested before the final survey was carried out. The surveying work was conducted using Open Data Kit (ODK). It is suites of tools help to create a questionnaire form in the Xform format and helps to collect, aggregate, and retrieve data for analysis.

The study considered four levels of participation such as planning, implementation, monitoring (follow up of activities) and contributing to decision-making processes. To measure the levels of participation for each household, principal component analysis was used in order to construct participation index (PI). The purpose of the PCA is to construct new variables (x_j (j = 1,2,3,..k). These are the principal components or factors generated. PC score for each level was computed by applying the following mathematical equation.

$$\text{PC Score} = \sum_{i=1}^{n} \text{x}i\alpha i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where, x_i are the variables determining each level of participation and αi is factor loadingincluded in each principal component to drive participation index. As the first principal component absorbs the maximum variation (62%) in the set of all the variations of the factor scores, the study considers factor loading corresponding to the first PC. Then, before creating the participation index the PC scores were standardized using rage equalization technique to get scores with equal weight. Range equalization is computed for each level using the following formula.

$$\text{W} = \frac{\text{PC}-PCmin}{\text{PCmax} - \text{PCmin}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where, W is range equalized PC score for each of the four levels, PC stands for principal component computed for each level of participation, PC_{min} is the minimum scores of the principal components, and PC_{max} represented the maximum scores of the principal components. Finally range equalized variables ($W_1=W_2=W_3=W_4$) for the four levels of participation are aggregated as follows, to create participation index.

PI = W1(PLAN), W2(IMPL), W3(ME), W4(DM) ..... (3)

W1(PLAN), W2(IMPL), W3(ME) and W4(DM) are range equalized PC score for participating in planning, implementation, follow up and decision-making respectively. Participation index (PI), thus captures the level of participation of the respondent households in the four levels of rangeland management activities and decision-making processes. Therefore, the higher the participation index is the higher the level of participation of the households, provided that the index value runs between 0 and 1.

Variable that sums up the total number of activities were also constructed to represent the overall participation scale. Which is a count variable that ranges from 0 (no participation) to 4 (participate in all the four menus), and measures the rates of participation across the entire rangeland governance decision-making activities. The study considered all the 210 questionnaires are satisfactory, and non-response biases were ruled out by discarding incomplete and inconsistent questionnaires. In this case, the questionnaires addressed broad aspects of demographic, socio-economic, and local level characteristics of the households such as social values, social network connections, and socio-political and group affiliations as mentioned above. The study measures the rates of participation taking households as the units of analysis. In this study, any opinion given by a household head is collective and taken as representative voice of all the household members. To test the proposed hypotheses, the following linear regression model has been specified, assuming that there exist liner relationships between level of participation and the determinant factors.

$$PI_i = \alpha + \beta_1 Edu_i + \beta_2 TLU_i + \beta Off\text{-}Herd_i + \beta_3 Land_i + \beta_4 Plan_i + \beta_5 Coop_i + \beta_6 InfoSou_i + \beta_7 Trust_i + \beta_8 CBRM_i + \beta_9 Pol_i + \beta_{10} Dep_i + \beta_{11} Status_i \text{.....} (4)$$

Where, PI_i is the value of the participation index for the *ith* households. The independent variables Edu, TLU, Off-Herd, Land, Plan, InfoSou, Trust, CBRM, Pol,

Dep, and Status, represents education, livestock holding, number of off-herd income sources, land holding, succession planning, number of information sources, government trust, Membership in CBRM groups, political affiliation, dependency on safety net program and socio-economic status respectively. Years of schooling is incorporated considering natural logarithm of the respective values. While livestock holding, number of off-herd income sources, size of land holdings, number of information sources, government trust, social status are standardized. The remaining succession plan, membership in CBRM groups, political affiliation, dependency on safety net program and socioeconomic status are dummy variables.

5. GOVERNANCE STRUCTURE AND INSTITUTIONAL FRAMEWORK

The chapter explores the governance systems and institutional arrangements of the Middle Awash Afar SES and identifies ways in which the challenges of securing adaptive rangeland governance could be addressed. The chapter also describes the governance system and characterizes the SESs of the study area.

5.1 Description of the SES and the Governance System

5.1.1 Middle Awash Valley as SES

In the Middle Awash Afar, areas of 2941 km^2 with a varying ecological and social diversity are administratively demarcated as Amibara District. The ecological heterogeneity is composed of Acacia woodland, open bush and shrub land, grassland, riparian vegetation, wetland, seasonal marsh and bare land, and recently having a significant portion of Prosopis invaded land (GIZ,2014) with a river Awash crossing the valley. Different species of birds, wild hippopotamus, Grevy's Zebra, Beisa Oryx, Gerenuk and Lesser Kudu are some of the major wildlife characterizing the ecological systems of the Middle Awash SES. The Allideghi wildlife reserve that has been established to serve as a buffer zone for the neighbouring Awash National Park and harbouring a wide range of wildlife and plant species found in the District administrative boundary.

The assessment work have confirmed that there have been interwoven interaction and webs of movements such as; regulated livestock movement, in and out migration of wildlife, seasonal shifting of community residents in accordance with resource availability within the District and clan boundary; out migration of locals and in migration of non-locals; hydrological flows from ground sources and river Awash; as well as various types of resources harvesting up from the Allideghi plain down to the riverine areas of the valley. Considering the presence of social and ecological interaction beyond the District Administrative boundaries, this governance assessment work selected Middle Awash Valley as a couple Landscape level SES. It includes the riverine of the Awash valley and the Allideghi plain. The works of (Robinson, 2011; Gubta, 2010and, Folk, 2007) were used to demarcate the SES. Thus, the SESs of the

study area were delineated taking watershed boundaries and ecological characteristics into consideration. Socio-economic consideration such as livestock movement and traditional boundaries were also considered.

The Middle Awash valley ecosystems are inhabited by diverse ethnic groups among these the Afar Adohimarra section (Debni and Weyma clans) are the dominant and native inhabitants engaged in pastoral and agro-pastoral livelihood activities. The remaining non-Afar ethnic groups are engaged in urban service delivery and wage labour activities in commercial farms and settler farms except the Oromo and Issa. The arrival of these non-Afar ethnic groups marked the establishment of Amibara Melka-Sadi irrigation farm and settler farms in 1968 and 1971 respectively. The establishment was aimed to exploit the fertile natural resources, livestock and the local pastoral populations (Getachew, 2001) and to satisfy the dual objectives of the central government. (Harbeson, 1978) explained this dual objective as consolidating territorial spheres of influence in the volatile Red Sea region and development of the Awash Valley. This was designed during the era of Minilik just alarmed by and in response to the cession of land to the Italian invaders.

The Afar-Issa hostile relationships that existed for long is among the very important social aspect that worth mentioning in the governance assessment of Middle Awash SES. According to the information obtained from the District Administration Office and the key informants, so far there is no any affable social interaction between Afar and Issa due to their rivalry hostile relationships. Previous scholars documented the hostility as historical and have been starting from the sixteen century (Abir, 1968).This was following the death of the historic Jihadist Leader Imam Ahmed and the defeat of his alliance which eventually was the splintering of the Somali-Afar alliance and marked the beginning of the enmity (Trimmingham, 1952). In confirmatory with the aforementioned sources an elderly person asked about the Afar-Issa relationship replied as follows. “I haven't seen and heard any peaceful coexistence between Afar and Issa though unaware highlanders misunderstood that there exist social relationship between us, simply looking at persons born from Afar-Issa family but the reality is far from peaceful relationship.”

He further explained that the Issa have been doing this forced marriage deliberately since it is one of their assimilatory strategies to conquer the Afar land mainly to get access to the Allideghi plain and the riverine areas of Awash. The other elderly man affirmed the prior statements of the Afar-Issa hostile relationships by summarizing his response with the widely spoken tale of Afar *"tidaren fed'diig Oromimitte abiit, bhitaan fed'diig Issaan abiit"* literally translated as "if you want to thrive marry an Oromo, if you want to get devastated marry an Issa" (Kelemework, 2011). This statement clearly shows that how the Afar-Issa relationships are worsened and their difference is yet negotiable. The Afar people also believe that any peace making effort should be based on the principle of mutual respect that keeps both of them in their own territories. However, by the time this research work has been on progress the Issa clan got de facto recognition to use and administer three Kebele in Afar territory of which one (*Gedamayitu*) is in Amibara District.

It is also important to note that the Allideghi grassland, the Awash Valley and the River Awash are the key drivers of change in rangeland governance, institutional arrangements, social and ecological dynamics as well as the major causes of conflict in the Middle Awash. For instance, the Afar pastoralists in the Middle Awash has undergone profound transformation for the past five decades due to their flood-fed dry season grazing lands and watering sites appropriated for State farms, sanctuary, and urban settlements. This is because of the high potential of the riverine areas of the Awash Valley for irrigated farming and the perennial nature of Awash River that catches the eyes of Sultanates, consecutive governments, and large scale agricultural investors. The Sultanates of Aussa were at the top of the socio-political and religious leader governing all aspects of the Afar people till the 1974 revolution.

On top of these during the imperial period the Sultanate of Aussa, the Afar clan and lineage were integrated into the Ethiopian administrative structure. In that the Sultanate was entitled to use the imperial title *Bitwoded (governor)*, *Balabat (clan head)*, the lineage head *'Chikashum' (village master)* and the *finaa head 'Yegobez-aleka' (local police chief)*. Despite all these imperial titles and the mandate given to them, the revised 1955 Constitution of the Ethiopia Empire Article 130 (d) stated that all collectively used rangeland resources that are not owned privately are state domains. The decree read as; "All property not possessed or not held in the name of any person, natural or

juridical, including all land in escheat and all abandoned properties, whether real or personal, as well as all products of the sub soil, all forests and all grazing lands, water courses, lakes, and territorial waters are State Domain."

Both the Dergue Land Reforms of 1975 and the current government constitutions did not recognize the Afar customary communal land tenure system and its associated traditional governance systems as a viable livelihood strategy. The 2001 rural development policy and strategy of EPRDF introduce an inevitable role change from smallholder peasant cultivation to large scale capitalist farming evacuated pastoralists from their age old tenure throughout the country. As of the group discussant the effect of this land transfer program severely hit pastoralists in the Awash valley than any other areas of the Region. Since the program targeted the Awash River and its tributaries for its major irrigation source as well as the program targets the fertile lands of the Allideghi plain and the riverbanks of Awash. They also added that the current land grabbing scheme coupled with the previous agricultural intensification program have denied them access not only from their ancestral land but also from their lifeline *'Awash river'*. Which the local people believe that the land grabbing scheme worsen their life than any other time before. This is mainly because the EPRDF government like its predecessors believed that the communal rangelands are vacant and under-utilized. As a result, 409,678 ha of rangelands mainly in the Awash basin have been transferred to the Federal land bank since 2009 to be leased for investors (Desalegn, 2011).

Despite all the current rhetoric that the right of pastoralists to grazing land and not to be displaced from their land was guaranteed by the Constitution; a Parliamentary Standing Committee has been created to watch and advocate the law enacted reflects the interests of pastoralists. Pastoralists Day is celebrated at national level, the reality on the ground shows pastoralists are becoming more and more insecure as a result of government interventions. In this regard, the key informants interviewed about the aforementioned privileges given to pastoralists ironically replied it as "lip service". They also believed that the government's keen interest on rangeland resources than the livelihoods of pastoralists was the main causes for their insecurity.

In confirmatory to the respondents the (Oakland Institute, 2011) reported that the Ethiopian government development strategy takes away key coping strategies from its

own people. Through destroying natural resources, abandoning resource governance institutions and thereby negatively impacts the livelihoods of millions of pastoralists. In this connection, the group discussants mentioned that the Afar pastoralists are intractably linked with nature; the natural resources and the service they get from the ecosystem that are vital for their livelihoods. Hence, they underlined that anything that directly or indirectly interferes with these natural resources could affect their mode of production and their institutional patterns. Above all it will affect their survival strategies which they have been successfully pursuing for generations. The following table summarizes the various stakeholders and their interests in the Middle Awash SES.

Table 4: Stakeholders and Their Interests

	Groups/Organization	**Mandate/ Interest**
Social stakeholders	Afar Pastoralists	Right to communal grazing and water
	Afar Agro-pastoralists	Right to communal grazing and water Right to cropland and irrigation water
	Isa Pastoralists	Access to grazing-land and water during drought, and livestock route
	Other communities (towns)	Access to petty trade and demean jobs
	Agricultural Investors	Land lease right to agriculture & access to irrigation water
Government stakeholders	District Council	Various, including security
	District NR Department	Various, including food security & NRM
	Werer Agri. Research Centre	Research and extension for drylands
	Awash national park	Wildlife &NRM
	Commercial farms	Agro-processing(sugar, cotton & fruit)
	Defence force- East regiment	Not defined yet
Non-state Actors	Clan councils	Various
	NGOs	NRM including Prosopis eradication and livelihood improvement programs

Source: Own Computation

5.1.2 The Governance System for Middle Awash Valley SES

The core organizational and institutional elements of the Afar rangeland governance system is centered on the traditional governance system and the customary institutions. Hence, it is important to introduce the social organizations and the associated institutional arrangements in order to have a clear understanding of the resource governance institutions and their decision making mechanisms. In this vein, Afar

reckon social organization from the smallest social unit household (*burra*) and extended family (*dahla*) to lineage (*gulub*) and clan (*kedo*). Sometimes they also identify themselves to either of the two clans' confederation namely Asahimarra or Adohimarra. The analysis of tradition and continuity by (Getachew, 2001) showed that property right, shared identity, resource governance and territory are totally linked with these social organizations. The clan is the lowest social unit of traditional governance systems, though there are also some governance activities to be taken place at smaller social units at lineage and sub-clan levels. As (Kelemework, 2014) noted, each clan comprises a group of people related to each other by decent, living within shared territory and sharing common rituals and socio-political leadership with well-established hereditary gerontocracy. Each clan land (*Kedo badho*) is named after a clan whose members have inhabited it for generations which comprises grazing and browsing lands, trees, water sources, communal graveyards, and ritual sites.

The principal tasks of the clan leadership are settlement of disputes, allocation and overall governance of resources under the clan's territory based on customary practices of resource management. For effective implementation of these tasks each clan has a clan council, clan head (*kedo abbaa*), fimaa members, and *fimaa* head (*fimaa-abba*). In order to exercise the land governance rules each Afar clan has a spokesman along with clan or lineage elders in a council and at a higher level within the section or multiple confederations of clan elders. The institutional analysis of clan including the role and responsibilities of clan councils and clan head are discussed in the next chapter. Here, I will only highlight the task of *fimaa* members since they have the greatest role in protecting rangeland resources. The main task of *fimaa* members is to enforce sanctions passed by clan authorities, clan elders and *fimaa-aba*. In short, *fimaa* are the enforcer of institutional rules and protector of natural resources from being abused by clan members and/or non-clan resource users. Sometimes in the absence of *fimaa* members their deputy *eerena* members could assume the responsibility of *fimaa.* However, under normal circumstances whose main duty is calling up *fimaa* members early in the morning saying loud and shout "*eei eei* ..." moving here and there across clan settlements. The following table summarizes some of the most important collective decisions made in the Middle Awash SES.

Table 5: Key decisions being made and main decision-maker

Decisions	Main Decision-making body
Regulation on the use and management of rangelands	Formal government Clan Council (Daar-Idola)
Land use and allocations	Clan Council Formal government
Seasonal mobility and rotational grazing	Different hierarchies of Clan leaders
Environment protection (including trees and sacred sites)	Du'abe (rangeland Manager) Fimaa members
Settlement of disputes and conflict resolutions	Clan Council Mabolo

Source: Own Construction

On top of these, elderly pastoralists confirmed that the pastoral land governance systems (*ma'ada*) and its associated customary institutions (*adaa*) remained strong until the central government appropriated pastoral lands for large scale agricultural projects and wildlife reserves. These views have been confirmed by many authors who conducted research in Afar, for example (FAO, 2001) document explicated that central government in Ethiopia until the 1970s lacked the institutional capacity to reach pastoral areas and change their customary systems. However, currently, the viability of the pastoral production system in Ethiopia in general and Afar in particular is under threat due to ill-informed government policies that marginalize and weaken the customary governance systems.

The statutory governance systems that are an extension of government's experience from highland agrarian societies were introduced in lowland pastoral areas during the Military Regime. Currently, Afar have administrative units with four level of government structures. The establishment of government administrative units, particularly Woreda and Kebele had significant ramifications on rangeland governance activities since these administrative units was established randomly based on number of households living in a given area irrespective of the prior clan territory. For example, 96% of the respondents reflect their dissatisfaction in the existing formal administrative units. They complain it, as it does not overlap with clan territories and that created a situation where clan lands and the clan members fall under two or more *Kebele* or *Woreda* jurisdictions.

However, sardonically, these new administrative units were established with the core essence of modernizing pastoralism based on the assumption that pastoralism is a backward and non-viable livelihood strategy that must be transformed into a form of sedentary mixed crop-livestock farming system. Conversely, the traditional governance system works to ensure the continuity of traditions, values and norms of the people, protect and maintain their natural resources, and pursue their livelihoods by adhering to what they believe it as God given livelihood strategy. They also strive to maintain their traditional institutions that are proved effective in dryland ecosystem in which they have been living for generations. An elderly pastoralist asked for his reflection on the government recommendations of sedentary form of production, replied as follows;

> *"We have no problem with the government's recommendation of crop farming if they provide us with water and other necessary support to grow crops. But the problem is, we live in an environment where the rainfall is erratic as a result we move with our animals in search of pasture and water elsewhere. Nonetheless if we are supposed to settle and depend on crop cultivations, our livelihood would be in mess as we could not move the land to water the crops when the rain fails in our envisaged settlement."*

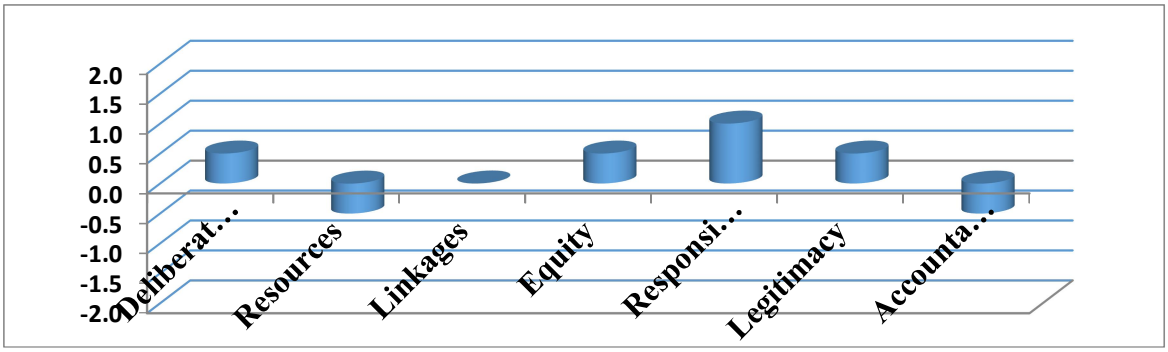
Therefore, these clearly seen ideological and practical difference between the customary and statutory approaches to rangeland resources governance and the straggle to dominate one anther created legal dualism that will finally end up with shifting the communal land to open land and hence, ruin is inevitable as (Hardin, 1968) call it “the tragedy of the commons”. These non-governmental organizations participating in the governance of Middle Awash SES have a focus at a level larger than the landscape level SES. Whereas in Middle Awash their main focus was limited to reclaiming Prosopis invaded land and other socio-economic development programs. The international NGOs that were proved effective and have the capacity to reach to the remote pastoral areas are not in a position to freely and directly get involved in the governance processes. This is due to the reason that the Charities and Societies Proclamation (No.621/2009) banned them from participating in governance and human right related activities. For example, among other things they were restricted from working on issues such as human rights; as well as the promotion of the efficiency of the justice system and law enforcement services. On the other hand, the Local NGOs that were given an exclusive mandate for the above mentioned governance related charitable activities lack the financial, material and human capacity to reach in such a harsh and remote pastoral areas.

5.2 Assessment of the Governance System

5.2.1 Assessment of Governance Processes

The tasks of assessing the governance processes in this section involved seven major indicators (Robinson, 2013) as explained bellow. These assessment tasks mainly answered whether or not the governance processes have meaningfully contributed to multilevel deliberation and effective decision making processes. The task has answered questions regarding the capacity of the governance system to generate resources; the presence of appropriate linkages among organization themselves and with institutions at different levels. The task also addressed whether institutional patterns provide a platform for fair governance of the SES. It specifically includes responsiveness, equity, legitimacy and accountability procedures (Gupta et. al., 2010).

Figure 3: Scores of Governance Processes Indicators



As shown in the above chart, the governance system of the Middle Awash SES does not respond to the needs and aspirations of the stakeholders in terms of resource provisions and accountability procedures. That scores below the average point "*2*" while responsiveness scores good result of "3". The rest governance process indicators such as deliberation, equity and legitimacy score slightly above the average by "*0.5*", but are still weak. Institutional linkages that have much greater influence over the other dimensions scores "2" or falls on the divide point "0". The following paragraphs briefly discuss and reinforce these findings with the views of the stakeholders.

The first evaluative indicator assessed about to what extent deliberation was made in order to contribute to effective decision-making processes and engaging stakeholders and decision makers for meaningful multilevel participation. It also addresses whether or not the processes of deliberation enabled co-production of knowledge thereby its

contribution to empowerment (Berkes, 2011). The same authors defined deliberation as a process in which people confer, ponder, exchange views, consider evidence, reflect on matters of mutual interest, negotiate, and attempt to persuade each other. Having these points in mind a checklist was developed to capture the views of selected group discussants and individual interviews in a coherent manner.

Thus, in replying to the aforementioned evaluative questions the group discussants stated that like any other pastoralists living in extensive dryland ecosystems the Afar pastoralists govern their limited natural resources based on the principle of mobility and rotational use of resources. In so doing, Afar pastoralists divide the year into four seasons traditionally known as *Karmaa, Gilaal*, *Sugum* and *Hagayi.* For each of this season the decisions on, where to move the livestock, and which land to be grazed and which to be reserved for future use was found to be made based on consensus. They reach consensus after serious deliberation and inquisitive inquires of resource availability and potential hazards. On top of this, the respondents explained that the Afar people have a well known locally accredited information exchange institution called *Daagu.* Through which they conduct serious deliberation among stakeholders themselves regarding the diverse challenges and opportunities they come across. The *Daagu* also create a platform for sharing different views and evidences among clan members and clan leaders of different hierarchy in order to decide on matters that affect their overall wellbeing. From these, one can understand that there is well established culture of deliberations that are intermingled with the traditional rangeland governance system of the Afar commons.

However, the respondents stated that the exchange of views, interests, positions, and knowledge sharing among stakeholders and formal government agencies was inadequate. The respondents assertively stated the condition as unsatisfactory and functioning only to communicate the decisions made by the government with no or little feedback from the local pastoralists. It also lacks the capacity to create a platform for mutual learning and deliberating on problems and possible solutions. The discussants further explained the lack of deliberation with vivid examples in that they mentioned the cases of seizure of more than thousand hectares of their wet season grazing land by the military and the de facto recognition of the Isa clan within the Afar territory without their knowledge let alone conducting deliberation. As a result,

community participation in decision making processes at a level higher than their respective clan was very weak. This in turn has been affecting the smooth relationship between the people and government officials. It also affects the sense of ownership on decision passed by the government. This ultimately impedes the much needed contribution of the governance system to community empowerment.

Regarding the resources generated the respondents unanimously agreed that the capacity of the governance system to generate financial, human and political resources is very limited and identified it as one of the key problems of the governance system. They also replied that the support given to them by the political leaders to improve the governance system is insufficient and ad hoc that are mainly aimed at gaining political advantages. They added that the problems with human resources are not only the issue of lack of capacity but also a political problem. In connection with this politically imposed problem, the respondents noted that the few capable persons produced by the traditional system are naively indoctrinated with government propaganda. This was done to implement governments' ostensible development agenda that are mostly against the interests of the local people. Community leaders who refused to accept these agendas will be forced to refrain from participating in socio-political activities in which they were legitimately represented by the community.

As (Ostrom, 2009) indicated in her book that in a political economy discourse money is not an asset but productivity of the system is considered as asset which in turn needs financial resources to improve and maintain its sustainability. In this regard, the financial resources that are needed to improve the productivity of the system through awareness creation and health promotion as well as in generating resources for key governance activities such as planning, coordination and monitoring are totally insufficient. This is because neither the local government provides support to the traditional rangeland governance activities with sufficient budget nor the communities have the tradition of fund raising for such activities. Even the livestock that are collected in the form of punishment has not been used for this purpose yet it is shared among concerned clan members as feast. However, recently, the Regional government taking the experience from the highland farmers has started to integrate the Safety Net Program with environmental rehabilitation work. In that a member of the household is set to work for 15 days for each month they are registered to get aid.

The third evaluative indicator used to assess the governance process is the presence of linkages. In connection to linkages (Armitage et. al., 2007) explained that one of the most critical factors for adaptive SES and robust governance system is the presence of linkages among institutions and organizations across different horizontal and vertical levels. In line with this argument the key linkages identified are the vertical linkages among pastoral communities and traditional leaders at different levels, local pastoralists and government administrative bodies. It also includes the relationship between the traditional authorities and formal government bodies from the Kebele to the Regional level. The other is the horizontal linkages among the wider communities and the linkages among traditional leaders themselves. Thus, in the study area the presence of strong affinity within clan and among different clans enforced by traditional information exchange institutions (*Daagu*) created the chance to communicate openly thereby strong horizontal linkages.

