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THE EFFECT OF LAND USE AND LAND COVER CHANGES ON THE LIVELIHOODS OF AGRO-PASTORAL COMMUNITIES IN BAIDOA DISTRICT-BAY REGION, SOMALIA

by
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A thesis
submitted in partial fulfillment of the requirements
for the degree of Master of Science
to the Food Security Program
of the Faculty of Agricultural and Food Sciences
at the American University of Beirut

Beirut, Lebanon
August, 2021

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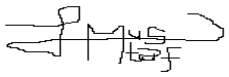

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ACKNOWLEDGMENTS

My sincere gratitude goes to all those who contributed to the successful completion of this project. My thesis committee who tirelessly guided me through the project. I would also like to express my gratitude to the food security program, especially Ms. Rachel Bahn, The Food Security Project coordinator who provided me with unwavering assistance and suggestions. Special thanks goes to my thesis advisor, Dr. Giuliano Martiniello. He has been there for me throughout my project. I would also like to thank the MasterCard Foundation Scholars program at AUB who funded my Masters study.

Finally, I would like to express my profound gratitude to my family for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them. Thank you.

ABSTRACT
OF THE THESIS OF

Mustaf Abdullahi Abdirahman for Master of Science
Major: Food Security

Title: The Effect Of Land Use And Land Cover Changes On The Livelihoods Of Agro-Pastoral Communities In Baidoa District-Bay Region, Somalia

Land use and land cover (LULC) changes have become a focus of global climate science and environmental research since the introduction of 'Land use and land cover project' in the early 1990s by the International Geosphere-Biosphere Program (IGBP) and the International Human Dimensions Program (IHDP). (Han et al., 2015). The motivation of the 'LULC project' was to build a compendium of knowledge from local to global land use/cover dynamics to knit local perspectives and advance scientific models capable of predicting future LULC change patterns for scientists and other stakeholders (Lambin et al., 2001). Climate-induced land use/cover changes precipitate ecosystem degradation in forms including restrained production capacity, habitat intrusion, biodiversity loss (Sala et al. 2000), soil degradation and exhaustion of water and nutrients in productive soil. Arguably, capital-driven agribusiness corporations in the global north see changes in LULC as not all negative, because of the colossus of wealth that can be generated from the production of food, fuel, and fiber in resource use efficiency (Lambin and Geist., 2006).

This research aimed to study the impact of LULC on the livelihoods of agro-pastoral communities in Baidoa Somalia. It examined 2 main questions: The drivers of LULC and the coping strategies that the communities adopted to tackle LULC. A sample consisting of 40 agro pastoral households, 2 FGDs, and 5 KII. A semi-structured questionnaire on livelihoods and land use change was administered.

The study found Population growth, urban expansion, land enclosures, deforestation of communal land. Climate and environmental factors and protracted conflict as the major drivers of LULC. It also found displacement migration and loss of livelihoods are the implication of such a LULC. For the question of coping strategies, the communities employed a wide range of strategies to adoaptively manage the crisis. Migration in search of better livelihoods, humanitarian assistance that become the lifeline of the affected communities and communal networks and bonds that responded well in times of crisis.

TABLE OF CONTENTS

ILLUSTRATIONS

Figure

CHAPTER I

INTRODUCTION

A. Background of the study

Land use and land cover (LULC) changes have become a focus of global climate science and environmental research since the introduction of 'Land use and land cover project' in the early 1990s by the International Geosphere-Biosphere Program (IGBP) and the International Human Dimensions Program (IHDP). (Han et al., 2015). The project is aimed at generating better information at local, national, continental and global level. Both institutions are United States based. The motivation of the 'LULC project' was to build a compendium of knowledge from local to global land use/cover dynamics to knit local perspectives and advance scientific models capable of predicting future LULC change patterns for scientists and other stakeholders (Lambin et al., 2001). Climate-induced land use/cover changes precipitate ecosystem degradation in forms including restrained production capacity, habitat intrusion, biodiversity loss (Sala et al. 2000), soil degradation and exhaustion of water and nutrients in productive soil. Arguably, LULC has a positive effect on human well-being. For example, conversion of forests to crop land has provided food, fiber fuel and a host of other products to an ever increasing population (Lambin and Geist., 2006).