The vertical linkages among pastoral communities and the traditional authorities were also quite effective in coordinating various rangeland governance activities. For instance, the linkages among clan leaderships and the wider pastoral communities in facilitating rotational grazing, livestock mobility and negotiating on pasture regenerations as well as sharing of information were found to be very effective. The vertical interplay among pastoralists including their institutions and government structures are fairly poor. However, it was witnessed that there existed adequate horizontal and vertical linkages at the clan level among the various stakeholder groups and governance institutions operating at a grass root level. In this regard, most clan council members interviewed stated that their linkage with the government was inadequate and if there existed linkages that were a kind of ad hoc and usually meant to discuss top-down agendas, particularly when conflicts arose.

Evaluative indicator number four refers to whether or not the institutional rules embodied in the governance system are fair and take account of unequal circumstances in society and assesses representation and inclusivity. The overall response to this evaluative indicator is somehow mixed. In that some of the respondents felt that the traditional governance system was equitable and fair as it takes unequal circumstances in the communities irrespective of wealth and other societal ranks. Conversely, some of the respondents believed that the governance system is unfair as it does not

acknowledge equality of gender and minority groups in decision-making processes. Since the governance system of Afar is based on hereditary approach, leadership role is only bestowed to the nobility and women are not allowed to participate in the decision-making processes and have no right to inherit.

The other important point mentioned by the respondents about equitability of the traditional governance system is the issue of land. In Afar customary laws the use, management and governance of land and land resources are entirely left for the clan system. Although land is deemed to be communally owned, each Afar clan and sub-clan has its own territory with the mandate to exclude non-clan members. The clan territory based approach to land ownership, as identified by government officials and key informants, are the main causes of unfair distribution of resources and conflict among clans and sub-clans living in Afar. The respondents also affirmed that the problem in the Middle Awash is getting worse as the land is grabbed by external actors and clan authority is getting deteriorated. For example, the so called '*Weyima'* clans who were forced to evacuate from eastern parts of the country have limited traditional tenure and are generally considered as gusts unlike the '*Debni'* clans who claim most of the *Alideghi* plain and parts of the riverine areas. For instance, the recent resource use conflicts occurred in July, 2017 between the so called *Debni* clans of *Sidihabura* and the *Weyima* clans of *Ablek-Ad'ali* that has led to the death of thirteen people justify the presence of inequitable traditional tenure right that scale up to bloody conflict among clans in the Middle Awash Afar. However, from equity point of view the formal government institutions provide better chance to women and reduce the inequitable clan ownership of land. In this regard, though it is at its initial stage the Afar National Regional State Rural Land Administration and Use Proclamation No. 49/2009 granted an equal access to land and other productive resources.

The other key evaluative indicator used is responsiveness which evaluates whether the governance system shows responses to society and the concerns and issues raised by people and communities. Thus, most of the respondents acknowledged the responsiveness of the traditional governance system and its allied institutional arrangements in responding to the concerns and issues raised by the communities. The issues that are usually raised by the people and the communities at local and higher level are aggregated around land, water, natural resource management issues. These are

rotational grazing and browsing, forest management and uses, seasonal movement of livestock, conflict management, and food aid in times of disaster. Accordingly, almost all the respondents highlighted the importance of the traditional institutions to the responsiveness of the governance system. At a local level, this responsiveness can be seen in ways in which the *Fimaa* members are able to consider individual and group circumstances particularly on natural resources governance activities. The traditional governance system also shows response to the issues and concerns of the communities at a level higher than the local settings through established traditional mechanisms. For instance, issues and concerns beyond the local level or issues that could not be held by the *fimaa* members such as resource use conflict and seasonal movement of livestock within and cross clan boundary are discussed at clan level. In this regard, the needs and priorities of the communities are raised in a meeting lead by clan heads. Decisions passed based on consensus after serious deliberations has been taken place.

However, the formal government structure extends to the lower administrative level, issues and concerns of individual stakeholders are not satisfactorily addressed at a local scale for the reason that pastoral Kebele cover large areas and settlements are far apart and satellite that makes accessibility of the people very difficult. Owing to the accessibility problems that pose challenges on the responsiveness of the governance system, the government draw and deliberate with community representatives who are assumed to deliver collective issues and concerns of the communities. Thus, the formal government bodies usually respond to the issues of disaster and risk management in times of drought and other crisis.

Besides, legitimacy refers to the extent to which the governance systems get trusted among the various communities and stakeholder groups and the general public. As a result, the level of legitimacy and the support given to the overall governance system by the rangeland users were found to be somewhat mixed. In this regard, the traditional resources governance institutions have greater support from the communities and they are legitimate in the eyes of the majority of the communities. However, the public institutions such as the District administrative bodies involved in the governance of natural resources have lower level of legitimacy. As of the group discussants the lower level of legitimacy given to the formal government bodies are partly due to the negative connotation pursued by the government against pastoralism, as backward and nonviable

livelihood strategy. To this end, the respondents agreed that government policies are contravening their age-old customary institutions. The other reason pointed out by the group discussants for the low level of legitimacy was the repeated failure of the local and Regional authorities to respond to the felt needs and priorities of the communities. In the Middle Awash Afar, the relation among government officials and the communities have taken a bitter course since after the expansion of state farms, agricultural investments and other development projects that sidelined the pastoral communities and their institutions. Likewise, traditional authorities mainly the clan and sub-clan heads including the *fimaa* members hesitate to offer support to the statutory governance institutions. This is mainly because of the government's continued lack of formal recognitions for the traditional rangeland governance mechanisms and the lack of appropriate consultation during the processes of decision-making.

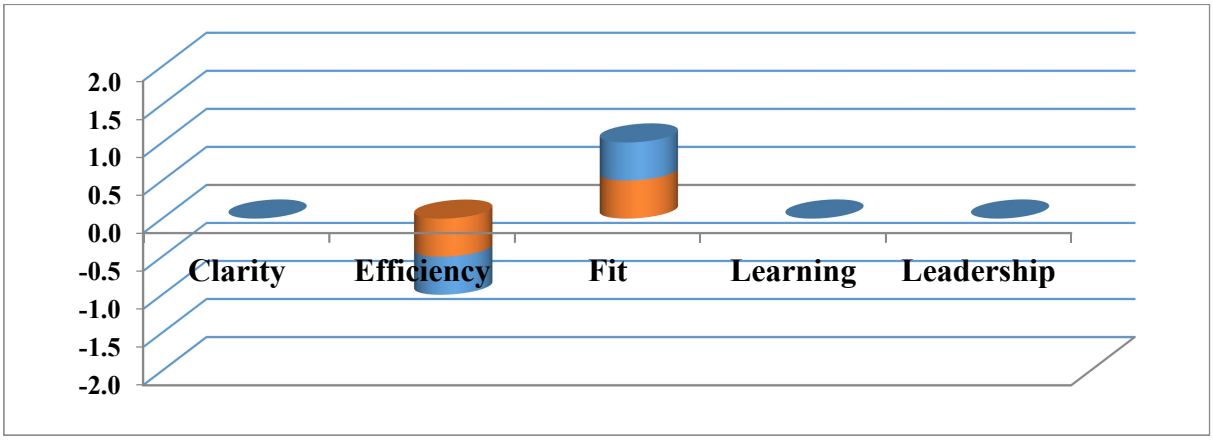
In response to the presence of accountability all the respondents agreed that there is lack of institutional platforms and governance mechanisms to hold both the traditional and formal government bodies accountable. The Afar traditional governance system that gives customary leadership role based on hereditary system without any electoral procedure in place is identified as the major causes to the lack of accountability of the traditional leaderships. The system does not have a means to make responsible those who are on power and take away leadership role even if the leader could not fulfil his responsibility as expected by the commoners except very few cases of pervasive inefficiencies known by clan elders. In this case, the elderly leaders discuss the issue in consultation with the family of the guilt leader, if convinced replace him by a man from his own family member.

The formal governance model also lacks institutional patterns to install accountability procedure. The lack of trust of pastoralists on the government and weak linkage between the people and local government leaders are some of the reasons. The lack of commitment by government bodies to ensure good governance and genuine power decentralization as well as the lack of awareness of pastoralists to hold the government bodies accountable are also mentioned as the major challenges of accountability. Besides, the key informants added that corruption and nepotism of the government bodies which extends its root in the traditional leaderships are the key problems for the lack of accountability.

5.2.2 Assessment of Governance Capacities

The tasks of assessing the governance capacities involved five major indicators that mainly answered to what extent the governance system contributed to effective decision-making. These are evaluated by clarity of purpose, efficiency and the fit between the governance systems and the existing SES. The other major points this governance capacity assessment task addressed are the extent to which the governance system promotes learning and creates a platform for the emergence of leadership of various kinds. Accordingly, the assessment results indicate that generally the capacity of the governance system to deliver effective decision, promoting learning and creating platform for leadership of various kinds are weak. Particularly indicators such as efficiency of the governance system are very weak with scores of "1.5" which is below the average by "0.5". The rest clarity of purpose, learning and leadership score the average point of "2" while institutional fit scores slightly above the average point by "0.5". The subsequent figure and its corresponding discussion portrayed some of the facts on the ground.

Figure 4: Scores of Indicators for Governance Capacities



Consequently, evaluative indicator number eight assesses the extent to which decision makers have clear scope, goals and objectives. Hence, the assessment result showed that the District administrative bodies and Kebele council members were found to have relatively clear guidance for themselves. They usually communicate their annual plan with Kebele council with little or no feedback from the council members. The respondents confirmed that there is no established platform to communicate and to have agreed upon plan that can provide clear scope and purpose for the communities and

their traditional leaders. In this connection, clan leaders in Amibara were asked whether they had clearly stated goals and objectives to guide decision-making procedures. Hence, they replied that so far we have been neither provided with written documents nor we prepared to guide our decision-making processes. The respondents believed that the traditional system still lacks both the capacity and the will to create established norms and procedures to provide clear scope and objectives among stakeholders. However, decisions on seasonal movement of livestock, rotational use of pasturelands water are made based on prior consultation with clan members. They added that the lack of guidance created a situation of uncertainty and confusion about their roles and responsibilities in the governance system.

Respondents who were asked about the efficiency of the decision-making processes indicated that decisions-making processes relatively take longer time and are mostly inefficient. The main reason identified for the inefficiencies are poor resource generating capacity of the governance system. The other reason identified by the group discussants was stumbling relationships between the traditional leaders and the government officials. This has made things difficult for the clan authorities to inform their decision making processes with timely information and obtain clear purposes to improve the efficiency of the governance system. Gradual increase in nepotism, corruption, mismanagement and elite capture by both the formal and traditional authorities were also mentioned as a bottle neck problem for the efficiency of the governance system.

The other evaluative indicator of effective decision-making examines to whatextent the governance system fit with the SES. It is also evident that the fit between governance institutions and the ecosystems they are meant to address determines the sustainability of SES (Graham Epstein et al., 2015). Generally, the respondents answered that the traditional governance system is good and congruent in addressing local issues and problems, although they lack institutional capacity to deal with issues and problems beyond their clan territory. However, there are cases where pastoralist elders negotiate and use resources beyond their clan-land in times of difficulty which the Afar people call it '*womaa'*. The respondents also identified issues and problems that the indigenous institutions are in a better fit. Particularly for issues such as, the management and use of rangelands and addressing problems of resource use conflicts and stakeholders'

disputes. Besides, the respondents replied that the support they get from government agencies to strengthen the traditional resources governance systems in responding to the changing circumstances of the ecosystem and the needs of the communities are insufficient. They further explained that however it is not fulfilled so far, their expectations from the government on issues of resource governance are provision of technical and financial support as well as encouraging restorative justice by channeling local issues and problems to the appropriate local institutions.

Evaluative indicator number eleven assesses the extent to which the governance system promotes learning. It is known that the Afar people have traditional information exchange (*Daagu*) institution. Through this institution the Afar pastoralist share their observations and experiences about the different aspects of their life including availability, use and management of rangelands, and the challenges they encountered along their journey. However, the weaknesses of the *Dagu* institution in promoting learning are the lack of coordination to engage various stakeholders for meaningful discussions. The other key weaknesses indicated were the lack of trust among government agencies, the communities and different clans especially those who had conflicting relationships. It was also indicated that the governance system is too political and people get frustrated to openly share ideas and learn each other. Thus, these in general obstructed mutual learning and collaborations thereby ultimately reduced the capacity of the governance system to promote learning.

Individual respondents and group discussants were asked to what extent the governance system makes room for the emergence of leadership of various kinds such as visionary, entrepreneurial, and collaborative. Hence, the respondents noted that the governance system of Afar facilitates leadership through patrilineal clan based mechanism. It was also indicated that along with solving their problems through this tradition of making deliberation the elders use the platform to carefully identify and nominate future leaders and nurture them with the traditional wisdom of leadership.

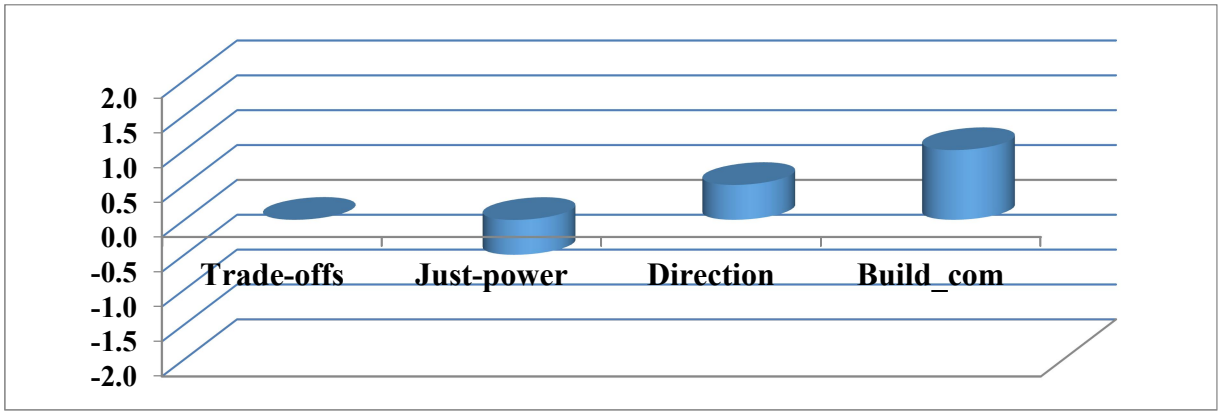
On top of this, an elderly man and a key informant from Amibara District noted that the Afar traditional governance system does not only inherit the leadership role but also the wisdom to effectively deliver leadership both in good and bad times. However, over the past three decades the formal governance systems gradually extend its administrative structure and contravene the age-old traditional system of leadership as primitive that

needs to be replaced with the so called modern leadership mechanisms. Key informants further explained this vilification of the traditional leadership as one of government's strategy to delegitimize the traditional institutions and replace the formal leadership mechanism. As a result of these challenges the capacities of the traditional governance system to create room for the emergence of leadership of various kinds get weakened.

5.2.3 Assessment of Governance Outcomes

Environmental scholars define government in a different way from governance in that they define government as set of organizations. Whereas governance as a set of social functions which are carried out by varieties of governmental and non-governmental actors as well as networks, norms and institutions working individually or in combination. The interactions of these determine how individuals or groups of people make decisions, share power, and exercise responsibility thereby shape the outcomes of the governance system. Accordingly, in this governance assessment framework the outcomes of the governance system were evaluated based on four key social functions (Robinson, 2014). These are resolving tradeoffs, shaping the use of power, setting direction, and building community. As shown in the figure below building community score cumulative average point of "3" which is the highest point from the data set. The rest indicators including trade-offs, just power relation and setting direction scores "2".

Figure 5: Scores of Indicators for Governance Outcomes



Accordingly, respondents were asked to what extent the governance system has resolved tradeoffs including social, economic and environmental needs in economically rational, environmentally safe and socially equitable manner. Hence, the respondents replied that traditional decision making processes consider various types of tradeoffs

including social, economic and environmental needs. For instance, decision making in rotational use of pasture and livestock mobility considered the social needs in order to decide on who are allowed to stay in settlement areas and who are to move with livestock. Besides, economic considerations such as, which animal to be sold for household consumption as well as environmental considerations such as which pasture to be used and which to be protected for regeneration. There are also trees allowed to be used for household consumptions and trees protected by law like Acacia trees. Nonetheless, the resolutions of tradeoffs made are not on a planned basis instead it is case-by-case decisions for immediate implementations. More or less the resolution of tradeoffs fairly addressed the needs of different social groups irrespective of social status and gender biasness within a particular clan member.

However, at higher levels the resolution of tradeoffs among government and pastoralists are generally very low and sometimes the government implements its interest without the knowledge of the resources claimants who could be affected by the decisions. In this connection, clan leaders who were interviewed about these situations bitterly voiced and mentioned the appropriation of their wet season grazing lands on Allideghi plain by the military without making any tradeoffs. They said "if we were consulted we would give them non-grazing land that would equally serve their interest, as they needed the land not for grazing but for military purposes". They added that the same is true for big agricultural investments that taken away thousands of hectares of land in valley and the riverine areas.

The other indicator used to evaluate the governance outcome is its contribution to just power relation. Hence, the evaluative indicator assessed the extent to which the governance system has placed limits on the use of coercive power, and to which it has enhanced power as capacity. In order to properly answer this question somewhat we need to see the past and current trends of power relations in the Afar societies. Thus, until the 1974 revolution the traditional governance system vested uncontested power to the Sultanate that descends to the clan leaders and the nobility groups. In a nutshell, it was a feudal system of governance in that the power relations between the nobles and the commoner pastoral communities were a kind of lord-tenancy relationships.

Ever since EPRDF has introduced a system of ethnic based power decentralization that does not apply the principle of subsidiarity at a grass root level, the power relation in the Afar pastoral societies have been in a constant change and tend to be asymmetrical. The power is mainly skewed to those who are fortunes to capture the winds of change such as the "local elites". Among other things the main reasons outlined by the respondents for the asymmetrical change of power relation are capture of power by the ruling party affiliated elites and absentee herd owners. Ostensible government interventions in the name of development and enforcement of law but favors sedentary livestock-crop production as well as private reallocation of land and land grabbing schemes are also some of the reasons. Therefore, the existence of these power imbalances has weakened the capacity of the governance system to empower the powerless and voiceless pastoral communities and has failed to limit the ability of authorities and elites influencing decisions to their own sake.

The other indicator employed is the capacity of the governance system to set clear direction. Accordingly, respondents were asked to what extent the governance system has established a common vision or direction among stakeholders. In response, it was found that unlike the perceptions of previous scholars and policy makers, pastoralists do plan and set directions though their plan is oral and not written down. Likewise, the Afar pastoralists set direction to govern the management and use of rangeland resources; to decide on access and use arrangements of different users; to facilitate mobility; and to prevent and resolve conflicts. In order to carry out these duties the Afar have indigenous governance and decision making institution '*Madaa'* with its customary laws' *Adaa'*. Under the *Madaa* system rangeland managers *Du'abe* take the tasks of coordinating the pre-assessment and planning work that will be provided to clan authorities for its ratification in clan councils. In this case, the *Madaa* system was found to be good enough in establishing common visions or directions among pastoralists. The presence of strong traditions of setting direction to achieve shared visions was acknowledged by most of the respondents. They explained the extent as "once decisions passed and directions set by the clan authorities all the concerned clan members act accordingly". Moreover, the respondents affirmed that they do planning and set directions if not detailed visions or strategic ones.

The last evaluative indicator "building community" assessed to what extent the governance system is helping stakeholders to identify or create shared values and shared identities. In this regard, the *Madaa* system and its set of rules (*Adaa)* govern all the Afar people irrespective of their clan affiliation or area of residence be it in Ethiopia, Djibouti or Eritrea. Since the Afar strongly valued their traditional rules and guidelines, and pay due respect for the elderly and their decisions. Moreover, the traditional leaders at different hierarchy sat for arbitration and settlement of dispute over social, economic, environmental and political issues, and the management of rangeland resources. Above all they work to protect the customary laws and their pastoral way of life from adulteration. Therefore, the traditional governance system through facilitating and enforcing the abovementioned activities helped the Afar people to have shared values and shared identities.

5.3 Summary of the Governance Assessment Tasks

It is evident that the current Ethiopian government enacted policies and strategies regarding rangeland development and institutional arrangements governing the use and management of rangelands. Unfortunately, these policies and strategies as argued by (Kelemework, 2014), disregard the traditional governance system and its allied customary institutions and practices. In consequence, the age-old traditional rangeland governance system and the institutions that have been practiced by Afar pastoralists get weakened. This among other things created gaps in the governance of rangelands and posed challenges on the continuity of traditions, norms and values of the pastoralists. Besides, the interventions affected the capacity of pastoralists' coping mechanisms to uncertainties, thereby, contribute to degradation of rangelands which consequently resulted in the deterioration of the livelihood of pastoralists. To this end, a typical example illustrating this daunting condition in the Afar pastoral settings is their dependency on external aid at least for about half a yearlong even in the absence of drought. In consideration to the aforementioned governance imposed challenges the governance assessment work investigated the extent and the capacity of the governance system to respond to the needs of the SES, employing 8 descriptive questions and 16 evaluative indicators. The descriptive questions assessed and summarized the identity of the SESs and the governance systems that are in place as summarized in the following figure.

Table 6: Summary of the governance system and the SES

Governance Dimensions	Summary
Definitions of the landscape	Predefined
Criteria for definition	Pre-existing(watershed, traditional territory, & District boundary)
Types of the SESs	Allideghi plain and riverine areas of Middle Awash
Governance institution	Formal and Indigenous governance institution (*Madaa)*
Governing law	statutory laws and customary laws (*Adaa)*
Authority & governance power	Vested to elected government bodies and clan leader
Governance by whom	Both (government bodies and Madaa rulers)
Planning by whom	Top-down gov't plan & rangeland managers (*Du'abe)*
Multilevel planning approach	No, only done at landscape or clan (*Kedo*) level
Form of representation and participation	Formally elected representatives (Kebele-Federal level) and informal community representation (clan leaders)
Women & minority involvement	Not involved in clan council

Source: Own manipulation

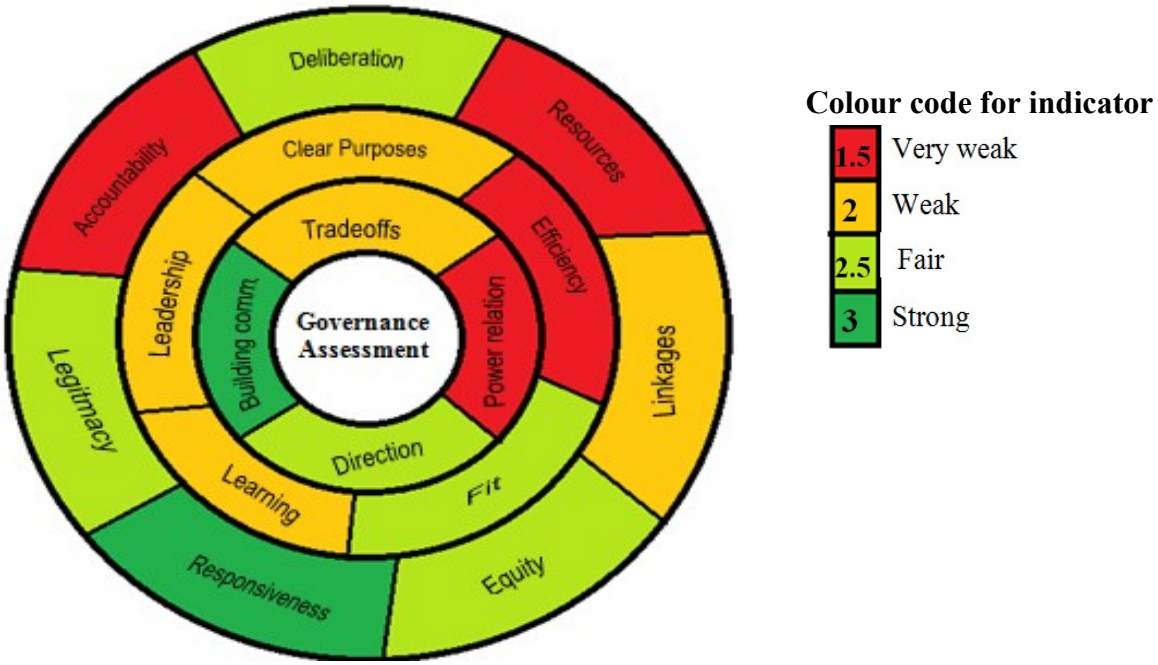
Middle Awash valley is an ecosystem of vital importance for more than 13,729 households of pastoralists, agro-pastoralists, crop cultivators and others relying on the services they get from the ecosystem. However, the governance systems and the proceeding decision-making activities are entirely based on pre-existing clan territories and administrative boundaries rather than ecosystem based approach. This together with lack of collaboration and poorly defined authority hampers ecosystem based management. The administrative boundary has coupled ecosystems such as the Allideghi grassland and the Awash Valley Riverine ecosystem. The ecosystem boundaries go beyond the District administrative boundaries. For instance, the Allideghi ecosystem extends to the Kereyu and Itu territory to the western escarpment and the Issa to the east. Likewise, the Awash valley crosses the boundary to Gewane and Fentale Districts. The governance system comprises different state, non-state actors and the communities with formal and informal linkages.

After identifying and describing the SESs and the governance systems the next task conducted were assessing the governance systems using sixteen evaluative indicators. The scores for each of the sixteen evaluative indicators were compiled in Figure 3, with colour coded showing the average scores of each indicator into three interlinked categories such as governance processes, governance capacities, and governance outcomes. The governance processes have seven indicators with which the social

functions are carried out, which in turn contributed to varieties of governance capacities in the community.