FAO (1997) described land use as an economic arrangement and livelihood activity that people exploit in a land cover type for agriculture, pasture, and plantation, residential, or other purposes. Alternatively, land cover refers to biophysical characteristics

of the earth's surface (such as forests, water, soil, snow and built up areas). LULC change involves multidisciplinary fields including scientists and social scientists such as sociologists, geographers, economists, GIScientists (Geographic Information System), and remote sensing scientists. Thereby, it is imperative to decipher the dynamics of LULC changes associated with human-environment interplay, given the ecosystem's feedback to livelihood strategies fueling threats to people and places around the world (Lambin and Geist., 2006). To shed light on the intensity of land use and land cover changes, figures are helpful. Globally, roughly 4.2 million km^2 of grassland areas, and 6 million km^2 of woodland and forests have been transformed into croplands since 1850 (Lambin et al., 2001). Available estimates indicate Africa accounting for 3.4 million km^2 of woody vegetation degraded by human activities not only in the form of agricultural expansion and rangeland destruction but also deforestation for wood and charcoal trade (Kigomo, 2003).

Climate change related land-use transformations seem to be challenging the traditional way of life (nomadism, pastoralism, and agro-pastoralism) in arid and semi-arid regions of Africa. It also seems that land use change dynamics withstand Hardin's concept of the 'tragedy of commons' where pastoral systems are deemed too environmentally resource disruptive, stimulating extensive pressure on rangelands and counterbalancing ecological equilibrium. Samatar (1989) argues Somali nomads, predominantly pastoralists, confronted consistent environmental degradation due to enormous herds exerting pressure on pasture leading to droughts and famines.

Meanwhile, agro-pastoral communities in sub-Saharan African countries are mainly dependent on these unpredictable natural resource livelihood assets (rangelands,

agricultural cropland (Bantider et al., 2011), and woodland for fuel and energy (Arnold et al., 2006)). Zooming to the Horn of Africa region, pastoral lands pose overarching ramifications for governments, humanitarian agencies, and development practitioners. They are deemed to be remote, impoverished, and subject to droughts and famines. Nevertheless, they can be economic hubs spurring cross-border livestock trade across route networks located along the borders of Ethiopia, Somalia, Kenya, and Sudan (Catley, 2013). Consequently, these rich networks of agro-pastoral routes have significantly been affected by changes spurred by climate related LULC assets. Agro-pastoral livelihoods, biodiversity, food security, and other economic means were directly affected. To mention a few examples of these effects; Soil erosion, rangeland destruction, cropland degradation, desertification, and deforestation (Abbas et al., 2010). Peasants have also been dealing with the expansion of agriculture/pastureland and massive urbanization (FAO, 2000).

Somalia was estimated to have 8 million hectares of cultivable land in 1987, where less than a million was cultivated (Biswas et al. 1987). Nonetheless, No recent study on the size of the cultivable, but also exploited land. Pastoralism is the dominant land use generating the highest revenues for Somalia outpacing crop production (Oduori et al. 2007). In spite of that, the country has faced unprecedented land degradation believed to have been primarily provoked by the loss of forest cover. In 1980, the total forest resource of Somalia in the mountains of Golis and along the two rivers of Juba and Shabelle was estimated to have covered 39 million hectares, about 62% of the country's land. Other estimates showed about 23 % of forest cover was lost from 79,294 ha to 67,199ha from 2000 to 2019 representing a loss of 1,058ha per year (Kipngeno, 2020.