The governance processes in combination with the governance capacities help to carry out the governance outcomes (Robinson, 2012). These are resolution of tradeoffs, shaping of power relations, setting direction for governance to function properly, and building community. Here, the four indicators that assessed the governance outcomes were found to have some degree of similarities. For instance, the tradeoffs that are made to enhance power as a capacity were also found to empower the community and help to set directions. The other overlaps observed were lacks of clear understanding on the scope, goals and objectives of government policies, strategies and planning. These contributed to the power imbalance and the use of corrosive power to implement government development agenda.

Figure 6: Score obtained from the analysis of the governance system



Source: Own synthesis

The results of the governance assessment task were summarized and presented into scales that run from 1(very weak) to 4(very strong). On top of these, the accuracy and redundancy of the assessment framework were taken in to consideration in order to ensure reliability of the assessment work. After summarizing and setting the scales the

average scores of all the evaluative indicators were computed and found to be nearly two (2.17). This implies that the governance processes, governance capacities, and governance outcomes of the system are generally weak. Among all the indicators, accountability of authorities, use of resources, efficiency of the governance system and power relation between authorities and the commoner pastoralists scored below the average value while indicators for responsiveness and building community scored the highest point (3) from the data set.

6. GOVERNANCE DYNAMICS AND THE CAPACITY TO INFLUENCE RESILIENCE

This chapter has two intertwined parts, the first part assesses and discusses about major institutional governance dynamics among the pastoral Afar of the Middle Awash, as it is influenced by regime change. The second part discusses the capacity of the traditional governance institutions to buffer change and influence resilience at systemic level.

Traditional Rangeland Governance Institutions and Power Relationship

Alike the formal governance systems duties, rights and obligations crafted by informal institutions shape relationships and guide human lives worldwide (Searle, 2005). These institutions do not only guide the day to day customs of the people but also govern future actions through helping them to form norms and structuring economic, social and political interactions (Newenham-Kahindi, 2015). However, empirical research conducted in sub-Saharan African countries indicated that most governments of the region sidelined these traditional institutions labeling them as old fashioned and incompatible with the changing parameters of the SES (Hinz, 2007). Similarly, in Afar pastoral settings it is evident that the formal government authorities denounce traditional institutions as ineffective or irrelevant. In this regard the respondents understood the case as a libel act deliberately done by the government, so as to soothingly uninstall the traditional institutions and substitute it with the formal one.

In Afar, access, use and management of rangelands are generally governed by traditional institutions along with formal institutions that are lately introduced to the system. Traditionally, authority to govern rangelands is vested on customary leaders of different hierarchy and agnatically transferred through generations. For instance, the confederation of clans (*Makaban*) council of clan elders (*Daar-iddola*), the rangeland manager (*Du'abe*) and the law enforcement institution (*Fimaa*) are the major institutions in charge of the traditional resource governance institutions of the Middle Awash Afar pastoralists. In these traditional institutions decisions are made after serious and lengthy deliberations among the concerned groups or individuals from the lower lineage (*Gulub*) level to the higher leadership organization (*Makaban*). Most of the time decisions made by the clan leaders are non-appeal and irreversible but there are cases

where the council of clan elders could accept appeal and review the decision especially when the issues are contested between different clans. Generally, the council of clan elders (*Daar-iddola*) is responsible when the issue crossed sub-clan and clan border, and members of other clans and/or ethnic groups are involved. In this case leaders from all affected groups brought in and deliberate in length till final decision passed by clan elders and *Fatiha* made by religious leaders. The council of elders also bear the responsibility of dealing with problems that violated Afar customary laws (*ma'ada*) where the case usually handled by an indigenous court (*mablo*) that get resolved through negotiations.

Politically the Afar are organized on the basis of kinship which formed the clan-based institutions that commonly play central roles in the overall Afar culture, governance systems, and mode of life. These clans based institutions have well established kinship based economic, social and political support networks with the authority to govern them. The clan system is the most autonomous institution and the de facto unit of traditional governance under the umbrella of confederation of clans. Each clan manages its resources collectively, based on customary laws and has successive social units. Such as sub-clan (*dahla*) and lineages (*gulub*) which also play significant role in the governance of natural resources in their respective groups. Major decision making power regarding herd management, water usage, land and other natural resources management resides under the clan council, consisting of the clan leader, elders, *fimaa*, and local wise men. The *fimaa* institutions play an indispensable role in implementing decisions passed by the clan and sub-clan authorities. Its main responsibility is enforcement of rules and sanctions passed by clan authorities. It is made up of honorable men of varying age groups and consists of a principal leader (*fimaa-abba*), a deputy leader (*erenna-abba*), and ordinary members.

The indigenous institutions of the Afar allow two types of resource users such as primary users (*waamo*) having alienation right and the secondary or alien users having only use right based on negotiation with the former. Although each clan member has an inalienable use right over the resources, intra-clan customary operational rules set by the council of elders (*daar-iddola*) regulate how and when it could be used. Accordingly, the Middle Awash Afar herd management follows rotational grazing patterns that are divided into four seasons namely *Sugum*, *Karmaa*, *Gilaal* and *Hagaayi.*

The length and duration of each season vary depending on climatic conditions. The duration is decided by elders who are versatile with traditional ecological knowledge and wise men in consultation with the clan leaders. In addition to these the clan council also decides which pasture to be used and which to be reserved for future use and regeneration. Grazing reserves (*deso*) are used in times of hardship when the normal rangelands are fully exhausted. However, in the Middle Awash such institutional protection of grazing reserves has been undermined by recurrent drought and fragmentation of rangelands due to large agricultural investments, expansion of invasive species as well as inter-ethnic conflicts over resource use. For example, many clans who deseeded from their previous holdings locally known as '*Woyima'* (gusts) have lost significant portions of their grazing land for the aforementioned reasons as a result they are forced to sustain their livelihood as alien resource users on other clan lands particularly on *Debni* (host) clans lands. This has created a situation of unpleasant gust-host relationships that is nowhere else in Afar except in the Middle Awash.

6.1 Traditional Leadership and Institutional Governance Transitions

Ever since Emperor Minilik II expanded imperial Ethiopia to officially include the Afar territories and other periphery areas the traditional leadership and its allied institutional arrangements have been subjected to change (Markakis, 2011). The inclusion of the Afar territories into the Empire in the first place successfully removed several sultanates leaving only the Aussa Sultanate as the sole political and spiritual leader of Afar (Puddu, 2016). Until the introduction of the 1955 constitution though pastoral areas came under State controls it was generally considered as "*no man's land*". However, particularly in the Middle Awash Afar significant governance change have occurred over the past fifty years after the 1955 constitution that decreed all lands and resources that are not owned privately are state domains.

Following the decree large areas of communal rangelands of the Awash flood plain were converted into state farms, private farms, settler farms and permanent settlement areas. These changes of property ownerships in turn affected the traditional leadership mechanisms and their mode of productions. For instance, pastoralists whose clan lands (*Kedo-bado*) confiscated for the aforementioned purposes were forced to shift from nomadic pastoralism to a kind of mixed crop-livestock production systems which they

had never experienced it so far. The change further tried to deepen its root by integrating the decentralized traditional leaderships into authoritarian central administrative structures of the Empire. In this regard, taking the experience from the highlanders, the *Sultan* was given the Imperial title *Bitwoded* (Governor), the clan head named as *Balabat (*land lord*)*, the lineage head as *Chikashum* (village master) and the *fimaa* head *Yegobez-aleka* (local police chief). The integration and the associated change in leadership titles were mainly designed to utilize the traditional structures in order to have grassroots representation and control over resources (Braukämper, 2013). This view has also been shared by the group discussants and elderly pastoralists interviewed in Amibara District.

Worse than its predecessor, the succeeding Military Communist Provisional Government dismantled the resources governance structures and property arrangements along with the imperial model of governance installed in Afar. At a national level the Proclamation No. 31/1975 has taken radical land reform measures including nationalization of all rural lands and redistribution to tillers. The military government also introduced new administrative units (peasant associations) disregarding the traditional leaderships with the purpose of strengthening its control and authority at a grass root level (Desta, 2006). Accordingly, the right to own land was vested in the state while access and use right was given to peasants through tight control of state mandated peasant associations. In general, the land reform policies of the military government had the least impact on the lowland areas, where pastoralists traditionally maintained their claims over grazing lands, since the new proclamation gave them rights of possession to land they used for grazing. However, pastoralists in the Middle Awash Valley had suffered a lot from the land reform policies of the military government as a result there was strong opposition to the land reform program to the extent that pastoralists demolished the state owned banana plantations and started sporadic armed struggle. Among other things the main reasons for their resistance were expansion of large scale state farms, distribution of grazing lands to individual cultivators of settled ex-pastoralists and above all insecurity of tenure.

Unlike all the previous governments, the present ruling front (EPRDF) introduced ethno-regional Federalism and decentralized governance systems with the intent of gaining and sustaining control of the country through exalting ethnic identity and hence,

the Afar National Regional State was born out of it. The EPRDF has created numerous formal pastoral institutions that ensured political representation and leaderships from Federal to Kebele level. The respondents drawn from elderly pastoralists and government officials in Amibara identified the situation in such ways that from all the transitions the replacement of traditional leaders by government officials; the bitter interactions between Kebele leaders and community members; and the shift in land ownership arrangements are the major changes that affected the endogenous leadership and governance systems of the study area. They also noted that though with subordinate roles the transition still leaves customary leaders in a position of power. Which the respondents explained it as "Before 1991 for example every decisions regarding rangeland governance activities was made by the clan leaders, but now replaced by Kebele leaders using the clan leaders as assistant". In spite of the changes to institutional governance, control and influence over the local population has not been completely taken away from indigenous to governmental institutions. The management of herd and grazing pattern, and its customary practices such as mobility, dispersion and diversity of cattle as well as tracking and flexible use of resources are regulated by clan leadership structures. From these one can understand that the governance of natural resources in Afar pastoral settings have been maneuvered by both informal traditional institutions and formal government agencies. On top of these the resilience of the SES largely depends on the mode of interactions of various institutions (formal/ informal), and institutions and the communities at grassroots levels.

6.2 Social, Institutional and Governance Factors Influencing Resilience

This section has two main parts that presented the analysis of factors influencing resilience from within the system mainly focusing on the social and institutional dimensions. The other sub-section presented the assessment results of certain attributes of governance functions that enhance the capacity of pastoralists to manage resilience. Herewith, the kinds of governance attributes that are taken into considerations are those that are commonly practiced by the Afar pastoralists in order to adaptively manage their natural resources. These are participation, deliberation, accountability, social justice, and institutional features such as multilayeredness and polycentricism.

6.3 Social and Institutional Factors Influencing Resilience

This sub-section presented the analysis of factors influencing resilience from within the system, in other words it explored the capacity of pastoralists and their institutions to build social-ecological resilience. In order to best understand the nature and sources of resilience analytical description tools that describe the identity of the system and visualize the thresholds were used. The analysis was also informed by the works of (Maclean et. al., 2014), they suggested six attributes of resilience emerging from within the system. These are knowledge and learning which in this case referred to the collective capacity of pastoralists to respond to local needs and issues including knowledge partnership, diversity and innovation potentials. The other is the relationship between pastoralists and their ecosystem which in this case described as the long held sense of traditional responsibility to protect and preserve natural landscapes. The rest are engaged governance that facilitate sharing of local experiences and indigenous knowledge, as well as pastoral networks that mainly help to cope with drought and other challenges. These are summarized in the following system identity and thresholds related to rangeland governance institutions.

6.3.1 Identities of the Social-Ecological System

The analytical description tools of SES such as system components, relationships, source of innovation and sources of continuity suggested by (Cumming et. al., 2005) were used to describe the system identity. Parts of the descriptions were generated from the survey results of the SES description section illustrated in chapter five of this thesis. However, in this case, all the characteristics of the system described in chapter five is not necessarily important, rather elements of the system which if removed would alter identities of the system are only considered. For instance, if the pasture and/or parts of the clan institution missed, the system would no more denote the Afar SES. On the contrary, if parts of the formal government administration body removed the identity of the Afar SES would remain as it was. With this understanding the following elements were identified as the key distinguishing features of the Middle Awash Afar SES. Hence, livestock (camel, cattle, shoat, equines); rangeland resources (trees/shrubs, bushes, grasses, and water points); traditional institutions (*mekaban*, *doraa-idolaa*,

du'abe and *fimaa*) and social organizations (household, lineage, sub-clan and clan) are selected as the key defining components of the Afar SES. However, if anyone of the animal species or types of rangeland resources were to be greatly reduced as it has happened in the study areas in 2016/17 drought episodes the general description of the system would be still essentially valid. This statement may not be applicable to camels the most cherished animal and acacia the most sacred tree of the Afar tradition since they are the key to the Afar livelihoods and the classic features of Afar SES.

Among the components mentioned above one of the most important relationships in the Middle Awash Afar SES is the customary institution that includes the council of elders (*daar-idolla*) who have the ultimate says and found at the top level of the Afar traditional governance (*ma'ada*) system. They are generally responsible for cases that transcend the clan or ethnic boundary and also for contested issue that needed ratification or appealed for reversal after it have been decided by the (sub)-clan leaders. In carrying out these duties and responsibilities vested on them, the *daar-idolla* maintains strong relationships with different hierarchy of the clan leaderships and members as well as with other clan or ethnic groups. In the Middle Awash Afar SES the clan council having the legislative power created wider relationships with all the clan members in the processes of delivering decisions about the spatio-temporal allocation of rangelands for grazing, settlement, farming and emergency uses. The rangeland managers (*du'abe*), under the leadership of the clan leaders, are responsible for facilitating and mobilizing mobility of livestock and rotational pasture use. In implementing these responsibilities, the rangeland manager (*du'abe)* work with scouts (*geba*) to assess the potential grazing areas and possible threats; contact with clan members to announce the day of migration (*guuro*); monitor and evaluate the implementation of decisions as planned and ensure the supply of necessary logistics to the *geba* in time of *guuro.* They are also responsible to decide on shifting grazing areas based on the reports of the *fimaa*. Thus, in delivering all these activities the *du'abe* maintains strong relationships with clan members and leaders of different hierarchy.

The other important relationships are the *fimaa* institution that has the executive power. The *fimaa* works in collaboration with the (sub)-clan leaders as enforcer of decisions. The *fimaa* also gather information on key resources and hazards in collaboration with the scouts (*geba)* which they report it to the clan leaders and the rangeland managers

(*du'abe*). The information gathered by the *fimaa* will also be communicated to the (sub)-clan members, and lineage groups through *du'abe* for necessary preparations. They have also work relationship with council of elders as a respected defender of the *ma'daa* rules.

The other important relationships are the vertical relationships among the different layers of social organizations such as, clan (*kedo*), lineage (*dahla*) and households (*burra*), and the horizontal linkages within individual members or groups. In Afar SES, pastoralists generally sustain their production systems and mode of life through the indigenous institution *ma'ada* and its set of rule *adaa*. Through the *ma'ada* system the Afar people network each other and work together at different levels of their social organizations. For example, the *ma'ada* system created strong relationships among (sub)-clan, lineage groups and households, in dealing with issues such as NRM (pasture & water), conflict resolution, mutual assistance, external relationships, and emergency situations. They have also the tradition of reciprocal pasture and water use relationships with other clan members in times of hardships. There is also tradition of stock sharing relationship mostly among the same lineage groups. For instance, this deal is done between households having excess lactating stocks and households having productive man power but lost their stock for emergency reasons. The deal is to use the milk and male calf while returning the transferred stock with its entire female offspring. Livestock selling and sharing feast are the other social relationships observed in the Middle Awash Afar SES.

As argued by many authors, Afar pastoralists in the Middle Awash Valley SES have been strongly challenged by both natural and human induced problems that undermined the viability of their production systems and affected continuity of their traditional governance mechanism. In response to these challenges pastoralists of these particular SES were found to adaptively improve their customary practices and in the course of time they came up with kinds of technical and institutional innovations. For ex, changing herd compositions, stock reduction, feeding through cut and carry system, and diversification of livelihoods are some of the innovations which they introduced to the system. For instance, owing to the recurrent drought and its ramification for reduced water availability and land cover change from grass to bush encroachment, pastoralists in the Middle Awash SES are increasingly replacing cattle with shoat and camels. The

other innovation identified was stock reduction usually through selling cattle as a means of future risk reduction mechanism based on traditional weather predictions and assessment of actual range conditions. The local wise men are responsible for the predictions and in doing so they consider various biophysical entities including livestock, birds, insects, wildlife, wind and soils to predict the climatic conditions. Traditional seers (*hutukbyaa*) also took part in doing probabilistic predictions looking at the star. Usually the final decisions are made based on the predictions suggested, the assessment reports about rangeland conditions and the information obtained from *dagu* as well as incorporating formal weather forecast.

In addition to selling livestock, in times of extreme drought pastoralists slaughter small calves and let the mother to migrate with other herds. The respondents explained this practice of killing the calf as a wise decision to save the life of the mother cow otherwise, both of them will be lost as witnessed by different drought episodes of the past. Besides, pastoralists in the Middle Awash have introduced system of feeding livestock through cut-and-carry techniques to use pasture in the enclosure of the park. The purpose of introducing this technical innovation is to settle the resources use conflict between pastoralists and the Awash National Park authorities. Since the enclosures of the park were their prime grazing lands, conflict between the claimant pastoralists and the parks authorities become common phenomena. Recently, however, the claimant pastoralists and the park authorities agreed to use the forage in the enclosure of the park in the form of cut-and-carry (zero grazing) system along with they introduced institutional innovation. This includes setting traditional rules that govern collection, transportation and use of forages in the park. The innovation also includes institutional innovation in the form of forming groups for shared ownership or rent of carts and ensuring equitable distribution of the forages among themselves.

In Afar pastoral settings, feature of the SES that mainly contributes to both innovation and continuity is the traditional governance system which governs all aspects of the Afar life. Since the contributions of the *ma'ada* system in helping to foster innovations for resilient governance of the SES were stated above and hence this portion is limited to the role of the *ma'ada* system in ensuring the continuity of pastoral production systems and NRM traditions. As an entry point respondents were asked to list the major challenges to the continuity of the traditional production systems and governance

functions. Accordingly, establishment and expansion of large scale agricultural investment, sedentarization and urbanization of pastoralists, and increased vulnerability to livelihood crisis were identified by the respondents as the major causes of the problem. However, in spite of these daunting challenges the Middle Awash Afar are still resiliently struggling to maintain the continuity of the traditional production systems and rangeland governance functions through their traditional governance (*ma'ada*) system and its set of rules (*adaa*). For instance, one of the main contributions of the *ma'ada* system as outlined by the respondents is maintenance of pasture through facilitating seasonal livestock mobility and rotational grazing patterns. The system also set rules to protect cutting of trees, reserving degraded areas for rehabilitation, maintain biodiversity of particular importance such as medicinal plants.

The *ma'ada* system also helped to ensure the continuity of norms, values, traditions and maintain institutions through promoting effective informal education and strong cohesion among social units. In this regard, the Afar elders take the greatest responsibility of transferring their pastoral traditions and disciplining successive generations through effective informal education in the form of storytelling, oral poetry and proverbs. The *ma'ada* rules also obliged the generations to strictly abide by elders' advice. For example, the following Afar proverb clearly shows the credit given to elders' advice "*kena wenim kirkirol megiyan*" translated as one who fails to abide by elders' advice falls into a bottomless pit. The *ma'ada* system also allows each of the social units to enjoy multitudes of reciprocal rights when they are legitimately demanding while at the same time fulfilling certain obligations that are necessary for inter group solidarity, and continuity of the group as socially, economically and politically viable entity.

6.3.2 Thresholds Related to Institutions Governing Rangeland Resources

As explained in the system identity section above the most important components of the Middle Awash SES that shape relationship, innovation and continuity of the system are the customary institutions particularly institution governing the use and management of rangelands. Nowadays, however, these institutions are undermined by various factors that mainly include economic, political and climatic factors. Therefore, this section examines some of the extreme conditions affecting institutions governing rangelands

and considers how to visualize of thresholds for these extremes. As identified by the group discussant, in both extreme cases which will be discussed below, the main factors that push the Middle Awash Afar SES towards the threshold is shrinkage of rangeland resources. This is due to expansion of crop farming, inter/intra ethnic conflict over resource, grazing encroachments with invasive alien species and land use policies that disregard mobile pastoralism whilst favoring sedentary mixed livestock-crop farming.

It is somewhat difficult to empirically measure and to quantitatively determine where the threshold could be lined, and operationalize the concept of resilience in cases like governance institutions. Thus, to overcome the difficulty of operationalizing the concept (Cumming et. al., 2005) suggested that one can define thresholds for the identity of the system, instead of attempting to objectively measure the width and depth of stability domains. The threshold defined through this system identity approach could be taken as an integral part for evaluating the resilience of the Middle Awash Afar SES. It could also be applicable for other erratic dryland ecosystems where the livestock-vegetation dynamics are not density or carrying capacity dependent where pastoralists withstand the situation by moving opportunistically to better conditions.

The threshold at one extreme is related to factors that undermine the traditional institutions governing flexible use of pasture and water across time and space. The most pressing factors that undermine this flexible use of resources as identified by the respondents are recurrent drought and inter and intra ethnic conflicts over resource use. Particularly in Afar, climatic factors play important roles in deteriorating and shrinking of grazing lands directly by influencing water availability and vegetation cover, and indirectly through escalating conflicts among competing resource user groups as they opportunistically move in search of better conditions. For example, the expansion of commercial agricu1ture in the flood plains of the Middle Awash Valley has made the conflicts increasingly severe by reducing the dry season reserve areas of pastoralists.

Similarly, the Afar of Middle Awash are surrounded by the Kereyu to the south, the Issa to the east, the Argoba to the north and the Itu to the southwest. Among these the Issa and Kereyu are well armed and historic rivalry of the Afar of Middle Awash and also displaced them from their eastern territories, even recently they further pushed them away from their wet season grazing reserve areas of the Allideghi grassland.

Particularly, the so called *Woyima* clans receded from their previous holdings in fear of the Issa and Kereyu in which the situations forced them to be hosted by the *Debni* (owners) clans as secondary resource users (*womaa*). These generally resulted into shrinkage of grazing lands and overstocking of livestock due to denial of access to their former grazing land which in turn has disrupted the mobility and rotational grazing patterns of livestock in the Middle Awash Afar.

Therefore, if pastoralists lose mobility and rotational grazing, like the case of the Afar in the Middle Awash, then all the factors influenced by herd mobility and rotational grazing will eventually be affected. As seen by the respondents, rangelands are overused to the extent that its regenerative capacity severely hampered which in turn resulted in decimation of livestock population especially during the 2016/17 drought episodes. Since threshold measure for herd mobility might focus on the number of livestock that do not move away from clan land in accordance with the customary practices, hence the thresholds for herd mobility and its governance institutions would be deemed to have been crossed (Robinson, 2012). Likewise, the threshold sits for institutions governing rotational grazing patterns have been crossed as the livestock graze on both the dry season (*suguum and hagaayi*), and wet season (*karma and gilaal*) pastures all the times without differentiation.

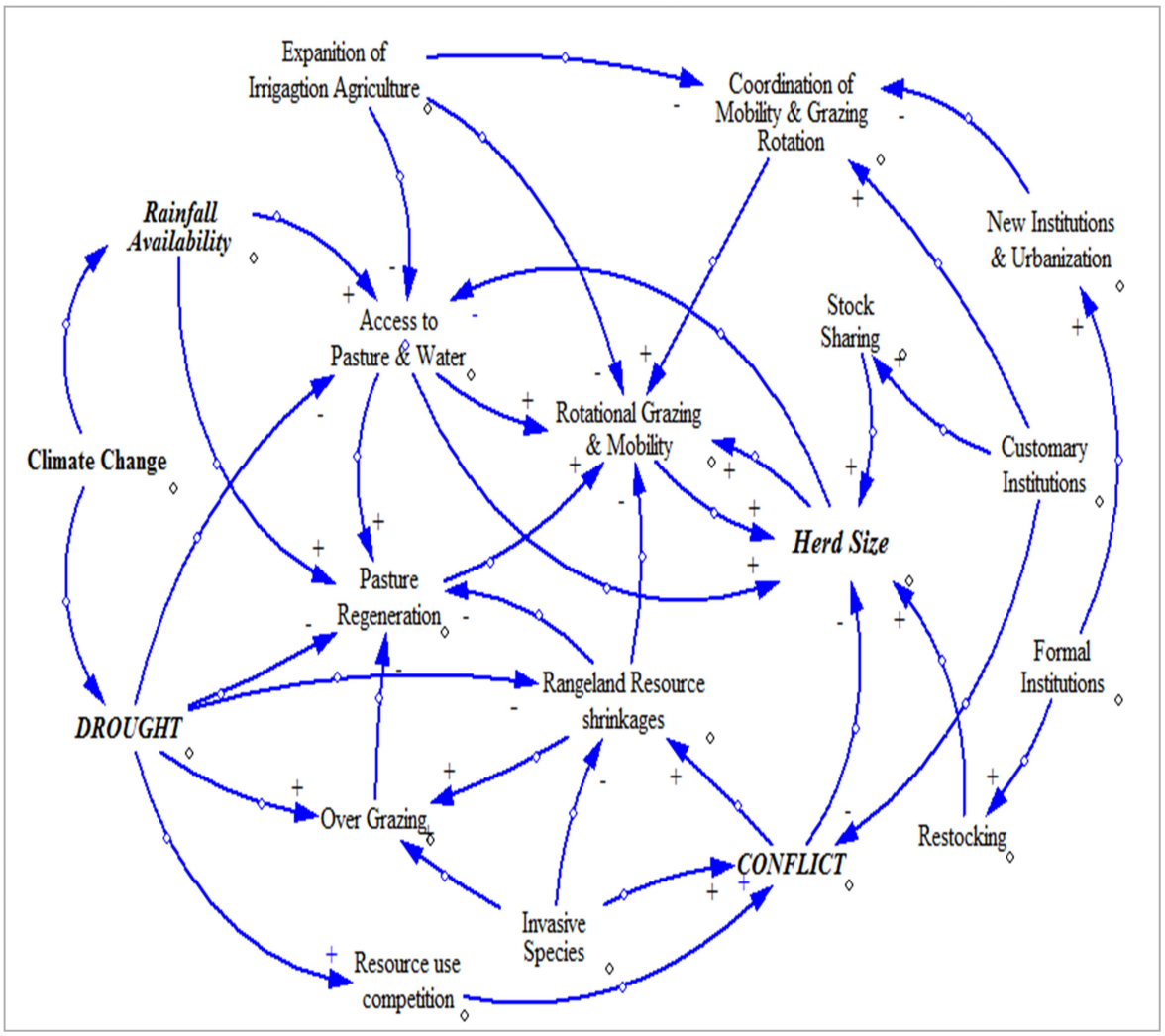
At the other extreme the threshold deemed to be crossed if the institution loses its capacity to deliver what it is actually expected to do. Based on this argument, the institutions that are mentioned above as the key distinguishing characteristics of the Afar SES are crossed. For instance, the *daar-idolaa* meetings that had been usually assumed to decide on issues of resource use and management nowadays carry out meetings rarely and their decisions are sometimes violated by government officials. The *fimaa* members that have been swiftly executing decision passed by elders in accordance with the *Adaa* rules are now becoming reluctant and rather focusing on personal fortune seeking. For this, a typical example mentioned by the respondents is the erosion of the *Adaa* rules that prohibit the cutting of important trees like *Acacia* species. They further explained that though Acacia trees are their dry season fodder reserves that seem no longer valid today more than Acacia charcoals as the executive capacity of the *fimaa* institution get weakened. These are a c1ear sign of crossing thresholds set for resource governance institutions. In general, such disintegration of

institutions and the breakdown of traditional rules have affected the capacities of the Middle Awash Afar pastoralists to build resilience of their SES.

In addition to analyzing the identity of the system and sitting thresholds it is also necessary to visualize some of the dynamic elements and cycles of the system in order to have a holistic view of the interaction and dynamism of the Middle Awash SES. Accordingly, the system visualization in this case explicitly focuses on factors that undermine resilience (negative feedbacks) and the traditional mechanisms that pastoralists used to build social-ecological resilience (positive feedbacks). For example, as shown in figure 7 the dominant cycle that undermined the resilience of the Middle Awash Afar SES are the cycles that are mainly dictated by drought and inter and/or intra ethnic conflict.

As shown in the figure below herd size increase and decline with climatic conditions of rainfall availability and drought respectively. Drought and conflict directly or indirectly reduce herd size but naturally this is followed regrowth of herds. Generally, Afar households that have fallen below a minimum threshold level of herd size look for traditional forms of stock sharing and/or restocking by the government or NGOs. For example, the 2016/17 drought severely reduced the livestock population that pushed almost all households to fall below the threshold hence the traditional stock sharing mechanism was found to be totally abandoned as no pastoralists have livestock to spare. This in turn, reduced livestock mobility since pastoralists have insufficient number of cattle to herd. The recurrent drought also created a condition in which pastoralists are forced to sustain their livelihood on aid and unable to seek out better pasture. So, nearby areas over grazed, pasture regeneration capacity reduced, resource use competitions escalated, reproduction is hampered and the households remain susceptible to future drought. Thus, this cycle of reinforcing problems (negative feedback) created a vicious circle that represents the weakening of the elements of the social and ecological systems.

Figure 7: System influences and visualizations



Source: Own construction based on data obtained through group discussion with pastoral elders & local experts. Key:(+)reinforcing feedback; (-)sign shows negative feedback loop.

6.4 External factors Influencing Resilience of the Social-Ecological System

This section explores the association between the selected governance attributes and the capacity to manage resilience. This can ultimately be expressed in terms of the degree to which the system is capable of learning and adapting to the change in SES and the capacity of self-organization after the occurrence of crisis. Therefore, the relationships between governance and the ability to manage resilience have been explored in terms of the key governance functions. In order to provide a succinct overview of the findings the assessed governance functions has been organized into three prepositions (Lebel et. al., 2006). These are (a) participation and deliberation, (b) polycentricism and multilayeredness, and (c) accountability and social justice. The ability to manage

resilience depends on stakeholders' social networks that link across scales and levels; institutional arrangements that fit into a particular SES and the nature of the ecosystem. In order for a system to self-organize, adapt and learn this ability need to be further broken down into capacities (Lebel et. al., 2006). A system having the capacity for self-organization, learning and adaptation can create ways to maintain and recreate its identity, and can get better at pursuing a particular set of governance objectives over time with the capacity to adjust itself (Folke et al., 2005).

6.4.1 Engagement in Genuine Participation and Deliberation Processes

As argued by many authors my preposition is based on the assumption that trust and shared understanding that are much needed to mobilize and self-organize a system is built through iterated participation and deliberation respectively. In my argument genuine participation and deliberation are interlinked concepts. In that participation facilitates and encourages bringing forward different issues and interests for public scrutiny while deliberation allows the difference in interests, issues and expectations to be explored without forcing one another. Trust and mutual understanding built up through these help to create a platform for coproduction of knowledge and mobilizing communities around uncertainty, enable social learning and establish linkages between institutions across levels. This in turn, fosters the creation of networks of nested institution and nested deliberation and lays the basis for self-organization around looming thresholds (Ostrom et al., 2014). Thus, it is on the basis of the above reviewed resilience characteristics that I try to evaluate whether the participation and deliberation made by the Middle Awash pastoralists enhance resilience of the SES or not.

The other very important point worth mentioning is that the research adopted institutional approaches to participation since community based natural resource management is often base on the rationale of participation as building community capacity. Participation in this case is the involvement of community members in community institutions with the aim of building community capacity in the SES through deliberative process that strengthens trust and institutional linkages at various levels. It is also assumed that the capacity generated through the processes of genuine participation and institutional linkages provide the capacity for stakeholders to take collective action which in turn influence the resilience of SES, by shaping the way their

SES works (Robinson, 2012). Thus, here I also try to look at the participation approaches pursued by the Middle Awash Afar pastoralists to decision exploring processes with a particular emphasis given to the traditional approaches to participation and deliberation in decision-making activities.

It is evident that, in Afar pastoral societies much of the meetings on deliberative processes and important decision-making activities take place occasionally when the need arose. Among the Afar of Middle Awash, important decisions including rangeland governance activities are made by *Iddola* meetings that are organized at different hierarchies of social organizations. These are clan council, sub-clan council, and *Ganta* members who are usually of the same lineage groups. Most of the meetings and deliberations pursue permanent institutionalized processes. Meetings usually begins with sharing of the issue to be deliberated and end up with blessings of the religious man which the Afar call it *Fatiha*. The meetings and deliberations are usually carried out to decide on issues of shared concern and to arbitrate disputes. For ex, in Afar deliberative meetings, such as the *Iddola* take place to decide on, which pasture to be used and which to be protected for regeneration and future use. The other deliberative meeting that the Middle Awash Afar carry out to settle dispute is *Mabolo* the traditional deliberative forum to settle disputes.

In this case, respondents indicated that deliberation and decision-making activities carried out are democratic even though participants are predominantly male. Depending on the seriousness of the issues raised the meetings and the deliberative processes will take more than a day long. The length of the meetings as identified by the respondents is due to the reason that participants usually reach a consensus after long and repetitive deliberations considering different views, opinions, reflections and reasoned arguments. Generally, in Afar societies the central aim of making deliberation is to reach a consensus and prevailing peace among individuals, group of communities or between ethnic groups. The adaptive strategies or resilience features of the Afar such as the rotational use and management of rangelands facilitated through deliberation. Livestock management such as herd splitting and herd diversification, and establishment of strong economic and social support networks are also collectively facilitated through deliberative decision-making processes.

The Afar pastoralists living in such fragile ecosystems have endured through history in this sense they are considered as persistent. However, I will not be guided by this premise of pastoral resilience sine my focus is not on the survival of individual pastoralist households, rather it is on the adaptability of pastoralists at the systemic level through collective action. In order to examine whether these processes of participation and deliberation enhance the collective capacity of pastoralists to manage resilience, thus, we need to look at various aspects of rangeland governance functions. These include the social networks, linkages among institutions, institutional arrangements and governance structures that provide assurance (trust) and mutual understanding and thereby enhance resilience. In this regard, the overall contribution of participation and deliberation made in the Middle Awash SES does not incorporate some of the key features of resilience. For example, the *Madaa* institution at a local level is limited to their own clan territory that have neither properly linked nor nested with other institutions. Here we see the problem of what (Ostrom, 2009) call it "small is beautiful". Environmental scholars explained the problem as the inability of maintaining links across spatial, functional and ecological scales, as it seeks to place jurisdiction at local or communal levels.

The other major challenge identified is related to issues of social networks of cooperation, experiential learning and coproduction of knowledge, and mobilizing people around uncertainty has becoming deteriorated. A key informant and group discussants in *Allideghi* related the problem with rising pressure on rangelands and shrinkage of grazing resources due to expansion of cropland and invasive species, and recurrent drought. Through these the Afar system of rangeland governance is being constantly undermined, traditional rules break down, institutions disintegrate, social networks weaken, thereby pastoralists interest to participate in NRM activities get reduced. The respondents also added that immigration of non-locals and out migration of locals as well as inclination of the Afar youths towards urban lifestyle than pastoralism (Filintan, 2013) which in the long run affected the sharing of knowledge that the elders accumulated through time. It was also observed that the growing tendencies of pastoralists relying on aid have weakened the traditional disaster preparedness and mitigation mechanisms.

6.4.2 Multilayered and Polycentric Systems of Institution and Governance

The other key governance functions influencing resilience and examined in this topic are multilayered and polycentric systems of institutions and governance. The argument is based on the works of (Ostrom, 2010) which he explained that polycentric and multilayered system of institutions and governance improve the fit between knowledge and collective action. This allows societies to respond adaptively at appropriate levels by encouraging close follow up and enhancing institutional incentives. In a more nuanced way it is to mean that governance structures with multiple and independent centres of authorities and multilayered and nested institutional arrangements can create opportunities for locally appropriate institutions to evolve and adapt to the changing circumstances of the SES. Moreover, (Ostrom, 2010) suggested that overall governance arrangements for resilient NRM must be an appropriate mix of local and state institutions. She suggested that this provide strong support for the strengthening of local institutions to mediate conflicts and enforce resource use agreement worked out by various local groups. Thus, in the following paragraph the robustness of institutions operating in the Middle Awash Afar SES will be evaluated using the abovementioned arguments as a benchmark.

It is clear that in the Middle Awash Afar SES, institutions governing rangelands are mixed government organizations and traditional clan-based institutions. The statutory system has hierarchies from Federal to Woreda and then Kebele levels. The traditional institutions also have different governance structures that are instituted at different levels of the clan system. Therefore, the question is, do these traditional and formal government institutions have a kind of polycentric and multilayered arrangements that enhance the capacities of the communities to build resilience of the SES. In order to answer this question some of the key indicators for polycentric and multilayered governance institutions are assessed. One of the indicators as outlined by (Lebel et. al., 2006) is the presence of decentralized and cross-scalar coordination of resources that involves the transfer of decision-making authority from central to local levels to creating linkages across scales.

Regarding decentralization both the formal and traditional governance arrangements in Afar are decentralized, and decision-making authorities and political power are

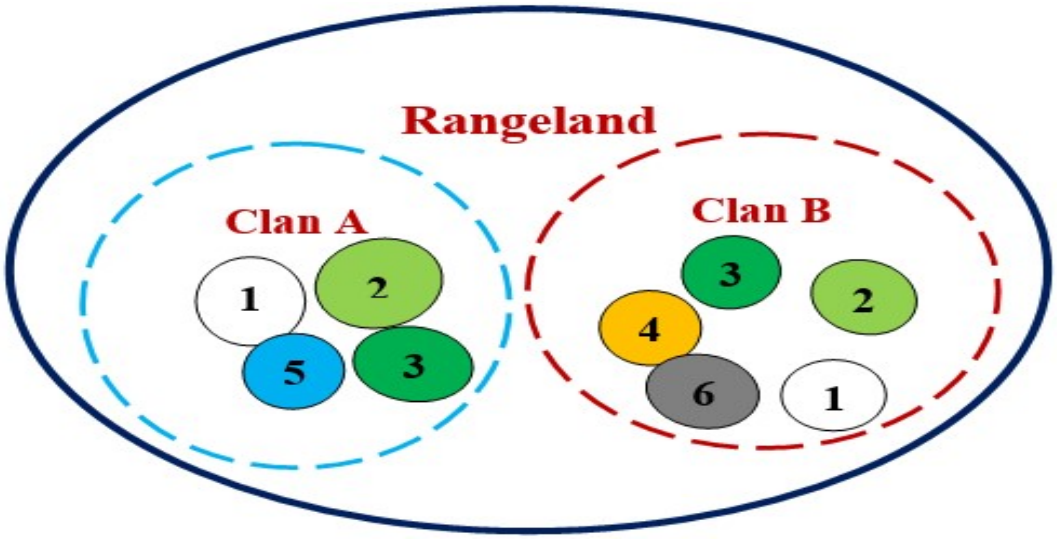
assumed to be devolved at lower levels. However, the decentralization of power and authority does not ensure genuine participation of local communities in decision-making activities and unable to create multiple and independent layers of authorities. As of the respondents the reason for the failure is flawed decentralization reforms introduced in 1994 created and nurtured new local elites who became political cadres and the local networks of corruption and nepotism. The respondents explained that the corruption and nepotism networks supported by political power on the first hand weaken the existing decentralized traditional system of resource governance. On the other hand, create a kind of monocentric hierarchical authorities that are deviously maneuvered by higher level authorities. These views of the respondents are congruent with the findings of (Lebel et. al., 2006).Which they concluded that decentralization is prone to several pitfalls that hinder transparency and accountability and could be prone to local elite captures and proliferations of local political entrepreneurs that did not exist before. Regarding the effectiveness of cross-scalar coordination of resources, major problem was observed. In that the governing institutions are not designed in a way to address the ecological scales since both the traditional and formal governance institutions are limited to their own clan territory and jurisdiction boundary respectively. These in general, reduce flexibility, hamper mobility and patterns of resource use, and undermine the ability to adjust to unforeseen circumstances.

The other indicator is the presence of functional linkages between institutions across scales and levels. It is clear that in the governance of fragile ecosystem like the Afar commons, connections between institutions across scales is thought to improve resilience to shocks and stresses. Such institutional linkages are also important parts of the governance system of rangelands that provide the collective capacity to influence resilience. It could also help to creating networks of nested institutions and nested deliberation processes. From this perspective the institutional linkages in the Middle Awash Afar SES are not that much satisfactory. For example, multilevel interaction across administrative boundaries and clan territories, and vertical integration at different levels of rangeland governance were found to be loosed and disconnected both in the eyes of the respondents and previous researchers. In creating networks of nested institutions and nested deliberation within the clan system the traditional institutions were working better. However, currently the effectiveness of the institutions to create networks and the sustainability of such nested institutions get affected. As of the

respondents this is mainly because of the lack of external support and recurrent drought that severely affected the traditional practices of NRM coping strategies.

However, in rangelands there are much stronger cases for governance structures to cut across administrative boundaries that reflect the realities of resource use patterns and seasonal mobility. In this case a nested governance structure having multiple and independent centers of authority can hold more significance, with governing institution of numbers of user groups that might be organized based on landscape approach such as river basin management, watershed management or any rangeland management units of water, tree or pasture. In well-functioning rangeland societies there exist structures set up to govern these different resource units. The following diagram shows the overall structure of nested institutions that had been practiced in the Middle Awash Afar.

Figure 8: **Nested institutional structures**



Key: 1= water, 2= Clan grazing reserve, 3= Woodland, 4= Communal dry season grazing land, 5= Communal wet season grazing land, 6 = Individual plots of land

The figure portrayed a traditional nested institutional structure established based on the ecosystem services on which the communities depend on. Nowadays, these nested institutional arrangements are not that much functional due to different internal and external pressures. Some of the reasons as identified by respondents and local experts are summarized as follows. Lack of enabling legal frameworks that support community-based initiatives and multi-scale governance of rangelands is one of the major drawbacks of sustaining the nested institutional arrangements. The respondents

explained the situation in that the traditional knowledge and practices that pastoralists use to sustain their livelihoods in the face of multiple stressors are neither appreciated nor integrated with scientific knowledge and adaptation interventions. The other drawback mentioned by local experts is the lack of investment in the building of capacity of local government authorities and community leaders. This would help to better understand the changing characteristics of rangeland ecosystems and support their transformation into more resilient entities through marrying the traditional and scientific knowledge.

6.4.3 Presence of Accountability and Social Justice

The third and the last category of key governance functions influencing resilience that are examined in this topic is accountability and social justice. The preposition pursued is accountable authorities who ensure fair distribution of benefits and involuntary risks enhance the resilience of the society as a whole including the most vulnerable groups. In this vein the basis for the argument is authorities who are answerable and who can be sanctioned for wrong doings can be hold responsible by groups or individuals who are unjustly disadvantaged in sharing of benefits and involuntary risks. In other words, it means that accountable authorities provide timely symmetrical information and explain the decisions made and actions taken, and they can be sanctioned when their performance and communication is unsatisfactory to the communities they represent. Hence, the governance system of the Middle Awash SES is examined whether or not satisfying the prepositions and arguments stated above.

Unfortunately, however, the assessment results indicated that both the formal and informal institutional arrangements were found to be hardly answerable to their constituency and, are not in a position to properly consider unequal circumstances in the society. The absence of accountability and unjust distributions of benefits and involuntary risks are still the major challenges undermining the capacity of pastoralists to influence resilience in the Middle Awash SES. Lack of transparency of authority, lack of stakeholders' awareness of their rights and responsibilities, hereditary system of reallocating traditional leaders, and clientelistic relationships between authorities and the society are the major challenges identified by the respondents. The appointment of local authorities and allocation of resources by the regional authorities generally lack

transparency and has undermined the accountability of local government officers to the local stakeholders with their performance being assessed at the higher hierarchy rather than at the local level. In connection with this the respondents affirmed that there exists only upward with no or very little downward accountability. Which they believe this in turn, created a lack of confidence of pastoralists in their own governance systems and as (Sommerhalter, 2008) indicated that the long-term practice of top-down approaches in decision-making can also undermine their capacity to participate and collaborate in efforts to manage resilience. Therefore, the system need to take into account that accountability of the governance institution to its constituents, and potentially include the development of performance and accountability measures, such as indicator and evaluation, as well as creating opportunities for stakeholders to participate in decision-making activities and provide feedback to the institution on its operations.

All the respondents also agreed that there are not functional institutional procedures to hold both the traditional and formal government bodies accountable. Regarding the customary institution there is neither verbal agreements nor written procedures that keep authorities beholden to the community they are accorded to serve. This is mainly because of the reason that traditional leadership roles and its allied activities are done based on the assumptions of the freewill or volunteerism of the person in charge. Besides, it has been identified that hereditary mechanism of transfer of power and leadership position without any electoral procedure in place is the other major cause to the lack of accountability of the traditional leaders. From individual perspective lack of awareness is observed as major weakness to make authorities accountable and challenged for the unjust distribution they might made. For instance, from the 210 respondents interviewed about their awareness in key government policies and strategies concerning rangeland governance issues including land tenure arrangements only 21% are found to be aware.

Moreover, (Paulos, 2007) in his investigation why Ethiopia's post 1991decentralisation reform is not taking the desired directions of creating accountable and responsive governance at lower levels, found that the decentralization reform is flawed and a kind of clientelistic relationships. In this sense clientelism can be viewed as a more or less patrimonial relationship between actors or sets of actors commanding unequal wealth, status or influence, based on conditional loyalties (ibid). The relationship creates a

favourable condition for elite capture and the proliferation of political entrepreneurs using the devolution of power as a fertile ground. This is the realities what has been happening in the Afar pastoral settings that could be observed both in the statutory institutions in the form of bureaucracy and political party system. In customary institutions, it is manifested in the form of nobler-commoner relationship. This has made the decentralization process an elusive promise, and affected the downward accountability of authorities and just distribution of benefits and costs. Thus, these undermine the ability of the system to coordinate cross-scalar linkages and command legitimacy and trust among the resource users and authorities. Therefore, ultimately, the resilience and stability of the governance systems and the robustness of the institutions has been affected.

7. IMPACT OF LAND USE LAND COVER DYNAMICS ON THE GOVERNANCE OF RANGELANDS

This chapter presents the results and discussions of land use land cover (LULC) change and its impact on the governance of rangelands. The study employed satellite data generated through GIS techniques, and qualitative data gathered through focus group discussions and key informant interviews. The study area was defined to have seven LULC categories.

7.1 Analyzing Land Use Land Cover Change Using Satellite Data

The extent of LULC change and the magnitude of their relative changes over a period of 31 years (from 1987 to 2018) for the Middle Awash Afar, Eastern Ethiopia are presented in tables 6 and Figure 10. The land use types identified include; grassland, settlement land, cropland, natural woody vegetation cover (i.e. woodland, bushland and shrubland), water bodies, bare ground, and *Prosopis juliflora* invaded land. The figures depict the land use land cover maps for the years 1987, 1992, 2010 and 2018, for which the corresponding area extent and net change detection results for each of the land use land cover class are presented in the succeeding tables.

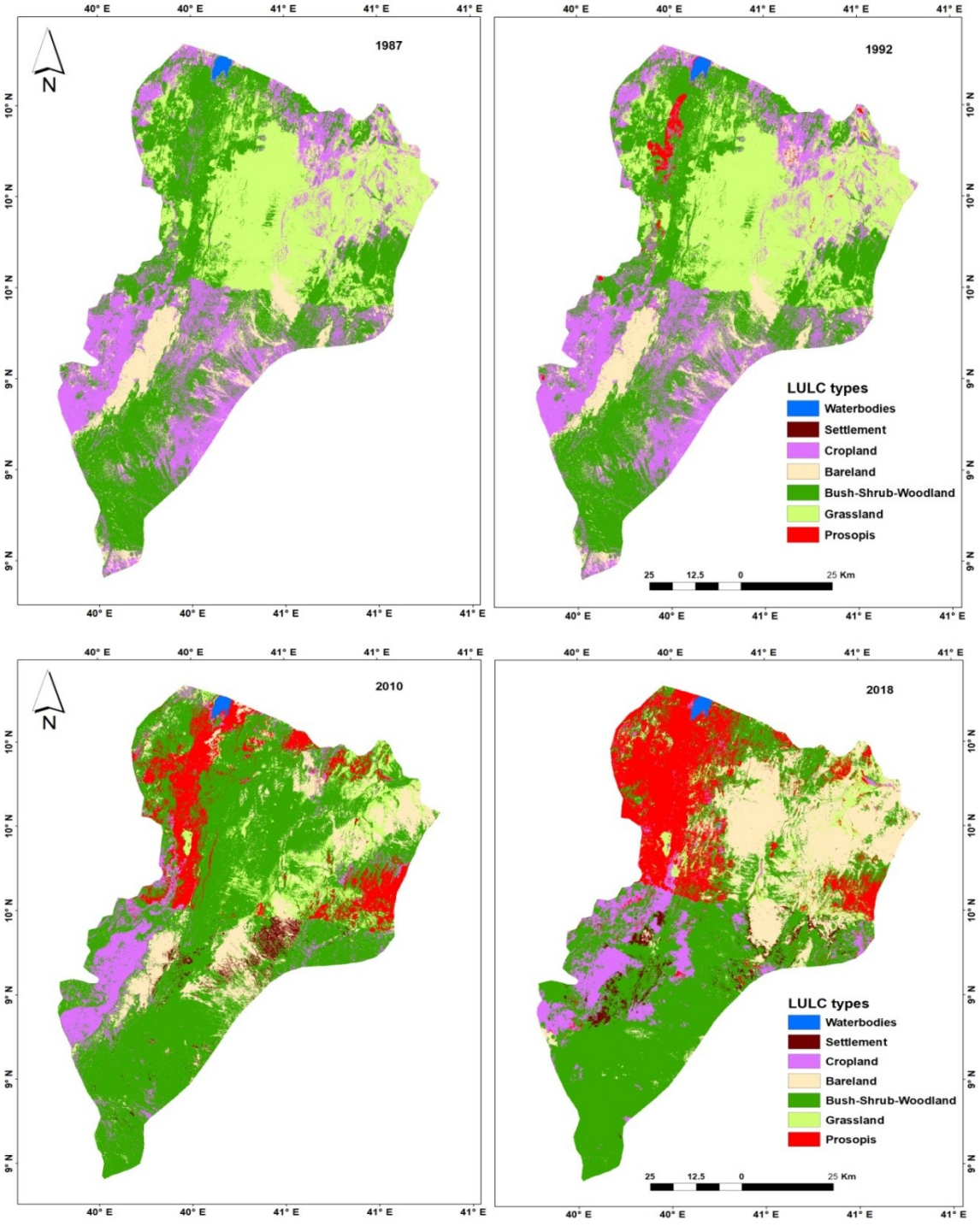
Table 7: LULC Change Detection for the years 1987, 1992, 2010 and 2018

LULC Classes	1986	Share (%)	1992	Share (%)	2000	Share (%)	2018	Share (%)
Grassland	108,577	27.7	108,941	27.8	26,545	6.8	15,909	4.1
Bush/Woodland	147,471	37.6	143,100	36.5	230,077	58.7	176,621	45.1
Water bodies	1,158	0.3	1,159	0.3	1,189	0.3	1,279	0.3
Cropland	97,604	24.9	97,464	24.9	33,186	8.5	35,182	9.0
Prosopis land	241	0.1	4,379	1.1	42,715	10.9	74,334	19.0
Bare-ground	36,782	9.4	36,783	9.4	50,635	12.9	80,987	20.7
Built up Area	123	0.0	140	0.0	7,619	1.9	7,654	2.0
Total area	**391966**	**100.0**	**391966**	**100.0**	**391966**	**100.0**	**391966**	**100.0**

Source: Own synthesis based on the satellite image detections

Moreover, based on the figures obtained from the satellite image the rate of change for each land use land cover and the conversions among the different land use/cover classes were analyzed for the periods 1987-1992, 1992-2010, 2010-2018, and 1987-2018.