Bay Region of Somalia has also been struck with Land degradation. The pastoral and agro-pastoral communities faced severe livelihood threats. Since the onset of the 2011 famine, agro pastoral communities have been deserting their land due to the failure of the staple crops in successive wet seasons among other factors including protracted conflict. Estimates reveal the likelihood of crop failure is as high as 75%. Sorghum is the staple crop in the region, and a considerable proportion is traded and exported to the rest of the country (ILO, 2014).

B. Research Rationale and Statement of the Problem

Somalia is one of the poorest countries in the world with a deeply rooted history of drought and famine, but also crisis and conflict that erupted in 1991. Before the collapse of the central government (1991), the country's economy heavily relied on livestock production. Rangeland was estimated to have accounted for 80% of the land, while 60% of the Somali people were involved in pastoralism (Ministry of National Planning, 1982). Looking at current land use, as per 2018 estimates, Agriculture land accounts 70.3%, arable land: 1.8%, permanent pasture: 68.5%, forest: 10.6%, others; 19.1% (CIA Factbook, 2018). Since the civil war started in 1991, already pressing seasonal variations and climate shocks have deteriorated, further igniting steady erosion of the natural resource base and other livelihood assets of both nomadic and urban agro-pastoral communities.

The Somali people are among the famous pastoralists in East Africa, and they are found across the countries in the whole region, including Ethiopia, Kenya, and Djibouti (Lewis, 1961). The pastoral discourse recognizes poverty among the pastoralists, with

significant drivers being described as below-average rainfall, causing shortages in water, pasture, political marginalization, and land degradation (Little et al. 2008). Land degradation among Somali agro-pastoralists has multi-faceted causes, often linked to human activities such as tree logging for charcoal trade, poor agronomic practices, lack of proper land policies, and their implementation (Omuto et al. 2014).

Drought and famine have been prevalent in the district of Baidoa, the study site. A severe famine in 1992, the beginning of the civil war, killed more than half a million people (Fitzgerald, 2002). Baidoa, the capital city, has become known as 'the triangle of death' and 'the city of the walking dead.' In September 1992, relief officials estimated the monthly mortality rate to have risen to 5979, nearly 2000 per day (Mukhtar, 1996). During that time, Baidoa had a population of around 180,000. However, Mukhtar believes the famine was neither the consequences of natural factors nor climate change, rather an excessive resource looting, rampage and an orientation towards clan occupation that aimed to drive off the ethnic 'Reewin' (owners and inhabitants of the land) from their property and replace them by other ethnic clansmen. In 2011, another famine forced roughly 35% agro-pastoral communities residing in Bay Region from their land to Mogadishu, Somalia's capital city, where they live in Internally Displaced Persons (IDP) camps (Majid and Mcdowell, 2012). Mortality estimates as a result of this famine were as high as 260,000 between October 2010 and April 2012 across Somalia (Checchi, F. and Robinson, 2014). In 2017, another significant drought caused immense human suffering; approximately 6 million, almost half of the country's population, were reported to be in critical food insecurity (IPC Phase 3 and

4). Hundreds of thousands were displaced and live as IDPs, abandoning their lands. Production shocks triggered by the droughts have led to livelihood disruption.

Enough literature has covered generally about conflict and crisis discourses in Somalia; see (M Doornbos, J Markakis., 1994; K Menkhaus., 2007; K Menkhaus, 2003). Drought and humanitarian interventions have also been studied at a general scope (Borton, 2001; Natsios, 1996). Pastoral studies in Bay Region are mostly post-civil war; see (MN. Al-Najim, 1989; Mn-Al-najim, 1990; RH Behnke, C Kerven, 1984; Al-najim., 1991). Remote sensing studies have also further neglected the perspective of the human subjects that have experienced and live/Ed with the issue. For example, see Omuto. et.al., 2014. Another limitation of using remote sensing alone is that it cannot elaborate on how people cope with changes in LULC; this underscores the need for a qualitative approach. To the best of my knowledge, no study has focused on the effects of LULU changes on the livelihoods of agro-pastoral communities in Baidoa District and Bay Region in general. Therefore, there is a crucial need and gap to investigate the matter through an extensive literature and qualitative approaches that can dig deeper into the minds of the affected communities.