Figure 9: LULC map for the four study years

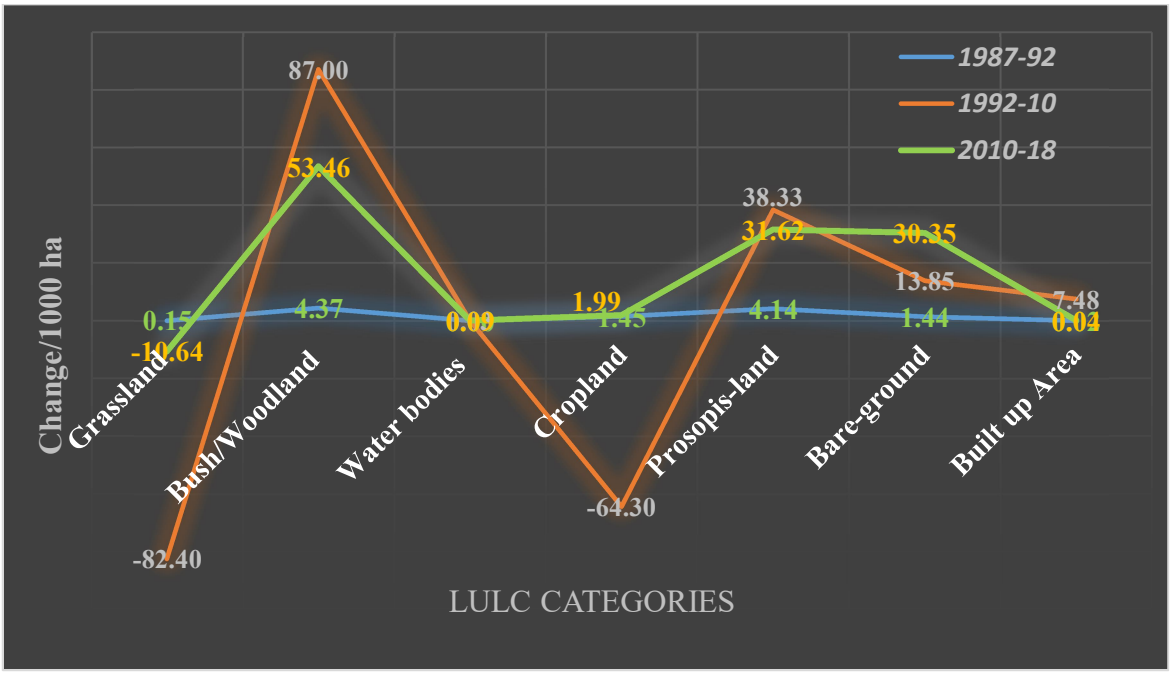


7.2 Land Use Land Cover Change Detection Results

The satellite image detection results indicated that grassland and croplands exhibited net decreases for the study years (1987-2018). Prosopis invaded lands, built up areas and bare grounds showed increment in all the study years. Natural woody vegetation covers exhibited a steady and fluctuating increase in all the study years particularly; bushes and shrubs were detected encroaching grasslands, while water bodies are relatively stable.

In the first period (1987-1992) of the study years, grassland increased by 0.3%, in the second period (1992-2010) decreased by 76%, and again decreased by 40% in the third study period. Natural woody vegetation (shrub, bush and wood) cover slightly decreased in the first study period followed by a 61% increase in the second study period while in the third period it showed a 23% decrease. Prosopis invaded land quite significantly increased in the first period by 1717% and also increased in the second and third periods but it was at a decreasing rate of increase by 875% and 74% respectively. Cropland showed decrease in the first and second period but slightly increased in the third period. Bare grounds increased at an increasing rate in all the study years.

Figure 10: Land Use Land Cover Changes for All the Study Periods



7.2.1 LULC Extent and Magnitude of Change from 1987-1992

The period of 1986 to 1992 showed different trends in land use land cover change in the history of Middle Awash valley ever since the area catch the eyes of governments and other interest groups. This is due to the fact that it was a transition period from the Dergue to the EPRDF government and it was times of major policy shift. Thus, the period exhibited slight increase in grassland cover by 364 hectares which conversely showed a decline in cropland by 440 hectares and bush/woodland by 4,371 hectares. The period also was marked with expansion of *Prosopis juliflora* from its plantation site covering 241 hectares to other land cover sites, invading 4,379 hectares with a net increase of 1,717%. Bare-ground and built up area also showed slight increase while water bodies remain relatively unchanged.

Table 8: LULC Extent and Change (1987 - 1992)

	Land Cover Extent		Land Cover Change		
LULC Types	**1987**	**1992**	**Hectare**	**%age**	**Status**
Grassland	109,087	108,941	146	0.3%	Gain
Bush/Woodland	147,471	143,100	-4371	3%	Loss
Water bodies	1,158	1,159	1.0	0.1%	Gain
Cropland	98,914	97,464	-1450	1.47%	Loss
Prosopis-land	241	4,379	4138	1717%	Gain
Bare-ground	35,482	36,783	1441	3.7%	Gain
Built up Area	123	140	17	0.1%	Gain

Source: Own synthesis based on the satellite image detections

7.2.2 LULC Extent and Magnitude of Change from 1992 to 2010

During the period of 1992 to 2010 major land use land cover change was observed in that large portion of rangelands or 11% of the total study area were invaded by *Prosopis juliflora*. Within this period, it accumulates a total gain of 38,336 hectares of land which is 9.75 fold of its 1992 status. The period was also marked with drastic expansion

of built up areas and an increase in woody vegetation covers particularly bushes and shrubs. Bareland and wetland also increased by 38% and 3% respectively. As we can observe from the land use land cover maps and from the land transformation matrix, the net gain of *Prosopis juliflora* has been accumulated from all land cover types even though the majority came from grasslands and abandoned croplands. The other major change observed during this period is the sharp decline in cropland which does not happen before and now.

Table 9: LULC Extent and Change (1992-2010)

	Land Cover Extent		Land Cover Change		
LULC Types	**1992**	**2010**	**Hectare**	**Percentage**	**Status**
Grassland	108,941	26,545	-82,396	76%	Loss
Bush/Woodland	143,100	230,077	86,977	61%	Gain
Water bodies	1,159	1,189	30	3%	Gain
Cropland	97,464	33,186	-64,279	66%	Loss
Prosopis-land	4,379	42,715	38,336	875%	Gain
Bare-ground	36,783	50,635	13,853	38%	Gain
Built up Area	140	7,619	7,479	5344%	Gain

Source: Own synthesis based on the satellite image detections

7.2.3 LULC Extent and Magnitude of Change from 2010 to 2018

The major land use land cover changes that have happened between the period of 2010 and 2018 are the change in Prosopis invaded land that showed a net gain of 31,619 hectares or 74 % increment from its 2010 status. The second one is bare-ground, expanding by 30,352 hectares which is around 60% of the preceding measurement years followed by 40 % loss of grassland which is 10,636 hectares. The remaining are a decrease in woody vegetation cover, a very slight expansion in water bodies and slight increase in cropland by 23%, 8% and 6% respectively.

Table 10: LULC Extent and Change (2010 - 2018)

LULC Types	Land Cover Extent		Land Cover Change		
	2010	2018	Hectare	%age	Status
Grassland	26,545	15,909	-10,636	40%	Loss
Bush/Woodland	230,077	17,6621	-53,456	23%	Loss
Water bodies	1,189	1,279	91	8%	Gain
Cropland	33,186	35,182	1,997	6%	Gain
Prosopis-land	42,715	74,334	31,619	74%	Gain
Bare-ground	50,635	80,987	30,352	60%	Gain
Built up Area	7,619	7,654	35	0%	Stable

Source: Own synthesis based on the satellite image detections

Generally, from the year 2010 to 2018 the major driving force in LULC changes were attributed by invasion of *Prosopis juliflora* in all land use types, expansion of irrigated commercial agriculture and desertification that ultimately contribute to the rise in bare grounds as well as degradation of natural vegetation covers due to overconcentration of livestock and deforestation of natural woody vegetation for local consumptions.

7.2.4 Gross Change in LULC Classes between 1987 and 2018

Generally, over the past 31 years (1987-2018), the gross changes in area coverage varied from one LULC categories to another with Prosopis-invaded land experiencing the most increase(74,093 ha) and grasslands undergoing the most decrease (92,668 ha) in area coverage while wetlands exhibiting the most persistent of all the land use land cover types. In terms of percentages change, Prosopis invaded lands took the greatest share accounting for 30,744% increase, followed by built up areas that accounts for 6,123% and bare ground hold the third place by 128% net gain. These indicate that the rangelands of the Middle Awash valley landscape has been changing from pasture land into unusable land types such as Prosopis invaded lands and bare grounds as well as expansion of built up areas due to urbanization which also does not have significance to the pastoral way of life. The following table and graph summarizes the net land use land cover changes.

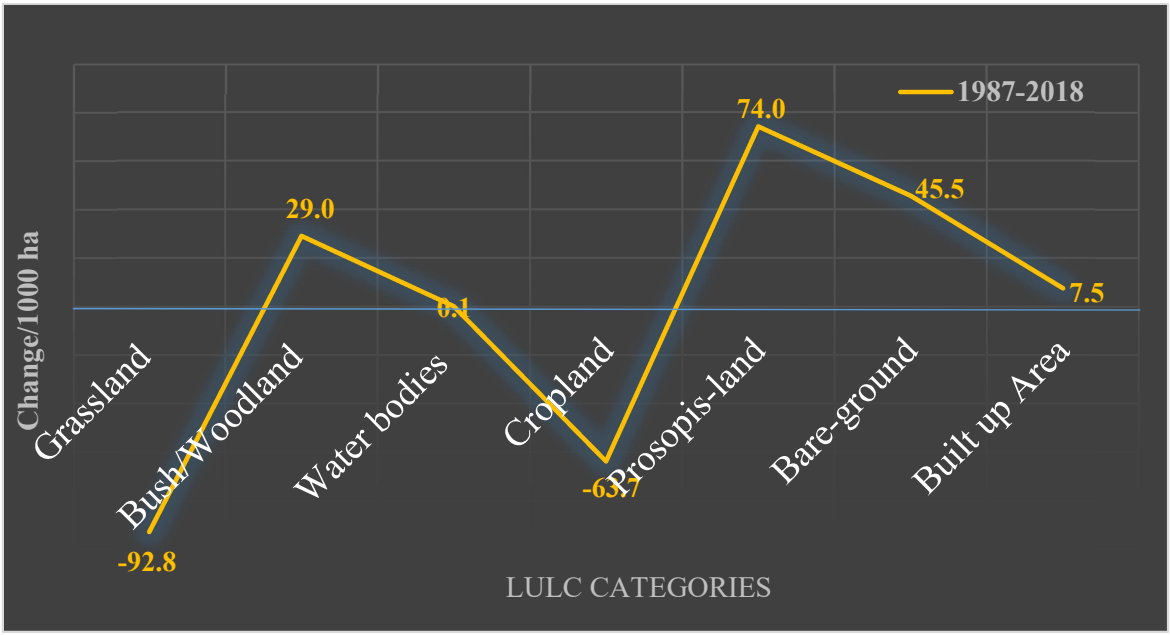
Table 11: LULC Classes and Net Change (1987-2018)

LULC Classes	Land Cover Extent		Net Change		
	1987	2018	Hectare	%age	Status
Grassland	108,577	15,909	-92,668	85%	Loss
Bush/Woodland	147,471	176,621	29,150	20%	Gain
Water bodies	1,158	1,279	121	10.4%	Gain
Cropland	98,914	35,182	-63,732	64%	Loss
Prosopis-land	241	74,334	74,093	30,744%	Gain
Bare-ground	35,482	80,987	45,505	128%	Gain
Built up Area	123	7,654	7,531	6123%	Gain
Total Study Area	**391,966**	**391,966**	**0.00**	**--**	

Source: Own synthesis based on the satellite image detections

The detection results also indicated that currently the largest share of the rangelands are occupied by bush and shrub covers which accounts for 45% of the total study area followed by bare ground and Prosopis invaded land accounting for 20.7% and 19% respectively. Grassland occupied 4.2% while cropland appropriating 9% of the total study area. The transition matrix also showed that cultivated land is converted from grassland, bushy grassland, and scrubland.

Figure 8: Gross Land Use Land Cover Change (1987-2018)



Generally, for the past 31 years (1987-2018), the gross changes in area coverage varied from one land use land cover class to another with grassland experiencing the most decrease with net losses of 92,668 hectares followed by cropland experiencing net losses of 63,732 ha. Prosopis invaded land showed drastic expansion by 241 hectares from 1987 when it was detected for the first time to 74,093 hectares in 2018. The 2018 satellite images showed that currently bush/woody land have the highest area coverage followed by bare grounds that most gained from abandoned cultivated lands and degraded grasslands. The third in terms of area coverage is Prosopis land while wetland has the lowest area coverage having a total of 1,279 ha.

As shown below in table 12, between the periods of 1987 to 2018, grasslands having the lowest net persistence ratio of all the land cover classes has released 25.04% of land area mainly to bare-ground through overgrazing and drought that accounts for 56.18% of the total loss of grasslands followed by bush encroachments that took 24%, significant portion of grasslands were also detected to be invaded by Prosopis and also cropland gained from grassland through appropriation of land for agricultural activities. Woody vegetation covers such as bush/shrub and wood land though have the highest persistence ratio showed high percentage of loss next to grasslands. It mainly released to Prosopis through invasion and to bare ground and cropland through deforestation. On the other hand, Prosopis invaded land having the highest net persistence ratio gained from all types of land cover classes including bare grounds without releasing to any of the classes. Wetlands remain unchanged thus it is the most persistent of all land cover types having a net change close to zero.

Although cropland gained from grassland, bareland and woody vegetation at the same time an equivalent or higher area of cropland reverted to grassland, bush/shrub land and bareland. The greatest net increase was for cropland, primarily converted from grassland, bushland, scrubland and woodland cover types. The magnitude of the net change to persistence ratio was large for grassland and cropland, with an increment towards the negative direction, whereas Prosopis invaded land and bare ground showed the highest net change to persistent ration with an increment towards the positive direction. The remaining land use land cover types had net change to persistence ratio close to zero showing higher tendency of persisting change over time.

Table 12: Transition Matrix of LULC Classes (1987-2018)

Initial year (1987)	Final year (2018)								
	LULC Type	**Grassland**	**Woodland**	**Wetland**	**Cropland**	**Prosopis**	**Bareland**	**Total 1987**	**Loss**
	Grassland	**2.76**	5.97	0.00	0.41	4.51	14.07	27.80	***25.04***
	Woodland	0.78	**15.57**	0.02	2.67	13.75	3.52	36.96	***21.39***
	Wetland	0.00	0.00	**0.29**	0.00	0.00	0.00	0.30	***0.00***
	Cropland	0.49	20.17	0.01	**5.31**	0.62	0.80	27.88	***22.57***
	Prosopis	0.00	0.00	0.00	0.00	**0.40**	0.02	0.06	***0.03***
	Bareland	0.12	3.35	0.00	0.59	0.09	**2.25**	7.13	***4.88***
	Overall persistence							**26.22 b**	
	Summary								
Total 2018		4.06	45.06	0.33	8.98	19.00	20.66		
Gain		***1.30***	***29.49***	***0.03***	***3.67***	***18.96***	***18.41***		
Net Change[a]		-23.74	8.10	0.03	-18.90	18.94	13.53		
Net Persistence [c]		***-8.60***	***0.52***	***0.10***	***-3.56***	***53.23***	***6.01***		

Note: The loss column and gain row indicate the proportion of the landscape that experienced gross loss and gain in each class, respectively. Bolded diagonal elements represent proportions of each LULC class that were static (persisted) between 1987 and 2018.

All the figures in the table are in percent except Net persistence, which is a ratio.

a. Net change = gain- loss.

b. The shaded figure is the sum of diagonals and represents the overall persistence (did not change).

c. Net persistence refers to net change to persistence ratio (net change/diagonals of each class).

7.3 Discussion and Implication of the Findings

Land use land cover changes in the Middle Awash Afar SES reflected spatial and temporal scales though the latter is with minor extent. The spatial land cover changes include; expansion of agricultural lands in natural vegetation cover such as grassland, bushland and woodland; expansion of bareland into grassland, bush/woodlands and cropland; introduction and invasion of *P. juliflora* into bushland, grasslands, croplands, woodlands, even on bare grounds as well as encroachment of bushes and shrubs into grasslands. While the temporal scales were the natural regeneration of woodlands and bushland on the same pieces of land after some years of clearing. With the exception of bush and shrubs encroachment into grasslands all other spatial changes including invasion of *P. juliflora* in the study area have been directly or indirectly driven by human interference in an effort to drive food and other services from the ecosystem as well as for societal gains.

Results of the analysis of the satellite images and qualitative data analysis generated from focus group discussions and key informant interviews showed that expansion of irrigated crop farming that mainly replaced grasslands and natural woody vegetation found along the river banks and flood plains are the major cause for the loss of dry season grazing resources. These losses of critical dry season grazing resources as argued by many authors are attributed to the failure of setting appropriate governance mechanism that do not consider the situation of pastoralists and the realities of the rangeland environments. Particularly, the appropriation of prime wet season grazing reserves of the Allideghi flood plain and the riverine of Awash for agriculture by the successive governments has been the results of ill-informed government policies which in general favoured plantation agriculture for the production of cash crops, while ignoring pastoral adaptation to these dryland ecosystems through mobility and flexible use of pasture. Above all it is undermining the pastoral production system of livestock herding as a whole. These neglects emanate from governance approaches that are less concerned with practical decisions to promote dryland resource management that mainly targeting on commoditization of the pastoral commons with no or less concern to the felt needs and priorities of the owners of the resources.

To this end, the land use land cover changes detected and shown in the above satellite images and its result tables are directly or indirectly related with the mode of governance and the land use policies followed by the consecutive central governments. Research documents revealed that the Middle Awash valley landscape remained undisturbed till the establishment of the Middle Awash Valley Authority (Markakis, 2012). The establishment was driven by governments' industry focused economic development strategy that aimed at producing raw materials and surplus food for the envisaged industries. During this period more than 70 thousand hectares of land were appropriated in the Middle and lower Awash valley. The project got intensified both in number and area extent at the expense of the pastoral livelihood and institutions governing these rangeland resources. In short, irrigated commercial farms during the Imperial era, state farms and villageization during the Dergue regime and land lease policy of the EPRDF government massively changed the land use land cover types of the study area.

In addition to the abovementioned statements, the land use land cover changes exhibited during the period of 1987 to 2018 exemplify the impacts of the national development policy on the dynamics of rangelands in the Middle Awash Afar landscape. For instance, a gross reduction in grassland from 1987-2018 due to appropriation of virgin lands for privatization and commercialization while at the same time redistributing previously appropriated and exhausted croplands to individual pastoralists and clans which immediately turned to bare grounds are a typical example of the neglect of pastoralism and governments' ill-informed and biased policies in rangelands. More specifically, decrease in croplands by 4,371 hectares and increase in grass covers by 364 hectares during the period of 1987 to 1992 was mainly due to the shift in government policies from centralized socialist ideology of state farms and producer unions to decentralized forms of governance that redistributed the state farms to the local pastoralists which they fallowed it to use as forages for livestock fed while the remaining 4007 hectares mainly turned to bareland lands (see table 12).

Furthermore, the group discussants and the key informants pointed out that the major driving forces of land use land cover changes in the study area are generally complex mixture of social, economic, political and ecological factors exacerbated by high rates of population growth and rapid urbanization and commercialization of rangelands as

well as drastic expansion of invasive alien species of plants which consequently resulted in the suffering of the pastoral livelihood and production systems. As mentioned above these views have been explored through involving individual interviews of elderly pastoralists and focus group discussions conducted to generate information on how pastoralists felt the land use land cover change and its ramification on their production systems and rangeland governance practices.

.

Accordingly, almost all the respondents (97%) reported that there have been observable changes in land use land cover and believed that the resultant changes affected their overall wellbeing including; reduction of livestock seasonal mobility and rotational grazing patterns, denial of access to riverine areas and river awash, increase in resource use conflict, forced and undesirable changes in livelihood and production system, dwindling and fragmentation of rangelands, the breaking down of traditional rules and institutions, as well as the negative impact of change on traditional rangeland resource use patterns and governance practices were reported. Hence, in the following paragraphs I will briefly explain the ramifications of the land use land cover changes on different rangeland governance practices in the Middle Awash Afar SES.

As explained in chapter one, until the establishment of the Awash Valley Authority (AVA) in 1962 the Middle Awash valley was mainly used by semi-nomadic Afar for extensive livestock production entirely based on natural vegetation covers of grass and woody species. However, under the management of AVA, development interventions in the Middle Awash Valley took the form of large scale mechanized commercial agricultural enterprises. These enterprises were mainly established on good quality grazing lands and expanded till 1986 appropriating nearly a total land area of 97,904 ha including the wet season grazing lands of the Allideghi plain which accounts for 25 % of the total land mass of the study area.

Consequently, competition over the remaining grazing lands increased, and hence the valley became regular conflict hotspots. In this regard, the focus group discussants explained that as more grazing lands reduced, competitions turned out to be more intense even among groups who were once allies. This in turn, threatened the social cohesion of the whole pastoral clan societies, and weakened cooperation and other traditional risk averting strategies that depend on negotiations with other pastoral

groups. Generally, the land use land cover change in the Middle Awash Afar has been the main causes for conflictual relationship within clans and among different ethnic groups that has also created 'no-go' zones in fear of each other groups. For example, the incessant conflict among the Issa, Kereyu and Afar ethnic groups has already turned the Allideghi grassland into an open grazing land with no defined boundary and users. In consequence, currently, the grassland has been reduced and changed to other land cover types such as bushy-grassland, Prosopis invaded land, bareland and scrubland.

The conflict over resource use driven by land cover change generally has environmental, economic and socio-political dimensions. The environmental dimension of the conflict that mainly arose due to expansion of irrigation agriculture in the Middle Awash Afar SES manifested in the form of rangeland degradation and tragedy of commons (Almaz, 2009). Though this research has not objectively determined degradation of rangeland based on scientific standards, it has been indirectly observed from overstocking of livestock in areas where natural vegetation covers are decreasing. This overconcentration of livestock has led to overgrazing and as a result extinction of forage species that has been commonly used by the livestock and having a particular importance to the nutritional requirements of animals. Interview of elderly pastoralists and focus group discussion in Amibara District confirmed that the species composition of forages has been severely reduced, and instead alien non-palatable plant species are sprouting and invading the areas.

Consequently, forced by these dire scarcities of pasture pastoralists move their livestock to other clan or ethnic territories where the pasture is relatively at a better condition and usually in this case conflict arises between the host and gust groups. Once the conflict is created it perpetuates itself in the form of vicious cycle. For instance, the conflict between the Afar of the Middle Awash and the Issa sub-clan of Somali has also contributed to further degradation of the rangelands and intensified the grazing pressure on the remaining rangelands of the valley which recently lead to the problem of non-excludability (no man's land) of the much contested Allideghi plain. Unless appropriate measure is taken, this in the very near future will create what Hardin called it tragedy of the commons provided that there are drastic expansion of bare grounds and invasion of Prosopis juliflora, as can be observed in the satellite images. The situations (dire

scarcity of pasture) has also created shift in the livelihood of the pastoralists and the weathering away of the age-old and deep rooted traditional governance institutions.

The other major consequences of land use land cover change in the Middle Awash valley are the change in livelihood practices that made pastoralists to be easily vulnerable to drought. It is evident that the Afar of the Middle Awash valley had been practicing (semi)-nomadic pastoralism for generations. However, government policies of rangelands that led to dislocation of pastoralists and expropriation of their prime dry season grazing lands in the riverbanks of Awash forced them to pursue another new livelihood practices such as agro-pastoralism and sedentary crop farming. The dislocation and relocation of Afar pastoralists from their seasonal residence patterns to a permanent residence (*Sefera*) along the Awash River has rendered them extremely vulnerable to drought. To this end, evidence suggests that the great famine (*Unda Abar*) of the 1973/74 and the 1983/84 famine were not caused entirely by drought, but rather by the dislocation of pastoralists for large-scale irrigation development, and the ensuing loss of grazing and water resources, livelihood change and environmental degradations(Pankhurst, 1986).

Elderly pastoralists participated in the focus group discussion confirmed the above statements and further explained the impact of drought as it was not only the losses of livestock, but also followed by change in vegetation cover from annual grass to bush cover, escalation of conflicts, frustration and loss of confidence in pastoral way of life, as well as disintegration of the social fabrics and its allied traditional governance institutions.

The other most critical impacts of land use land cover change identified through focus group discussion and key informant interview is the impact of P. juliflora which according to the 2018 satellite image invaded 19 % of the total land masses of the study area. The majority of the respondents (94%) identified the negative impacts of this alien invasive thorny species of plant as a threat to livestock production, wildlife and biodiversity as well as human health. However, very few or 6% of the respondents identified and argued its positive contributions to the local livelihoods in terms of its use as animal fodder, fuel wood, and construction materials. In addition to the respondent pastoralists, the local experts while recognizing the abovementioned

negative impacts, they also explained the positive roles of *P. juliflora* in rehabilitating degraded land and improving soil fertility through reduction of erosion by reducing wind speed and the velocity of runoff. The local experts also added that *P. juliflora* helps in reducing desertification and adjust the micro-climate as well as in the reclamation of saline and sodic affected soils. These views of the respondents are in consistent with the findings of (Almaz, 2009).

Generally, as shown in the transition matrix table12 *P. juliflora* took 13,114 ha of land from bush/woodland, 457 ha of land from grassland, 2,309 ha of land from cropland. It also occupied 335 ha around settlement areas and 2,912from bareland. since 18.7% of the invaded land previously covered by natural woody vegetation and grasslands on which traditional livestock production were entirely based on, the land cover change to dense unusable *P. juliflora* had created significant impact on the pastoral production systems. It also affected the traditional rangeland governance practices and the biodiversity that are unique and having greater importance to the local ecosystem.

In this connection, the respondents further explained that the impacts of *P. juliflora* on livestock production and productivity. This can be manifested through eradication of endogenous forages by invading pasture lands and directly by posing health risks on the cattle feeding its pods and by pricking animals with its poisonous thorny nods. It also affected livestock production by blocking livestock routes with its impenetrable deep thickets. It also undermine pastoral production through exploiting extra more labor that would otherwise be invested in other productive work than to clear *P. juliflora* at homestead and to protect livestock from entering into its dense tickets. The group discussants explained that the invasion has affected the availability of livestock feed on grazing lands of the Middle Awash area to the extent that entirely converting pasture lands into *P. juliflora* invaded land. Studies conducted by (Angassa, 2008) supported these responses of pastoralists.

The respondents also made clear that the invasion has undermined the traditional institutions of cooperation. It is known that reciprocity is at the heart of the Afar tradition and one of their key adaptation mechanisms to adversity. Especially, in cases when households lose their livestock due to natural or manmade accidents, the loses are shared among the (sub)-clan members based on the magnitude and severity of the risk.

However, currently, the possibility of risk sharing has been abandoned as the loss of livestock due to *P. juliflora* becoming very common in every household and reduces the livestock holding of households in different ways. As of the respondents and local experts the reductions in households' livestock holding due to *P. juliflora* could be traced back to three main reasons. The first is dire scarcity of animal feeds as large areas of pasture lands has been invaded and turned to non-usable land, this coupled with recurrent drought decimate significant numbers of livestock. The second is due to disease locally known as *"Armeko"* caused by eating the pods of *P. juliflora*, which is locally characterized by twisted neck, dental disfiguration and emaciation of cattle, sheep and goat.

The respondents also added that the dense thickets of *P. juliflora* hide predators, so once the livestock entered and trapped by the dense tickets can be easily preyed. As a result, nowadays, the killing of livestock by predators becomes common even around homestead. In connection with the death of livestock due to *Prosopis Juliflora,* the respondents noted that households experiencing continual reduction of livestock asset have found things very difficult to depend on sole pastoralism. As a result they have been forced to look for additional or alternative means of livelihood because the killings make things very difficult to depend solely on pastoralism.

Furthermore, the group discussants mentioned that the shrinkages of gazing lands and the blocking of livestock routes and thereby hampering mobility due to *P. juliflora* invasion affected their institutions governing rotational grazing patterns and coordination of seasonal mobility. They explained that because of the significant loss of prime grazing lands following the invasion of *P. juliflora*, the use of rotational grazing pattern on their own clan land (*Kedo Bado*) and seasonal migration in times of scarcity has been hampered. Hence, the traditional institutions that were playing significant roles in supporting the maintenance of the environment and the biodiversity have been significantly affected. For instance, seasonal mobility to the Allideghi plains and Riverine areas that are aimed at getting better water access, and ensuring sustainable utilization and management of grazing lands have been severely affected. Thus, currently, pastoralists are forced to be limited on the remaining pasture lands exploiting this same land beyond its capacity to provide which as a result in the long run turned to bare ground.

Regarding the impact of *P. juliflora* on biodiversity, all the respondents and the group discussants agreed on its negative impacts. In which they specifically mentioned that very useful indigenous grass species of the Middle Awash SES are now on the verge of extinction. They also mentioned that the basal cover under the canopy of *P. juliflora* changes from grass to forbs. In agreement with these observations of the respondents, studies indicated that the leaves of *P. juliflora* contain water soluble allelophatic chemicals which could inhibit seed germination and retard seedling growth of grasses and decrease native species diversity (El-Keblawy and Al-Rawai, 2007). (Almaz, 2009) also indicated that *P. juliflora* have significantly decreased richness, cover, species composition and frequency of occurrence of herbaceous vegetation.

Figure 9: Prosopis Invaded Land in Allideghi Grassland

Note: Photo captured during field visit in Amibara District, Afar Region

The other major land cover changes that significantly affected the traditional rangeland governance practices and posed a challenge in securing adaptive governance of rangelands in the study area is related to expansion of bare grounds in natural vegetation covers such as grasslands and woody vegetation covers that are the basis for the pastoral production systems. As we can see from the satellite image detection results expansion of bare grounds increased at an increasing rate starting from 1987 to 2018. For instance, it showed an increment of 3.7 % from 1987-1992, 38 % from 1992-2010 and 60 % from 2010-2018 as well as 128 % gross increases from 1987-2018. The transition matrix also portrayed the fact that bare-ground gained a significant portion of land from grasslands, natural woody vegetation covers, and irrigated agricultural lands.

In this regard, appropriation of rangelands for agriculture mainly irrigated commercial farms that use high external inputs such as chemical fertilizers and pesticides contributed large areas of land to bare grounds. This is attributed to increased concentration of acid in the soils due to repeated use of chemicals and the effect of salinity and sodicity that comes mainly from irrigation water. According to the information obtained from the respondents these lands were exhaustively used for the past half a century with the application of irrigation water from Awash River and supply of high external inputs in order to get the desired yields of the appropriators. This in the long run converted the land into bare ground where plants cannot grow there except *P. juliflora*. The other driving forces as perceived by the respondents are overgrazing of grasslands and deforestation of woody vegetation covers for different purposes. In this case, cutting of trees for fire wood consumptions and charcoal production are identified as the major causes of deforestations which currently exacerbated by increased urbanization and population growth.

Therefore, in the Middle Awash Afar landscape, expansion of bare grounds in natural vegetation covers have been directly and indirectly affecting pastoral production systems and rangeland governance practices mainly through reducing the much fragmented and very scarce pasture lands. In connection with this, the respondent pastoralists whom I encountered seemed to be very frustrated about the situation in that they literally explained the case as “the beginning of the end of pastoralism in the Middle Awash areas”. They further explained that previously we have been struggling to protect the land in order to sustain our production systems and maintain our traditions in all possible means but we cannot fight with nature as it refused to grow any plant species to be used as fodder for our livestock. They added that nowadays we hardly move our animals in search of pasture instead we spent most of the years around settlements grazing on the remaining and limited pastures. This of course, lead to further degradation of rangelands and worsen the situation due to overconcentration of animals per limited area of land without giving enough time to the land for regeneration. The respondents also mentioned that currently in consequence of the expansion of bare grounds thereby the lack of adequate pastures; traditional rules and institutions that have been governing rangelands are being violated and disregarded.

8. PARTICIPATION OF PASTORALISTSIN RANGELAND MANAGEMENT AND DECISION-MAKING ACTIVITIES

This chapter presents the assessment results of the level and rates of participation of pastoralists in local level rangeland management activities and decision-making spaces in the context of a social-ecological framework for adaptive rangeland decision-making. The study identifies and explains participation from the point of planning, implementation, follow up of activities and contributing to decision making processes. Since people's participation is constructed as an alternative development paradigm and its level and quality are determined by several economic, political, social and institutional factors. In this sense, people take part in the planning, implementation, follow up of activities and decision making. This, in turn, contributes to meet the issues of sustainability, democratization and good governance at local levels. Hence, this chapter reports the findings of the descriptive and econometric analysis. Accordingly, in the first section results of the descriptive analysis are presented. In the second section results of the econometric analysis computed using principal component analysis (PCA) and regression analyses, are presented.

8.1 Results of the Descriptive Analysis

This sub-section examines the socio-economic and institutional characteristics of the respondents including level of education, access to quality and variety of information sources, livestock holding, size of land holding, off-herd income sources, political and group behaviour, livelihood dependency, and social status.

8.1.1 Knowledge and awareness level of the households

Knowledge and awareness levels of the respondent households are captured through level of education and information accessibility. Higher level of education is a direct predictor of participation (Helliwell and Putnam, 2007). Therefore, the distribution of the total sample respondents in terms of literacy level has shown that 46.2% were illiterate, 38.1% could read and write through attending religious school (20.5%) and adult education (17.6). The rest 15% attended formal education of which 14.8% attended primary education and the remaining 1% attended secondary and above. Apart

from the education, levels of awareness that directly predict participation depends up on the range and quality of information the households get. In this aspect the respondents were asked and their responses were categorized in to four scales such as never used, poor quality, good quality, and excellent quality information. Thus, the survey result indicated that the percentage of households never get any quality information is 31.9%. While the percentage of households getting poor, good, and excellent quality information are 27.1%, 37.6% and 3% resp. For both level of education and quality of information the mean difference was found to be statistically significant at $p< 0.00$.

8.1.2 Distribution of Respondents by their Participation in Off-Herd Activity

Almost all (99.8%) the respondents or their household members were involved in off-herd income generating activities of which 37.14% were participated in all the four levels of participation such as planning, implementation, monitoring of activities, and contributing to the actual decision-making processes. The main off-herd activities that sample respondents engaged in were petty trading including Kchat, cheap labour such as daily labourer, employees in commercial farms and other labour intensive activities available in the District, as well as small scale and piecemeal crop production activities.

8.1.3 Distribution of Households by Resource Holdings

In this study a household possessing assets such as livestock and relatively higher land holdings is hypothesized to maintain high economic and social status thereby higher level of participation (Kreuter et al., 2004). Across the Middle Awash Afar pastoral households hold assets in the form of livestock and land. The average livestock holding is 18.94 TLU with a standard deviation of 9.23. Apart from the livestock, the study used land as a proxy for wealth and hypothesized that having larger private plots of land improve participation. The average land holding was found to be 1.1 hectares with a standard deviation of 1.17, provided that 41.4% of the respondents did not own private plots of land. The study indicated that there exists statistically significant difference in livestock holding between participant households and non-participants at a 10% significant level and for land holding at a 5% significant level.

8.1.4 Distribution of the Respondents by Political and Group Behaviour

Almost every empirical analysis and theory of agricultural decision-making considers operation and operator characteristics to be import. Here the respondents' political and group behaviors were analyzed based on individual household membership in community based rangeland management groups (CBRM) and affiliation of member of the households to the local political organizations. Hence, 63.3% of the respondent households were found to participate in the local CBRM initiatives and 55.7% were found to be affiliated to the ruling local political organization.

8.1.5 Distribution by Livelihood Dependency and Social Status

Scholars particularly proponents of right based approach argued that dependency of a household on public provisioning realizes the importance of participation. Most importantly, conferring safety net assistance in critical times necessitates and gives added strength, especially to the poor and the marginalized to participate in local level rangeland management decision-making activities. On the other hand, in Afar social structure, people belong to a particular clan among which few are scheduled as nobility while many falls under commoner social structures (Getachew, 2001).

Table 13: Summary statistics and demographic details of sample households

Characteristics	Variable	Mean	Std dev.
Manager's characteristics	Years of schooling	2.04	1.15
	Access to quality information	2.12	0.90
	No of information sources	2.10	0.84
	Private land holding	1.11	1.18
	Livestock holding	18.95	9.23
	Socio-economic status	1.79	0.72
	Succession plan	0.63	0.48
Social values & networks	Government trust	2.37	0.69
	Political affiliation	0.56	0.50
	Group membership	0.63	0.48
Economic and social status	Livelihood dependency	0.92	0.27
	No of Off-herd income sources	2.08	0.99
	Status in the community	0.38	0.49

Source: own computation using IBM SPSS 20

In this regard, the commoners were found to be engaged in implementation of labour intensive NRM activities, while the nobility play decision-making roles and less engaged in actual implementation of activities. Hence, this study hypothesized that the dependency of households on public provision of safety net and social status belonging to the commoners enhance participation. This will be analyzed in the following econometric model result section, but in this section the frequency distributions of the respondents and its statistical significance were checked. Accordingly, the study found that 91.9% of the respondents are recipients of safety net, from these 41% participate in planning, 100% in implementation and 45.71% took part in contributing to the decision made. Regarding the social status, almost all the respondents who identify themselves as commoners were found to be engaged in implementation of activities and their contribution to the decision-making was 23.8% at 10% significance level.

8.2 Econometric Model Results

To get unbiased, efficient and consistent estimators the variables were tested for econometric problems. In doing so, the variables were checked for heteroscedasticity and multicollinearity since they are the most common problems in the analysis of cross-sectional data (Gujarati, 2003). As a result, the presence of multicollinearity problem among the independent variables was also checked using variance inflation factor (VIF) for the original data set (x_i variables) and correlation matrix (CM) for the PC scores. Thus, the result of the VIF indicated that the data had no serious problem of multicollinearity. The contingency coefficients calculated for the dummy variables showed a weak degree of association among the dependent variables. Thus, the hypothesized variables were included in the model for regression analysis. As it is thoroughly discussed in the methodology section, regression analysis and principal component analysis (PCA) were conducted to predict the rate and level of pastoralists' participation in rangeland management and decision-making activities, in the Middle Awash Afar SES. Accordingly, the results of the OLS model and PCA results are presented in the following sections.

8.2.1 Levels of pastoralists' Participation in Rangeland Management Activities

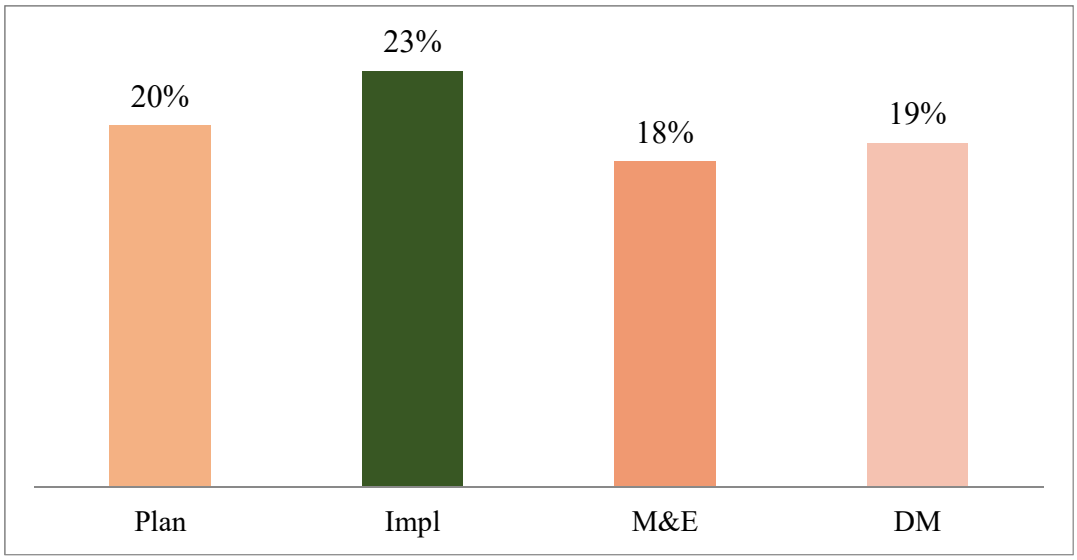
Generally, the incidence and extent of participation of a household at different levels of adaptive rangeland management activities found to be depending on level of education

and awareness, economic status, political and group behaviour, nature and extent of livelihood dependency, and the social status of the household in community structures. The study measures the level of participation taking households as a unit of analysis and captured the position of individual member in the household. This is because of the reason that in Afar pastoral settings, household is a cohesive unit usually the father acts as the head and decisions are assumed to be made collectively by adult members of the household and communicated by the household head. Thus, any household member participating in local level natural resource management activities and decision-making processes can be taken as a representative of the household.

In order to determine the effect of each hypothesized variable on the four different levels of participation such as, planning, implementation, monitoring and decision-making activities, principal component analysis (PCA) was employed. The primary aim of using the principal component analysis in this case is to drive index values for the four levels of participation. Accordingly, three principal components were generated, which accounts for 58% of the total variations. Out of the total variations (58%) the first component absorbs 36% of the variations and the rest two components absorb 22% of the variations (Annex). Thus, the first principal component (PC) score is taken as index value to drive participation index, as it absorbs the maximum variations.

As it is discussed in the methodology part, the index values were standardized using range equalization technique before the percentage value has been computed for each levels of participation. As a result, the level of participation in planning, implementation, monitoring and decision-making was found to be 20%, 23%, 18% and 19% respectively. The result showed that the level of pastoralists' participation in the Middle Awash Afar are very far below the average and indicates that there are a lot to do in order to improve people's engagement in natural resource management and decision-making activities at least to the acceptable level. Apart from being very low the result also showed somewhat consistent patterns over the three level of participation such as planning, follow-up of activities and contributing to the decision-making processes, while the level of participation in implementation of activities to some extent showed different response.

Figure 10: Participation Index



Source: Own synthesis

The other important point worth mentioning is the presence of big disparities between the level of participation obtained from the descriptive analysis and the result obtained from the index value. It is because in the descriptive case, the levels of participation simply reflect the frequency of respondents who reported "yes" to each level of participation while in the latter case the index values are generated from each corresponding measure variables. In other way the measure value loadings have significant effect on the principal components from which the percentage of participation in each level has been generated.

Hence, the first index value corresponding to planning and decision making is influenced by succession plan, number of information sources, number of off-herd income sources, access to quality information, socio-economic status, size of private plot holding and membership in CBNRM. The second index value corresponding to implementation of activities is mainly influenced by political affiliation to the ruling party, years of schooling, livestock asset, government trust, and status in the community. The third principal component corresponding to follow up of activities is influenced by livestock assets, status in the community and household's status in the community. However, the variable safety net dependency has no any effect on levels of participation and its coefficient is negative. For more information, please see the Rotated Component Matrix that shows the effect of each variable on the PC scores thereby on the levels of participation.

Table 14: Rotated Component Matrix and Component Coefficient Matrix

Measure Variables	Rotated Component Matrix			Component Coeff. Matrix		
	1	2	3	1	2	3
Education level	0.508	0.323	(-) 0.591	0.197	0.149	(-) 0.478
Quality Information	0.766	0.273	0.067	0.197	0.050	(-) 0.073
Private plot	0.580	0.011	0.177	0.162	(-) 0.090	0.037
Livestock Asset	0.392	(-) 0.079	0.646	0.050	(-) 0.138	0.380
Off-Herd Income source	0.736	(-) 0.135	0.035	0.255	(-) 0.200	(-) 0.073
Safety-net Dependency	(-) 0.133	(-) 0.441	0.075	0.014	(-) 0.259	0.088
Information Sources	0.784	0.282	(-) 0.102	0.225	0.060	(-) 0.188
Gov't Trust	0.124	0.768	0.049	(-) 0.085	0.459	(-) 0.017
Succession Plan	0.796	0.222	0.249	0.190	0.005	0.046
Group Membership	0.566	0.178	0.405	0.101	0.007	0.184
Political Affiliation	(-) 0.019	0.794	0.282	(-) 0.168	0.488	0.157
Status in community	0.114	0.258	0.555	(-) 0.079	0.120	0.343
Socio-economic status	0.673	0.175	0.519	0.120	(-) 0.017	0.246

Rotation Method: Varimax with Kaiser Normalization
Extraction Method: Principal Component Analysis

Another finding regarding the measure variables is the size of land holding, which increases the odds of participation in all levels of participatory processes except in implementation of activities, having particular effect on the level of participation in planning and decision-making. On the contrary, dependency of households on safety net provision significantly increase the odds of participating in implementation of activities with very limited effect on participation in planning, monitoring and decision making activities. The rationale behind these are, pastoralists having relatively larger size of private plots seemed to have been settled around their farm plots and can be available when they are called to participate in local participatory forums including planning, follow-up of activities and actual decision-making forums. On the other side, pastoralists whose livelihoods depend on external aid are obliged to contribute labor in natural resource management activities as a requirement to get aid. This increases the probability of safety net dependent households to participate in implementation of activities. It was also found that households having diverse income sources have higher probability of participation in decision-making and lower probability in implementation of activities.

Apart from generating index value the principal component analysis helps in reducing larger set of variables in to smaller component parts to make statistical analysis easier. Likewise, in this case all the thirteen measure variables were reduced into three components and then the generated values were used to run regression analysis that predict the impacts each principal component on levels of participation. It also help to determine the statistical significance of the principal component parts. Thus, regression analysis was carried out and the results are presented in the following table.

Table 15: Regression Results of Component Scores

Principal Scores	Variation Absorbed	Regression Coefficients		
		Standardized	Unstandardized	
		Beta	B	Std. Error
PCS-1	36%	0.613***		0.060
PCS-2	11%	0.100**		0.060
PCS-3	10.7%	0.402***		0.056
Constant				0.055
No of observation = 210				
R Square = 0.677				
Adjusted R2 = 0.672				
KMO Test = 0.840				

*Note: *, **, *** represents level of significance at less 10%, 5% and 1% respectively. PCS stands for Principal Component Score. Dependent variable: level of participation*

As a result of these, the first principal component, which corresponds to the variable that determines level of participation in planning and decision-making activities, is significant at p-value > 0.000 and its coefficient is strong. The second principal component, which corresponds to the measure variables affecting households' participation in follow up of activities, is significant at p-value > 0.000 but the coefficient is relatively weaker to explaining the level of participation. The third principal component corresponding to implementation of activities was not found to be a significant predictor of participation. In summary, an important point to note here is that the purpose of the regression analysis of the principal components is to check the statistical significance of the component parts from which the participation index is derived. Accordingly, all the necessary analyses were carried out and the results were found to be acceptable (KMO Test= 0.840) and significant.

8.2.2 Rates of Participation in the Overall Rangeland Management Activities

A regression model was employed to estimate the impact of the independent variables on the dependent variable (overall participation scale). Which is a count variable that ranges from 0 (no participation) to 4 (participate in all the four levels).It measures the rate of participation across the entire rangeland management decision-making activities. The study considered that all the 210 samples are satisfactory and non-response biases were ruled out by discarding incomplete and inconsistent questionnaires. Then, the data were coded and the analyses were carried out using STATA version 9.Accordingly, the result showed that about 89% of the overall sample cases were correctly predicted by the model. In general, the variables indicating managers' characteristics were found to be important predictors and significantly influence the level and rate the overall participation in all the menus of NRM activities and decision-making processes. However, level of education measured by mode years of schooling, household incomes measured by livestock asset (TLU) and socio-economic status of the household do not seem to be a significant predictor of participation.

Consequently, the findings indicated that households having access to quality information through formal and informal communication channels exhibit greater degrees of participation compared to those who do not have. This indicates that having access to unbiased and relevant information encourages people to get more reliable information on matters that affect their livelihoods. It also gives exposure to exercise rights, thereby help people to be aware about the importance of participation. The result also showed that pastoralists who are well connected to variety of sources of reliable information and knowledge networks have higher rates of participation. The same is true for time horizon variable which significantly increases the rate of participation. This is because pastoralists having short and long term succession plans are more likely to participate in planning, monitoring, and decision making processes. The result also indicates that these groups of people are relatively educated, and have better awareness and experience on different aspects of rangeland governance practices. Therefore, level of education and experiential knowledge indirectly influence participation through helping people to guide their activities through succession plans.

Table 16: Rates of participation in the overall decision-making activities

Independent variables	Regression Coefficients		
	Standardized	Unstandardized	
	Beta	B	R. std. error
Education level	(-) 0.056	(-) 0.068	0.058
Access to quality information [a]	0.236	0.681***	0.193
Nº of information sources [a]	0.158	0.457***	0.154
Private plot [a]	0.115	0.323**	0.13
Livestock asset [a]	(-) 0.025	(-) 0.035	0.065
Socio-economic status [a]	(-)0.001	(-)0.002	0.213
Succession plan (Dummy)	0.062	0.087*	0.082
Government trust [a]	0.072	0.100*	0.065
CBNRM membership (Dummy)	0.017	0.037	0.067
Political affiliation (Dummy)	0.100	0.140***	0.068
Nº of off-herd income sources [a]	0.088	0.252**	0.121
Safety-net dependency (Dummy)	(-) 0.023	(-) 0.032	0.084
Status in the community (Dummy)	0.354	0.494***	0.093
Constant		1.563	0.287
Total Nº of observation = 210	R-squared = 0.708		
	Adjusted R^2= 0.688		
	Mean VIF = 1.47		

*Note: *, ** and *** represent level of significance at less 10%, 5% and 1% respectively. 'a' indicates that the variable is standardized .*

The social value and social network variables designated as government trust and political affiliation to the ruling party turn out to be significant predictors of participation except the variable for membership in community based rangeland management activities, which has very low coefficient. In this case, the result for membership in community based rangeland management activities is not in confirmatory with the hypothesis made based on the findings of (Nishal, 2006).He argued that membership in community level organizations enhances households participation in decision-making. while, households affiliated to the ruling Afar people

democratic party (APDM) were found to be more participative in local level natural resources management activities and decision-making processes compared to people who are not affiliated to APDM.