C. Study Objectives

The general purpose of this study is to investigate the effects of land use land cover on the livelihoods of agro-pastoral communities in Baidoa District-Bay Region-Somalia. The specific goals are:

- Assess land use/land cover changes in the study area through extensive literature review;
- Examine the implications of land use/cover changes on livelihoods of agro-pastorals;
- Discover the driving forces of land use/cover changes in Baidoa District; and
- Discover the coping strategies of agro-pastoral communities on changes in land use/cover;

D. Research Questions

2. What are the driving forces of LULC change in Baidoa District, Somalia?

3. What are the coping strategies that agro-pastoral communities adopt to respond to LULC?

E. The potential significance of the Study

Knowledge of LULC changes and its driving forces are pivotal to designing sound environmental policies. Land use/cover analysis will provide baseline data needed to identify how the land has been used in the past and what extent of change to be expected in the future. The study is envisaged to deliver critical knowledge regarding human-environment nexus, climate change, and other driving forces of LULC. The survey can act as a guide for community-based organizations, government ministries (environment, agriculture, livestock, planning, etc.) and non-governmental organizations in formulating policies that affect land use, livelihoods, and agro-pastoralism. A sound analysis of the impact of LULC changes on the livelihoods of agro-pastoral communities can inform

strategies to overcome Hardin's concept of the 'tragedy of commons' if found existing in the area. Land conservation strategies could be derived based on the findings of this research. Government officials and natural resource managers will resolve community conflicts over natural resources (such as rangelands, croplands, and water bodies) (Karteris and Pyrovetsi 1986). Since land degradation has been identified as one of the crucial issues, the study can help shed light on possible further land degradation for proper prevention. For sustainable management of land, it is pivotal to monitor the current processes of LULC, and inform concerned stakeholders for immediate decision making.

F. Scope of the Study

This study covered LULC and their effects on the livelihoods of agro pastoral communities in Baidoa district. A mixed-method of qualitative and literature review was performed. For the qualitative part, fieldwork, participant observation, interviews, focused group discussions and Key Informant Interviews (KIIs) were carried out. 40 agropastoral household were approached for interview with a semi-structured questionnaire guide. 2 focus groups and 5 key informants were also interviewed.

CHAPTER II

LITERATURE REVIEW AND ANALYTICAL FRAMEWORK

A. Land Use and Land Cover Changes

Several decades ago, a focus on land use/cover change research transpired on the global environmental agenda. The International Geosphere-Biosphere Program (IGBP) and International Human Dimension Program on Global Environmental Change (IHDP) initiated a comprehensive, interdisciplinary and joint 'land change science' project in 1995 as a part of an effort to establish the role of land change within the earth system (Lambin, 2006). According to the Inter-governmental Panel on Climate Change (2001), land use/cover change is a contributing factor of CO_2 (carbon dioxide) concentration of the atmosphere fueling climate change. Human activities have, for thousands of years, played an escalating role in the modification of the environment (Ojima et al. 1991). The speed of human alteration of the earth's land surface is unparalleled (Lambin, 2001). Analyzing and predicting how land use/cover change contributes to degradation, feedback on livelihood strategies from land degradation, and the challenges they pose to people and places demands a comprehensive outlook of the interaction of the human and the environment (Lambin, 2006).

Inter-linked impacts of climate and LULC change inflicted catastrophic implications for pastoral livelihoods and food security in East Africa (Galvin et al., 2001). However, pastoral communities established a rationale to inhabit in the harshest landscapes

in the world (adaptive strategies). That is why it is considered as a livelihood asset that best endures climate change. Yet pastoralists are in the forefronts of climate devastation and are the most affected communities in the Horn of Africa. (Sulieman., and Elagib., 2012). The region is the epicenter of scientific and scholarly debates on climate driven, LULC change.