Among the variables representing social and economic status of the respondents, the variable status of households in community structure (dummy) and number of off-herd income sources were found to be significant predictors of participation with positive and strong coefficients. Therefore, the findings also proved that households belonging to the commoners are highly participative in implementation of activities while the nobility groups and politically assigned cadres who usually assume the leadership roles were found to be participative in decision-making and follow up of activities. This is in line with the hypothesis made and corroborates the argument that poor people who are from the lower social status are more likely to participate in natural resource management activities and other participatory forums to foster their political, economic and civil rights. While the social and economic status variable and safety net dependency (dummy) showed negative coefficient and does not influence rates of participation. This means there is no statistical difference between households receiving aid and those who do not receive.

8.3 Discussion and Implication

The research adopted adaptive decision-making framework that integrate insights from different theoretical perspectives to identify variables expected to influence participation decisions and provides a richer conceptualization and recognizes how pastoralists respond to the changing SES conditions over space and time (Lubell et. al., 2013). The framework also draws insights from literature on pastoralism and rangeland systems that consider how well pastoral communities adapt to environmental change (McAllister, 2012). Accordingly, in this study the framework recognizes some of the key variables influencing participation. This includes the characteristics of household as a rangeland manager, the role of social variables and networks hypothesized by diffusion theory as well as concepts like time horizons explained by succession plans. Hence, many important inferences emerge from these findings by extending theories of the adaptive decision-making.

In the first place for participation to improve, people need to have access to information regardless of their years of schooling. In the study area, though it has its own limitation the traditional information exchange institution *'Dagu'* is a vital means of information sharing and awareness creation among people. It would have been very helpful if supported with extension services that provide locally appropriate information and help in the processes of knowledge acquisition. In general, the regression result has shown that pastoralists with higher numbers of information sources participate in more menus of the rangeland management activities and decision making processes. This in turn, indicates that opinion leading pastoralists who are well connected to information and knowledge networks have higher rates of participation.

It is well understood that among other channels listening to mass media by itself implies the interest of individuals towards personal or societal needs. As confirmed through group discussion listening to mass media has been one of the main sources of both gaining information and acquiring knowledge. Hence, the mass media helps to acquire information about the socio-political processes, the benefits of participatory governance, and their critical roles in participatory natural resource management activities. The communication channels are also means to remain up-to-date about the

changing rules, regulations and norms. It is also known that individuals having access to communication channels would be motivated to participate in local level decision-making activities. It is thus, pertinent that in the wake of inadequate formal education, the case we have in the study area, made aware of the participatory process through such means of information sharing mechanisms.

Levels of education were not found to be important predictor of the rate of participation in the study area. Since the majority of the respondent household heads years of schooling is at elementary level and far below the average levels of literacy in that 84.2% do not attend formal education. This indicates that their years of schooling has not yet reached the threshold beyond which people can reason and demand for meaningful participation in local level participatory forums unless they are forced to do so. This of course, indicates the strong need for improving the educational levels of the people in the study area. In the long run this among other things helps them to realize the importance of participation in matters that have a bearing on their lives.

The other important household characteristics hypothesized to influence participation were size of landholding and livestock ownership. The results showed that livestock holding is not a significant predictor of participation while size of private plot determines the level of pastoralists' participation among households. This confirmed the common understanding that in pastoral settings, practicing both crop farming and animal husbandry and having relatively larger plots of land are likely to have greater voices, but not necessarily those which have higher incomes. In Afar it is known that households with more land holdings are mostly engaged in mixed livestock-crop farming activities, as a result, they stay around the farming areas to perform their agricultural activities. This allows them to have time and access to participate in local level decision-making forums than households moving with their livestock seasonally. These groups of households practicing livestock-crop farming activities may also have the ability to take hold of the public services and governance functions due perhaps to their traditionally established elite status in the locality.

Besides these, greater land holding also is considered as a sign of higher social status and proximity with the government as well as strong social position in the Middle Awash Afar. They are locally known as *'Balabat',* who have the ability and legitimacy

to influence decision at local level. However, the problem with these groups of people is elite capture in participatory forums. In this connection, for instance, there exists evidence that these local elite usually raise their own issues firmly, as if it is the concern of all the local households. This clearly indicates that the possibility of elite capture in local decision making forums. As of the discussants, currently, these tendencies of elites capture in local participatory forums and decision making spaces perpetuated the culture of clientelism. Moreover, the findings have ascertained that pastoralists having consistent succession plans are more participative than others. Discussion with selected key informants also proved the significance of having succession plan on the rates of participation in rangeland management and decision making activities. The respondents also affirmed that pastoralists, who are relatively educated, experienced and exposed to information are better in having succession plans than others.

The social value and network variables such as government trust and political affiliation are somewhat interrelated and are found to be important predictors of participation in rangeland management and local participatory governance forums including in adaptive rangeland governance processes. This shows that pastoralist who has trust on the involvement of government in rangeland management issues and other local governance activities usually take the lead to participate in local participatory forums and forward their views openly. According to the key informants drawn from Amibara District, this kind of people are either affiliated to the ruling classes or naïve community representatives who forward their ideas irrespective of the consequences.

However, political affiliations influencing the overall rates of pastoralists' participation might be understood from different perspectives. In that local representatives could easily mobilize community members affiliated to their political parties to participate in rangeland management activities. In Afar pastoral settings the local representatives and households affiliated to the ruling political parties are often seen to be mutually interdependent. That is, the local party representatives need the presence of their affiliated household members to ensure the smooth implementation of their agendas through exploiting political party loyalty to the extent that overriding other rational considerations. Likewise, the affiliated households might participate to ensure their self-interests may at times in the future receive favorable attention of the government. This kind of patrimonial relationship is the realities of power relation that can be easily

observed in Afar governance structures and decision-making spaces. This unfortunately created clientelism in delivery of basic services and provisioning of governance functions, where more and better services including relevant information are channeled towards the supporters of the ruling party. In this connection, the group discussion revealed that household members belonging to the opposition are usually not encouraged to participate in and their voices are seldom heard, if not badly threaded.

In addition to these, people belonging to the commoners and mostly non-Afar have less participation compared to the nobility and local cadres who assumed leadership roles. Generally, the study indicated that in Afar pastoral settings non-Afar ethnic groups have no room to participate in any decision-making activities and the commoners are seldom invited to take part in decision-making processes. The commoners for instance, in most cases their participation in natural resources management activities is limited to; self-help contribution, the provisioning of labor, and giving opinion when asked. These indicate that the decision making processes are not that much inclusive, as politically and socially weaker sections of the community do not properly participate in popular spaces and actual decision making activities. However, as this group of the societies constitutes the large majority of the community; improving their participation in decision-making may lead to better delivery of public services and provisioning of appropriate governance functions.

Regarding the negative correlations between safety net dependency and the overall rates of participation, many authors suggested that it is mainly due to the reason that the resilience of pastoralists has been progressively weakened and that pastoralists are increasingly unable to cope with environmental shocks. In the past decades, droughts in Ethiopia have triggered widespread and severe livelihoods crisis and have plunged millions of pastoralists into humanitarian crisis. For instance, the increased frequency and severity of droughts coupled with deep rooted bad governance in Afar pastoral settings are leaving pastoralists more and more exposed to shocks as the time needed to rebuild the herd is longer than the intervals between the occurrence of drought. Unable to recover, pastoralists become trapped in a downward spiral of vulnerability and destitution thus they are increasingly dependent on aid. Their dependency on relief assistance however can also be seen as related to years of neglect and misunderstanding by the consecutive central governments (Kelemework, 2011). Rather than addressing

pastoralists' vulnerability with participatory and community empowerment approaches, governments' reliance on provisioning of safety net donated by international organizations is a clear sign for the neglect of pastoralists.

Regarding the relation between overall participation and membership in community based rangeland management groups the findings indicated that though the coefficient is positive membership in CBRM was not found to be a significant predictor of rates of participation. Thus, in order to improve participation of group members and meaningfully contribute in decision-making process we need to integrate it with the traditional self-help organizations working at a grassroots level. For example, in Afar pastoral settings participating in mutual collaborative institutional arrangements such as the traditional NRM cooperation lead by the *fimma* institutions and community based rangeland management groups lead by *Du'abe* enhance the involvement of pastoralists in decision-making activities. Both pastoralists and agro-pastoralists use these institutions of mutual cooperation to address new economic, social and ecological problems, for instance the management of *Prosopis* invasion at local level has been addressed through this institution of cooperation.

9. SUMMARY, CONCLUSION AND RECOMMENDATIONS

9.1 Summary

For long the political, economic, social and territorial institutions of pastoralists have facilitated ownership and management of resources, resolution of conflicts, sharing of benefits and costs, and provisioning of governance in order to sustain their production system and livelihoods. Nevertheless, nowadays, both internal challenges and external factors that intrudes and erodes pastoral institutions, and increased interest of the state over rangelands that sidelined and undermined pastoral production systems, have challenged and compromised the effectiveness and existence of the pastoral governance institutions. Due to these and other challenges pastoralism in the Middle Awash Afar is currently under profound pressure so much so that they have become incapacitated to bear even the basic needs of human existence. Therefore, this research investigates the governance system and institutional arrangements of the Middle Awash Afar SES with a particular emphasis given to the social and institutional diagnosis, the relation between rangeland dynamics and pastoral governance and the capacity of the governance system to enhance social-ecological resilience as well as investigate pastoralists' participation in natural resource management activities and decision-making spaces.

Accordingly, the analyses of institutional dimensions of governance using a framework developed by the International Livestock Research Institute (Robinson et al., 2014) shows that the overall effectiveness of the institutions in promoting adaptive rangeland governance is generally poor. This indicates that the governance process does not meaningfully contributed to multilevel deliberations and participatory decision-making processes. The main reason for this is the lack of capacity to generate resources and create linkages among organizations and institutions at various levels as well as the inability of institutional patterns to provide a platform for fair governance of the ecosystem. Moreover, the capacity of the governance system to deliver effective decision making, and to promote learning and leadership of various kinds are very weak. At both the Allideghi grassland and the Awash Riverine ecosystem levels, the system of governance reveals the lack of harmony among different actors and even within the same groups. The institutional arrangements and their administrative

structures do not correspond to the local social conditions and ecosystem dynamics, indicating the lack of institutional fit and at large the failure of institutions to shape the outcomes of the governance system.

Likewise, the capacity of the social and institutional systems to influence resilience is below the threshold set for resilient governance of the dryland ecosystems. The analytical description tools employed to describe the identity of the system and visualize thresholds clearly shows that the capacity of pastoralists and their institutions to build social-ecological resilience is unsatisfactory. In this vein, the findings indicated that the long held sense of traditional responsibility to protect and preserve natural landscapes has been deteriorating. The sharing of local experience and indigenous knowledge, as well as pastoral network that mainly help to withstand drought and other challenges are weathering out. The findings also indicated that the governance system does not incorporate the key features of resilience as evaluated by the capacity of the system to learn and adapt unforeseen circumstances and the capacity of self-organization around loaming thresholds.

Besides, after the introduction of the 1994 constitution, governance arrangements in Afar like anywhere else in Ethiopia said to be decentralized. Hence, decision-making authorities and political power are assumed to be devolved at lower levels with the aim of enhancing grassroots representation. However, the decentralization reform does not ensure genuine participation of local communities in decision-making spaces and unable to create nested institutional arrangements that have multiple and independent layers of authorities. Instead, the decentralization reform created and nurtured new local elites who became political cadres and the local networks of corruption and nepotism. The research identified that these networks of corruption and nepotism had weaken the existing decentralized forms of traditional institutions and created kind of monocentric hierarchical authorities that are maneuvered by political entrepreneurs and local elites. A typical example portraying these facts in the Middle Awash Afar is the land use dynamics that sideline the majority of the poor and created unequal circumstances in the society which does not exist before.

Therefore, pastoralism in both the study sites (Allideghi grassland ecosystem and the Awash Riverine ecosystem) is under profound pressure. Among other things the land

use land cover dynamics are the main driving forces that push pastoralism towards extinction. The Allideghi plain named after its grass cover now drastically changed into bush covers, Prosopis invaded land and bare grounds due to ethnic rivalry and failure of the governance institutions to define boundary and authorized users. In the same way on the river banks of the valley pastoralism is becoming history than livelihood practices. Although the root cause of the problem goes back to the early beginning of commercial agriculture and establishment of settlements around the valley the current situations seemed to be different in its tactic of land appropriation and influence on pastoral governance system. The raise of new political economy of land maneuvered by absentee land owners and local elites that is facilitated by networks of nepotism which systematically exclude commoner pastoralists so as to capitalize the irrigable flood plains of the Middle Awash valley.

Consequently, these have created wealth disparities among the commoners and the elites who captured the resources. Along these, the other major problem with these groups of people is elite capture in participatory forums and decision-making spaces. In this connection, there exists evidence that these local elites usually raise their own agenda allegedly, as if it is the voices of the majority. These corrupt systems of exploitation recently extends its roots in pastoral resource governance institutions and establish patrimonial relationship among actors and groups of actors commanding unequal wealth, status and influence in decision making based on conditional loyalties of nobler-commoner relationships. Hence, it greatly undermines the ability of the governance system to influence resilience and hinders genuine engagement of the people in participatory forums and decision-making spaces.

9.2 Conclusion and Recommendations

The study aimed to examine the way how governance structures and institutional frameworks in rangelands enhance participation thereby affect the capacity of pastoralists to influence social-ecological resilience. Besides, it detects the impacts of rangeland dynamics on pastoral governance practices. Accordingly, the study ascertained that different socio-economic and political characteristics of the respondent pastoralists seem to play critical role in the overall rate and level of participation, however, it is too inadequate to lure pastoralists towards genuine participation in

decision-making and participatory governance forums, due to the incidences of 'elite capture' and 'clientelism' arising out of possession of more resources and better political connections to the ruling classes.

Similarly, the processes, capacities and outcomes of the governance system as evaluated by sixteen indicators perform below the average, indicating that the governance system is generally weak and there exists miss-fit between institution and the ecosystems it serves. These coupled with rapid changes in land use land cover affect the capacity of pastoral institutions to build resilience of social-ecological systems and securing adaptive rangeland governance. Hence, the research suggests that there is a need to envision a new alternative of installing "hybrid institutions" that marry scientific approaches with traditional mechanisms. Generally, the findings of this thesis underlines that the Middle Awash Afar social-ecological systems experienced rapid and untapped change for the past 45 years. The present tendency thus may yield undesirable outcomes in terms of pastoral production systems and livelihood activities, and ultimately undermine the allied governance systems and institutional arrangements if not corrective measure is taken.

Therefore, the key recommendations stemming from this study relates to the establishment of a nested institutional structure to address natural resource management at the ecosystem level, which would interface with existing structures and tap on traditional governance systems. Despite the debates and policy discussions about the sustainability of pastoralism, it seems more appropriate to accept and understand the changing trends in pastoral areas at all levels. This, therefore, suggests appropriate pastoral development policies, approaches and programs in accordance with the pace of the rapid changes happening in pastoral areas. Moreover, follow-up of the land use changes in the Middle Awash Afar rangelands is required, to ensure equitable distribution of resources and to make participatory forums and decision-making spaces become truly democratic and inclusive.

10.REFERENCES

Abbay A. 2004.Diversity and state-building in Ethiopia. African Affairs 103 (413), 593-614.

Abbink J. 1997. Ethnicity and constitutionalism in contemporary Ethiopia.Journal of African Law 41 (2), 159-74.

Abule E, Snyman HA, Smit GN. 2005. Comparisons of pastoralists' perceptions about rangeland resource utilization in the Middle Awash Valley of Ethiopia. Journal of Env't Management 75, 21-35.

Agrawal A., Perrin N. 2009. Climate adaptation, local institutions and rural livelihoods. In Adger WN, Lorenzoni I, O'Brien KL (eds) Adapting to Climate Change: Thresholds, Values, Governance, 350-67. Cambridge University Press, New York.

Agrawal A. 2001. Common Property Institutions and Sustainable Governance of Res. World Development 29(10):1649-1672.

Allen, V.G., Batello, C., Berretta, E.J., Hodgson, J., Kothmann, M., Li, X., McIvor, J., Milne, J. Morris, C., Peeters, A., Sanderson, M. & The Forage and Grazing Terminology Committee. 2011. An international terminology for grazing lands and grazing animals. Grass and Forage Science, 66(1): 2-28.

Almaz Tadesse. 2009. Sustaining the Allideghi Grassland of Ethiopia: Influence of Pastoralism and Vegetation Change.

Almaz, T., Coppock, L. 2015. Livestock-mediated dispersal of Prosopis juliflora imperils grasslands and the endangered Grevy's zebra in Northeastern Ethiopia. Rangeland Ecology Manag. 68, 402-407.

Angassa, A. and Oba, G. 2008. Herder perceptions on impacts of Range enclosures, crop farming, fire ban and bush encroachment on the rangelands of Borana, Southern Ethiopia. *Human Ecology*, 36: 201-215

Armitage, D. R., F. Berkes, and N. Doubleday. 2007. Adaptive Comgmt: collaboration, learning, and multi-level governance. University of British Columbia Press, Vancouver, British Columbia, Canada.

Behnke, R. H., Fernandez-Gimenez, M. E., Turner, M.D. and Stammler, F. 2011. Pastoral migration: mobile systems of livestock husbandry (Chapter 10), in Milner-Gulland, E.J., Fryxell, J.M. & Sinclair, A.R.E. (eds) *Animal migration: A synthesis*, Oxford Univ Press.

Behnke, Roy & Kerven, C.2013. Counting the costs: replacing pastoralism with irrigated agri in the Awash Valley in Catley, A; Lind, J & I. Scoones (eds): Pastoralism and Devpt in Africa: Dynamic Change at the Margins, Earthscan/Routledge, London.

Bekele, Hundie. 2008. The transformation of the Afar commons in Ethiopia State Coercion, Diversification, and Property Rights Change among Pastoralists, Humboldt University of Berlin CAPRi Working Paper No. 87.

Bekele, N., Kabede, G. 2014. Rangeland degradation and restoration in semi-arid areas of southern Ethiopia: the case study of Borana rangeland. Int J Environ Sci 3(2):94–103

Bennett J, Ainslie A, Davis J. 2013. Contested Institutions? Trad.Leaders and land access and control in communal areas of Cape Province, South Africa. *Land Use Policy* 32: 27-38.

Berhanu, W., Beyene, F. 2015.Climate variability and household adaptation strategies in southern Ehiopia.Sustainability 7:6365 6367.

Beyene,F.andB.Korf.2008.UnmakingtheCommons:Collectiveaction,PropertyRightsand ResourceAppropriationamong(Agro-)PastoralistsinEasternEthiopia.CAPRI WorkingPaperNo.88.IFPRI,Washington,DC, USA.

Binder, Claudia R., Jochen Hinkel, Pieter W. G. Bots, and Claudia Pahl-Wostl. 2013. Comparison of Frameworks for Analyzing SESs. Ecology and society 18 (4).

Bogale, Ayalneh and Korf, B. 2009. Resource entitlement and mobility of pastoralists in the Yerer and Daketa valleys, Eastern Ethiopia, *Human Ecology* 37: 453-462.

Bowles, S. 2003. Microeconomics: Behaviour, Institutions, and Evolution, Princeton University Press, Princeton and Oxford.

Boyd, C.S., and T.J. Svejcar. 2009. Managing complex problems in rangeland ecosystems. Rangeland Ecology and Management 62: 491-499.

Boyd, E., and C. Folke. 2012. Adapting Institutions: Governance, Complexity and Social-Ecological Resilience. Cambridge University Press, Cambridge, UK.

Braat, C., Groot, D., 2012. The ecosystem services agenda: bridging the worlds of natural scie and economics, conservation and development, and public and private policy. Ecosystem. Serv. 1, 4-15.

Briske, D. D., Nathan F. Sayre, L. Huntsinger, M. Fernandez-Gimenez, B. Buddand, J. D. Derner. 2011. Origin, Persistence, & Resolution of the Rotational Grazing Debate: Integrating Human Dimensions into Rangeland Research. Rangeland Ecology and Management 64 (4): 325-334.

Brunson, M. W. 2012. The elusive promise of social-ecological approaches to rangeland management. Rangeland Ecology & Management 65:632-637.

Campbell,J., Lusch, D., Smucker, T., Wangui, E. 2005. Multiple methods in the study of driving forces of land use and land cover change: a case study of SE Kajiado District, Kenya. Hum Ecol 33(6):763-794.

Casson MC, Della Giusta M, Kambhampati. 2010. Formal and informal institutions and development. World Development 38 (2), 137-41.

Central Statistical Agency. 2013. Population Projection of Ethiopia for all Regions at Wereda Level from 2014-2017. CSA, Addis Ababa.

Cleaver F, Franks T, Maganga F, Hall K. 2013. Institutions, security, and pastoralism: exploring the limits of hybridity. African Studies Review 56 (3), 165-89.

Cleaver F. 2002.Reinventing institutions: bricolage and the social embeddedness of natural resource management. The European Journal of Development Research 14 (2), 11-30.

Cleugh, A., Leuning, R.,Mu, Q., Running,W., Teixeira, C., Bastiaanssen. 2012. Developing LULC data sets for the Australian continent – a collaborative approach. Remote Sens. Env. 1, 343–354. https://doi.org/10.1016/j.proenv.2012.01.162.

Coppock, D. l. 1994.The Borana plateau of southern Eth: Synthesis of pastoral research, development and change, 1980-91, ILCA, Addis Ababa, Ethiopia.

Cosens, B.A., Williams, M.K. 2012. Resilience & water governance: adaptive governance in the Columbia river basin. Ecol. Soc. 17.

Cumming, G.S., Barnes, G., Perz, S., Schmink, M., Sieving, K.E., Southworth, J., Binford, M., Holt, R.D., Sticker, C. & Van Holt, T. 2005.An exploratory framework for Empirical Measurement of Resilience.*Ecosystems*, *8,* 975-987.

Curtain, C.G., and J.P. Parker. 2014. Foundations of resilience thinking. Conservation Biology.28(4): 912-923.

David D. Briske, Andrew W. Illius, and J. Marty Anderies. 2017. Rangeland Systems, Processes, Management and Challenges: Nonequilibrium Ecology and Resilience Theory.

Davies, J., Herrera, P., Ruiz-Mirazo, J., Mohamed-Katerere, J., Hannam, I., and Nuesri, E. 2016.Improving governance of pastoral lands. Food and Agriculture Organization of the United Nations (FAO) Governance of Tenure Technical Guide No. 6.

Dedeuwaerdere, T. 2002. Biological diversity protection and self-regulation of local communities: Some implication of reflexiveinstitutionalism approach. Working paper.

Dessalegn Rahmato 2011. Land to investors.Large scale land transfer in Ethiopia.Addis Ababa Forum for Social Studies.

Desta, S. 1996. Past and present pastoral development in Ethiopia. p. 26-28. *In:* S. Edwards and T. Mesfin (eds). Proceedings of conference on pastoralism in Ethiopia, Addis Ababa.

Desta, S., and Coppock, D.L. 2004."Pastoralism under pressure: Tracking systemchange in southern Ethiopia." *Human Ecology* 32(4): 465-486.

Dietz, T., Ostrom, E., Stern, P.C. 2003.The struggle to govern the commons. Science 302, 1907-1912.

Diress Tsegaye, Stein R. Moe, Paul Vedeld & Ermias Aynekulu. 2010. Land-use/cover dynamics inNorthern Afar rangelands, Ethiopia. Agriculture, Ecosystems & Environment, No.139.pp174-180

Djalante, R., Holley, C., Thomalla, F., Carnegie, M. 2013.Pathways for adaptive and integrated disaster resilience. Nat. Hazards 69, 2105-2135.

El-Keblawy, A. and Al-Rawai, A. 2007.Impacts of the invasive exotic *Prosopis juliflora.*

Ensminger J. 1997. Changing Property Rights: Reconciling Formal and Informal Rights to Land in Africa. In Drobak, JN, Nye JV (eds) The Frontiers of the New Institutional Economics, 165-96. Academic Press, San Diego.

Ethiopian Central Statistical Agency; Statistical Abstract.2007.Population Projection of Ethiopia for all Regions at Wereda Level from 2014-2017. CSA, Addis Ababa.

Fabricius C., C. Folke, G. Cundill, and L. Schultz. 2007. Powerless spectators, coping actors, and adaptive co-managers? a synthesis of the role of communities in ecosystem management. Ecology and Society 12(1):29.

Falleth, E. I., and S. Hovik. 2009. Local gov't and nature conservation in Norway: decentralization as a strategy in environmental policy. Local Env't 14(3):221-231.

Fauchald, O. K., and L. H. Gulbrandsen. 2012. The Norwegian reform of protected area management: a grand experiment with delegation of authority? Local Environment 17(2):203-222.

Fekadu B. 2010. Driving Forces in the Expansion of Enclosure Among (Agro)Pastoral.Herders in Ethiopia, Quarterly Jour of Intern Agri*49* (2010), No. 2: 127-146.

Fekadu B. 2011. Dismantling of Common Property, Land Use and Pastoral LH in Eastern Ethiopia Journal of Dvp't and Agricultural Economics Vol. *3*(10), pp. 475-486.

Flintan, F., Behnke, R. and Neely, C. 2013.Natural resource management in the drylands in the Horn of Africa. Brief prepared by a Technical Consortium hosted by CGIAR in partnership with the FAO. Technical Consortium Brief 1. Nairobi: ILRI.

Folke, C. 2006. Resilience: The emergence of a perspective for social-ecological systems analyses. Global Environmental Change 16: 253-267.

Folke, C. 2006. Resilience: The emergence of a perspective for social-ecological systems analyses. *Global Environmental Change, 16*, 253-267.

Folke, C., 2007. SESs and adaptive governance of the commons. Ecol. Res. 22, 14-15.

Folke, C., Chapin III, F. S & Olsson, P. 2002. Transformations in ecosystem stewardship: *Principles of Ecosystem Stewardship Resilience-Based NRM in a Changing World* (pp. 103-138). Springer.

Folke, C., Colding, J. & Berkes, F. 2003. Synthesis: Building resilience and adaptive capacity in social-ecological systems in Berkes et al, (Ed.) *Navigating social-ecological systems* (pp. 328-352). Cambridge: University Press.

Folke, C., S.R. Carpenter, B. Walker, M. Scheffer, T. Chapin, and J. Rockstrom. 2010. Resilience thinking: Integrating resilience, adaptability and transformability. Ecology & Society 15(4): 20.

Folke, C., T. Hahn, P. Olsson, and J. Norberg. 2005. Adaptive governance of SES. Annual Review of Environment and Resources. 30:441-473. http://dx.doi.org/10.1146/ annual rev. energy.30.050504.144511.

Gebremedhin, B., J. Pender, and G. Tesfay. 2004. Collective Action for Grazing Land Management in Crop-Livestock Mixed Systems in the Highlands of Northern Ethiopia. Agricultural Systems 82(3):273–290. https://doi. org/10.1016/j.agsy.2004.07.004.

Getachew, K. (2001). Resource Conflicts among the Afar of North-East Ethiopia. In Mohammed Salih et al (eds), pp. 145-171.

Getachew, K. (2004). Settlement among the Afar Pastoralists of the Awash Valley. In A. Pankhurst and F. Piguet (eds), pp.222-242.

Graham Epstein, Jeremy Pittman, Steven M Alexander, Samantha Berdej, Thomas Dyck, Ursula Kreitmair, Kaitlyn J Raithwell, Sergio Villamayor-Tomas, Jessica Vogt and Derek Armitage. 2015. Institutional fit and the sustainability of social-ecological-systems. Current Opinion in Environmental Sustainability 2015, 14:34–40.

Green, O. O., A. S. Garmestani, C. R. Allen, L. H. Gunderson, J. B. Ruhl, C. A. Arnold, N. A. J. Graham, B. Cosens, D. G. Angeler, B. C. Chaffin, and C. S. Holling. 2015. Barriers and bridges to the integration of social-ecological resilience and law. *Frontiers in Ecology and the Environment* 13(6):332-337. http://dx. doi.org/10.1890/140294.

Grêt-Regamey, A., Weibel, B., Kienast, F., Rabe, S., Zulian, G., 2015.A tiered approach for mapping ESservices.Ecosyst. Serv. 13, 16-27.

Groom, R., Western, D. 2013.Impact of land subdivision and sedentarization on wildlife in Kenyas's southern rangelands. Rangeland Ecol Manage 66(1):1-9.

Gupta, J., C. Termeer, J. Klostermann, S. Meijerink, M. van den Brink, P. Jong, S. Nooteboom, and E. Bergsma. 2010. The Adaptive Capacity Wheel: A Method to Assess the Inherent Characteristics of Institutions to Enable the Adaptive Capacity of Society. Environmental Science & Policy 13(6):459-471.

Gunderson, L. H., and C. S. Holling, editors. 2002. Panarchy: Understanding Transfor in Systems of Humans and Nature. Island Press, Washington, D.C.

Hailu Shiferaw, H., Bewket, W., Alamirewa, T., Zeleke, G., Teketay, D., Bekele, D., Schaffner. U., Eckert, S. 2019. Implications of LULC dynamics and Prosopis invasion on ecosystem service values in Afar, Ethiopia.Sc of the Total Envt. 675, 354-366.

Harbeson JW. 1978. Territorial and development politics in the Horn of Africa: the Afar of the Awash Valley. African Affairs 77 (309), 479-98.

Hardin, G. 1968. The Tragedy of the Commons.*Science* 163(3859):1243-1248.

Haregeweyn, N., Tsunekawa, A., Tsubo, M., Meshesha, D., Melkie, A., 2013. Analysis of the invasion rate, impacts and control measures of P. juliflora: a case study of Amibara District, Eastern Ethiopia. Environ. Mon. Assess. 185, 7527–7542.

Hatfield-Dodds, S., Nelson, R. and Cook, D. 2007. Adaptive governance: An introduction and implications for public policy. Paper presented at the 51st Annual conference of the Australian Agricultural and Resource Economics Society.

Hinz MO. 2007. Traditional governance and African customary law: Comparative observations from a Namibian perspective. In Bosl N, Horn A (eds) Human Rights and the Rule of Law in Namibia, 59-87. Human Rights and Documentation Centre, Windhoek.

Huitema, D., E. Mostert, W. Egas, S. Moellenkamp, C. Pahl- Wostl, and R. Yalcin. 2009. Adaptive water governance: assessing the institutional prescriptions of adaptive (co-) management from a governance perspective and defining a research agenda. *Ecology and Society* 14(1): 26.

Hundie B, Padmanabhan M. 2008. The Transformation of the Afar Commons in Ethiopia: State Coercion, Diversification, and Property Rights Change among Pastoralists. CAPRi Working Paper No. 87. International Food Policy Research Institute, Washington DC.

Hurlbert, M.A., Diaz, H., 2013. Water governance in Chile and Canada: a comparison of adaptive characteristics. Ecol. Soc. 18, 61.

International Union for Conservation of Nature (IUCN). 2003. The Durban accord: our global commitment for people & earth's protected areas. 5th IUCN World Park Congress.

Jeroen Rijke, Rebekah Brown, Chris Zevenbergen, Richard Ashley, Megan Farrelly, Peter Morison, Sebastiaan van Herk. 2012. Fit-for-purpose governance: A framework to make adaptive governance operational. Environmental science and policy 22.

Kamara AB, Swallow B, Kirk M. 2004.Policies, interventions and institutional change in pastoral resource management in Borana, southern Ethiopia. Development Policy Review 22 (4), 381–403.

Newenham-Kahindi A, Kamoche K, Qixun Siebers L, Mamman A. 2015. The dynamics of managing people in diverse cultural and institutional context of Africa. Personnel Review 44 (3), 330-45.

Karpouzoglou, T., Dewulf, A. Clark, J. 2016.Advancing adaptive governance of SES through theoretical multiplicity. Environmental Science & Policy 57, 1-9.

Kassa G. 1997. A note on the Finaa (Fimaa) institution among the pastoral Afar of the Middle Awash Valley, North Eastern Ethiopia. Journal of Ethiopian Studies 30, 1-26.

Keeley, James; Wondwossen Michago Seide; Abdurehman Eid and Admasu Lokaley Kidewa.2014. Large scale land deals in Ethiopia: Scale, trends, features and outcomes to date. IIED, London.

Kelemework Tafere. 2011. Social organization and cultural institutions of the Afar of NorthernEth International Journal of Sociology & Anthropology, Vol.3, pp. 423-429.

Lance W. Robinson, John A. Sinclair & Harry Spaling .2010. Traditional pastoralist decision-making processes: lessons for reforms to water resources management in Kenya, Journal of Envt Planning & Mgmt, 53:7, 847-862.

Lautze, Sue; Raven-Roberts, Angela & Teshome Erkineh. 2009. Humanitarian governance in Ethiopia, Humanitarian Exchange Magazine, Issue 43.

Lesorogol CK. 2003. Transforming institutions among pastoralists: inequality and land privatization.American Anthropologist 105 (3), 531-41.

Lister S. 2004. The processes and dynamics of pastoralist representation in Ethiopia. IDS Working Paper No. 220. Institute of Development Studies, Brighton.

Little, Peter D; Behnke, Roy; McPeak, John & Getachew Gebru: Policy Options for Pastoral Development in Ethiopia. Report No. 3 (Pastoral Economic Growth and Development PolicyAssessment, Ethiopia) DfID, Addis Ababa, March, 2010.

Lubell, M., B. B. Cutts, L. M. Roche, M. Hamilton, J. D. Derner, E. Kachergis, and K. W. Tate. 2013. Conservation Program Participation & Adaptive Rangeland Decision-Making. Journal of Rangeland Ecology & Management, 66(6):609-620.

Lubell, M., and A. Fultol. 2008. Local policy networks and agricultural watershed mgmt. Journal of Public Administration Research and Theory 18:673–696.

Makki F. 2012. Power and property: commercialization, enclosures, and the transformation of agrarian relations in Ethiopia. Journal of Peasant Studies 39, 81–104.

Markakis J. 2011. Ethiopia: The Last Two Frontiers. James Currey, London.

McAllister, R. R. J. 2012. Livestock mobility in arid and semiarid Australia: escaping variability in space. The Rangeland Journal 34:139-147.

MCAllister, R. R. J., D. M. S. Smith, C. J. Stokes, AND F. J. Walsh. 2009. Patterns of accessing variable resources across time and space: desert plants, animals and people. Journal of Arid Environments 73:338-346.

Mengisteab K. 1997. New approaches to state building in Africa: the case of Ethiopia's ethnic based Federalism. African Studies Review 40 (3), 111-32.

Middle Awash Agricultural Development Enterprise/MAADE. 2005, Unpublished Doc.

Ministry of Finance and Economic Development (MoFED). 2010. Growth & Transform Plan, 2010-2015, Addis Ababa.

Moritz, M. 2010. Crop-livestock interactions in agricultural and pastoral systems in West Africa, *Agriculture Human Values* 27: 119-128.

Moyo B, Dube S, Moyo P. 2013. Rangeland management and drought coping strategies for livestock farmers in the arid savanna communal areas of Zimbabwe.Journal of HumanEcol 44(1):9-21.

Msoffe, F., Kifugo, S., Said, M., Neselle, M., Van, P., Reid, R., Leeuw, J. 2011. Drivers and impacts of land-use change in the Maasai Steppe of northern Tanzania: an ecological, social and political analysis. J Land Use Sci 6(4):261-281.

Niquisse, S., Cabral, P., Rodrigues, Â., Augusto, G. 2017. Ecos services and biodiversity trends in Mozambique as a consequence of land cover change. Int. Journal of Biodiversity.Sc. Ecosystem Services.Manag. 13, 297-311.

Nisha, K. R. 2006. Community participation in rural water supply: analysis using HH Data from North Kerala. "working paper 173, Bangalore: Institute of social & economic change.

Nkedianye, D., Leeuw, J., Ogutu, J., Said M., Saidimu, T., Kifugo, S., Kaelo D., Reid R. 2011. Mobility and livestock mortality in communally used pastoral areas: the impact of the 2005-2006 droughts on livestock mortality in Maasailand. Journal of Pastoralism 1(1):17.

Oakland Institute. 2011. Half a Million Lives Threatened by Land Dev't for Sugar Plantations in Ethiopia. Understanding Land Investment Deals in Africa.

Olsson, P., Gunderson, L.H., Carpenter, S.R., Ryan, P., Lebel, L., Folke, C., Holling, C.S., 2006. Shooting the rapids: navigating transitions to adaptive governance of social-ecological systems.Ecol. Soc. 11 (1).

Ostrom Elinor. 2009. A General Framework for Analysing Sustainability of SESs. Science 325 (5939):419-422.

Ostrom, E. 1990.Governing the Commons: The Evolution of Institutions for Collective Action, 1-298. Cambridge: Cambridge University Press.

Ostrom, E. 2009.A general framework for analyzing sustainability of SES. Science 325 (5939):419-422.

Ostrom, E., M. A. Janssen, and J. M. Anderies. 2007. Going beyond panaceas. Proceedings of the National Academy of Sciences of the United States of America 104(39):15176-15178.

Ostrom ,E.,Poteete, Amy R. and Marco A. Janssen. 2010. Working together collective action, the commons, and multiple methods in practice. Princeton, N.J.; Oxford: Princeton University Press.

Ostrom, E., McGinnis, Michael D. 2014. Social-ecological system framework: initial changes and continuing challenges. Ecology and society 19 (2).

Pastoralists Forum Ethiopia. 2010. Pastoralism and Land: Land tenure, administration and use in pastoral areas of Ethiopia, Addis Ababa.

Pearson DM, Gorman JT. 2010. Managing landscapes of the Australian Northern Territory for sustainability: visions, issues and strategies for successful planning. Fut. 42:711–722.

Pearson P, Schmidt M. 2017.Commodity individuation of milk in the Somali Region, Ethiopia.Area.

Plummer, R. 2009. The adaptive co-management process: an initial synthesis of represent models and influential variables. Ecology and Society 14(2): 24.

Plummer, R., and D. Armitage. 2007. A resilience based framework for evaluating adaptive co-management: linking ecology, economics and society in a complex world. *Ecological Economics* 61(1):62-74.

Puddu L. 2016. State building, rural development, and the making of a frontier regime in Northeastern Ethiopia, c. 1944-75. The Journal of African History 57 (01), 93-113.

Quaas, M. F., S. Baumgartner, C. Becker, K. Frank, and B. Muller. 2007. Uncertainty and sustainability in the management of rangelands. Ecological Economics 62:251-266.

Raik, D. B., and D. J. Decker. 2007. A multi-sector framework for assessing comm based forest management: lessons from Madagascar. *Ecology and Society***12**(1): 14.

Reda KT. 2011. Social organization and cultural institutions of the Afar of Northern Ethiopia.International Journal of Sociology and Anthropology 3 (11), 423-29.

Reid, R., Fernandes-Gimenez, M., Galvin, K. 2014.Dynamics and resilience of rangelands and pastoralists around the globe. Annu Rev Environ Resour 39:217-242.

Renders M. 2007.Appropriate 'governance-technology'?Somali clan elders &instit in the making of'Republic of Somaliland'.Africa Spectrum 42 (3), 439-59.

Rijke, J., Brown, R., Zevenbergen, C., Ashley, R., Farrelly, M., Morison, P., van Herk, S. 2012. Fit-for-purpose governance: a framework to make adaptive governance operational. Environ. Sci. Policy 22, 73-84.

Robinson, L. W., and F. Berkes. 2011. Multi-Level Participation for Building Adaptive Capacity: Formal Agency-Community Interactions in Northern Kenya. Global Environ Change 21(4):1185-1194.

Robinson, Lance W., Philip Dearden, and Alejandra Orozco. 2012. Framework for Assessing Governance for Landscape-Level Ecosystem-Based Management, Working Paper No. 13.

Robinson, Lance W. 2013. Mt. Marsabit, Kenya: An Assessment of the Governance System. Landscape-Level Ecosystem-Based Management, Working Paper no. 2.

Robinson, L.W., J. Kagombe, H. Kabugi, F. Kariuki, M.B. Mamo, D.A. Odongo & J.F. Wamboi. 2014. Policy brief: Framework for Natural Resource Governance in Dryland Landscapes in Kenya: Making Ecosystem-Based Management a Reality. ILRI, Kenya.

Rodima-Taylor D, Olwig MF, Chhetri N. 2012. Adaptation as innovation, innovation as adaptation: an institutional approach to climate change. Applied Geography 33, 107-11.

Ruhl, J. B. 2011. General design principles for resilience and adaptive capacity in legal syst: appl to climate change adaptation law. *North Carolina Law Review* 89:1374-1401.

S. Munaretto, G. Siciliano, and M. E. Turvani. 2014. Integrating adaptive governance and participatory multicriteria methods: a framework for climate adaptation governance. Ecology and Society 19(2): 74.

Sandford S. 2006. Too many people, too few livestock: the crisis affecting pastoralists in the Greater Horn of Africa.

Sansculotte-Greenidge K, Fantaye D. 2012. Traditional authority & modern hegemony: peacemaking in the Afar Region of Ethiopia. In Sansculotte-Greenidge K, Mutisi M (eds) Integrating Traditional and Modern Conflict Resolution: Experiences from Selected Cases in the Horn of Africa. Africa Dialogue Monograph Series No. 2/2012.

Schmidt M, Pearson O. 2016. Pastoral livelihoods under pressure: ecological, political and socioeconomic transitions in Afar (Ethiopia). Journal of Arid Envt 124, 22-30.

Scholes, J., Montanarella, L., Brainich, E., Barger, N., Ten Brink, B., Cantele, M. 2018. Summary for policymakers of the assessment report on land degradation and restoration of biodiversity and ecosystem services.IPBES Secretariat. Bonn, Germany.

Scoones, I., editor. 1995. Living with Uncertainty: New Directions in Pastoral Dvep't in Africa. Intermediate Technology Publications, London.

Shehim K. 1985. Ethiopia, revolution, and the question of nationalities: the case of the Afar. The Journal of Modern African Studies 23 (2), 331-48.

Sonneveld BG, Pande S, Georgis K, Keyzer MA, Seid Ali A, Takele A. 2010. Land degradation and overgrazing in the Afar Region, Ethiopia: a spatial analysis. In Zdruli P, Pagliai M, Kapur S, Faz Cano A. Land Degradation and Desertification: Assessment, Mitigation and Remediation, 97-110. Springer, Dordrecht.

Sorice, M. G., W. Haider, J. R. Conner, AND R. B. Ditton. 2011. Incentive structure of and private landowner participation in an endangered species conservation program. Conservation Biology 25:587-596.

T. Dietz, N. Dolsak, E. Ostrom, and P. Stern. 2002. 'The Drama of the Commons in E. Ostrom, T. Dietz, N. Dolsak, P.C. Stern, S. Stonich, and E.U.Weber (eds), The Drama of the Commons: Committee on the Human Dimensions of Global Change. National Academy Press, 3-35.

Tamanaha B. 2015.The knowledge and policy limits of New Institutional Economics on Development. Journal of Economic Issues 49 (1), 89-109.

Temesgen, H., Wu, W., Shi, X., Yirsaw, E., Bekele, B., Kindu, M. 2018. Variation in ESservice values in an agroforestry dominated landscape in Ethiopia: implication for land use and conservation policy. Sustainability 10, 11-26.

Tenga, R., A. Matee, N. Mdoe, R. Mnenwa, S. Mvungi, and M. Walsh. 2008. Study on Options for Pastoralists to Secure their Livelihoods in Tanzania. Current Policy, Legal and Economic Issues.Volume I.

Termeer, C.J.A.M., Dewulf, A., Breeman, G., Stiller, S.J., 2013.Governance capabilities for dealing wisely with wicked problems.

Turner MD. 2011. The new pastoral development paradigm: engaging the realities of property institutions and livestock mobility in dryland Africa. Society and Natural Resources 24 (5), 469-84.

Unruh JD. 2005. Changing conflict resolution institutions in the Ethiopian pastoral commons: the role of armed confrontation in rule-making. GeoJournal 64 (3), 225-37.

Upton C. 2012. Adaptive capacity and institutional evolution in contemporary pastoral societies.Applied Geography 33, 135-41.

Vaz, A., Kueffer, C., Kull, A., Richardson, D., Vicente, J., Kühn, I., Schröter, M., Hauck, J., Bonn, A., Honrado, J. 2017.Integrating ecosystem services and disservices: insights from plant invasions.Ecosystem Services. 23, 94-107.

Wakjira DT, Fischer A, Pinard MA. 2013. Governance change and institutional adaptation.Ethiopia Environmental Management 51 (4), 912-25.

Walker, B.H. & Salt, D. 2006.Resilience thinking: sustaining ecosystems and people in a changing world. Washington, Covelo, London: Island Press.
Yasin Mohammed. 2008. Political history of the Afar in Eth& Eritrea. Africa Spectrum 42 (1) 39-65.

Yayneshet, T. and A. C. Treydte. 2015. A Meta-Analysis of the Effects of Communal Livestock Grazing on Vegetation and Soils in Sub-Saharan Africa. *Journal of Arid Env't*116:18-24.

Young OR. 2010. Institutional dynamics: resilience, vulnerability and adaptation in Env't and resource regimes. Global Environmental Change 20, 378-85.

Zere, G. H. and B. E. Norton. 1987. Range/Livestock Devpt in East Africa with particular reference to Ethiopia. Post-Doctoral paper, Department of RangeScience, College of Natural Resources, UtahState University, Logan Utah, USA.

Zewdie,W., Csaplovics, T. 2015. Remote Sensing based multi-temporal land cover classifications.&change detection in North Ethiopia. European Journal of Remote Sensing 48, 121-139.

11.ANNEXES

Annex 1: Governance Assessment Framework for Middle Awash SESs

Table 17: Governance Assessment Framework: Annex-1

No	Description of the SES					
Q1	Whatisthe"identity" ofthe SES?	A brief description of the SES of the study area				
Q2	Who arethe stakeholders?	A list and description of key stakeholder groups				
Q3	Whatare the main issues and problems inthe SES?	Reflections of the main issues and problems by the various stakeholder groups				
Q4	Whatare the objectives,interests,and valuesof the stakeholders; with their communalities and contradictions	Brief descriptions of what various stakeholder groups see as important and comparison and discussion of the views of stakeholders				
	Description of the Governance System (Assessment of Policies and rules, institutions and processes of rangeland governance)					
Q5	Whatare the core organizationalandinstitutional elements ofthe governancesystem?	The formal decision-making mechanisms at the core of the governance system, such as statutory institutions, customary institutions				
Q6	Whatare the keymechanisms &strategies used for governance	Asummaryofhow governance mechanismsgovernment policies and rules, processes, strategies and institutionsinfluencebehavior				
Q7	Whatare the keydecisionsbeingmade thataffectthe SES and the problems?	The most important collective decisions that affect the SES				
	Assessment of Governance Processes based on *Indicators*					
	Governance Criteria	**Scoring Criteria**				
		"1"	**"2"**	**"3"**	**"4"**	**Comment**
A	***Deliberation:*** The extenttowhichSHsanddecision-makers engage in genuine deliberation on important issues.					
B	***Resources*** Abilityofthe Governance System to generate financial,human and political resources.					
C	***Linkages***: The presence of appropriate linkages among organizations and institutions, especially across levels.					
D	***Equity***: Whetherornot institutionalrulesarefairand take account of unequal circumstances in society					

E	***Responsiveness***: Whetherornot institutionalpatterns show responseto society	
F	***Legitimacy***: Whether thereis public supportfortheinstitutions of the GS	
G	***Accountability***: Whetherornot institutionalpatterns provide accountabilityprocedures	

Annex 2: Sample Governance Assessment Questionnaire

Table 18: Governance Assessment Questioners Guide-Annex 2

	Governance Criteria	Scoring Criteria				
		Scoring Criteria wasset for each Qnrs				
		"1"	**"2"**	**"3"**	**"4"**	**Remark**
Legitimacy	Is the mechanism widely understood and accepted by local, Afar rangeland SHs?					
	Is the mechanism relevant for local, Afar stakeholder needs and appropriate to local cultural and rangeland resource livelihood norms and practices?					
	Does the mechanism have a clearly defined and appropriate legal foundation?					
	What can be done to improve Legitimacy of the mechanism?					
Direction	Are the roles & functions of the mechanism in supporting rangeland resource use and managementin local, Afar clear?					
	Does the mechanism support and strengthen sustainable management of local, Afar rangeland resources?					
	Are there any aspects of the mechanism that are damaging or undermining sustainable rangeland resource use and					
	What can be done to improve the direction of the mechanism?					
	Is the mechanism effective &efficient in supporting local, Afar rangeland resource management and use?					

Performance	Is it easy for local, Afar rangeland resource SHs to access and use the mechanism?					
	Is the mechanism responsive tostakeholder needs and opinions?					
	12. What can be done to improve the performance?					
Accountability	13. Is the mechanism transparent andopen to local, Afar rangeland resource SHs?					
	14. Do local, Afar stakeholdersunderstand their rights with regard the mechanism, and are they					
	15. What can be done to improve the accountability of the mechanism?					
Fairness	16. Is the mechanism inclusive, (equally accessible to all local, AfarSHs (d/ft groups, youth, women and minorities))?					
	17. Is the mechanism impartial (are the mechanisms benefits and costs shared out equally between d/f stakeholders)?					
	18. What can be done to improve the fairness of the mechanism?					
Summary	19. Does all thesemechanism play avaluable role in promoting sustainable rangeland resource use &management in local, Afar?					

Source: Adopted from governance assessment frameworks developed by ILRI

Table 19: Correlation Matrix-Annex 3

Correlation	Edu level	Qlty Info	Prvt plot	LS Asset	Off-Herd	Aid	Info Sorce	Gov't Trust	Suc Plan	Group Memb	Polit Affil	Status comm	Social Status
Edu level	1.00	.318	.153	-.059	.237	-.188	.495	.224	.309	.146	.071	-.052	.091
Quality Info	.318	1.00	.441	.274	.506	-.172	.648	.295	.641	.422	.229	.220	.536
Private plot	.153	.441	1.00	.217	.353	-.045	.321	.136	.436	.276	.103	.142	.483
Livestock Asset	-.059	.274	.217	1.00	.259	-.042	.256	.068	.406	.376	.087	.248	.551
Off-Herd Income	.237	.506	.353	.259	1.00	-.064	.459	.026	.471	.322	.005	.135	.449
Safety net	-.188	-.172	-.045	-.042	-.064	1.00	-.172	-.119	-.156	-.045	-.194	-.094	-.235
Info. Source	.495	.648	.321	.256	.459	-.172	1.00	.257	.641	.407	.186	.176	.486
Gov't Trust	.224	.295	.136	.068	.026	-.119	.257	1.00	.287	.224	.468	.110	.240
Succes Plan	.309	.641	.436	.406	.471	-.156	.641	.287	1.00	.622	.188	.271	.666
Group Memb	.146	.422	.276	.376	.322	-.045	.407	.224	.622	1.00	.237	.183	.601
Political Affili	.071	.229	.103	.087	.005	-.194	.186	.468	.188	.237	1.00	.257	.242
Status comm	-.052	.220	.142	.248	.135	-.094	.176	.110	.271	.183	.257	1.00	.288
Social Status	.091	.536	.483	.551	.449	-.235	.486	.240	.666	.601	.242	.288	1.00