LULC impacts and response strategies are reported across East Africa, especially in Kenya, Ethiopia and Somalia. For example, in western Kenya, the Rift Valley delta areas, a substantial increase in agricultural activities has been observed between the years 1995 and 2000. This is due to forest land in the riverine regions being converted to agricultural land (Res et al., 2012). Similarly, In Godey District, the Somali Region of Ethiopia, land use/cover changes such as wood and shrub-land decrease due to recurrent droughts, charcoal production, firewood for cooking energy, overgrazing, and urban expansion into cropland (Worku, 2018). In the central region of Ethiopia, a study explored the perception and the adaptation strategies followed in response to undesired LULC changes in two districts of the Central Rift Valley of Ethiopia. The study found that cropland expanded at the expense of all other land-cover types. The area covered with forest, woodlands, grasslands and water have declined from 10.0%, 33.0%, 30.0% and 16.0% to 4.4%, 18.3%, 17.2% and 13.4% of the total study area, respectively, while the area cover for cropland increased from 11.0% to 46.7%. Population growth, drought, social unrest, government change, and land tenure policy were perceived as the major drivers underlying these changes (Ariti et al., 2015).

B. Theories and models of land-use change

Land use (LU) theories and models are tools that aid in analyzing the causes and repercussions of the dynamics involved in LU (Verburg et al. 2004). There are two theories of comparative case study analysis that attempt to explain the complexities of land-use change systems; one deals with organizing an 'a priori' set of standardized case studies, for example, examining deforestation and their linkages to an institutional arrangement. The other one is a posteriori comparison of case studies available in the literature. The former go through standard protocols that support inferential statistical modeling. The latter illuminates causal factors that have been found pressing on a global scale. However, those factors share the same outcome (such as deforestation, desertification, and agricultural intensification). For example, causes of dryland degradation, and comparative studies that involved forest cover change. This creates a cyclical pattern (Giest et al. 2006). The modeling approaches are a portfolio of technical construction that unravels the dynamics of land-use systems (Verburg et al. 2004. Despite long-standing calls of adopting standardized protocols for carrying out field studies about LULC, no generally agreed harmonized approach yet in place. Anti-standardization scholars argue that each study locality is unique, and results cannot be extrapolated (Giest et al., 2006). Building on Giest's view, we will focus on the descriptive and narrative approach that deals with the qualitative approach.

Economic models have also been used in the literature of land-use change. These modeling processes are principally ad-hoc and multidisciplinary. Causal relationships of individual choices and land-use change results are well explained in such models. As a

vantage point, it starts with a rational landlord and makes decisions that maximize his/her utility. Behavioral and structural econometric models enable us to generate patterns of human-induced change. Non-economic models that are spatially explicit, but also empirical attempts to explain the land-use difference. Geographers and natural scientists commonly employ them with the help of remote sensing science. Other models include cellular automata. These are mathematical based models that utilizes probabilities and deterministic rules to assess the impact of LULC. Some geographers used cellular automata models to analyze the processes of urban growth which are also a part of LULC (Irwin., 2001).

So far, theorizing land-use change in connection with livelihoods has been manifested through the social processes and power as the entry point. According to McCusker and Carr (2016), there are fewer studies on land-use changes that have engaged with livelihoods. Among approximately 320 sources reviewed in the literature by a study, 35 (11%) mainly referred to any livelihood approach. The study also looked at livelihood literature in connection with land use. Out of 209 references deemed to relate with the search, 5% (12) addressed a land-use change in the context of livelihoods. A considerable gap is observed. The definition of livelihoods by Chambers and Conway (1991) points out several assets used by individuals and communities to make a living; they are categorized into capital, physical, human, financial, and natural assets. The land is a natural capital that is exploited by human beings for a living. Social relationships are the baseline for any discussions of these livelihood assets (in this case, access to land). The relationship between land-use change and livelihood change is seen as a cause and effect. Most studies on the impact of land-use change focused on the global carbon cycle. Causal forces have

also been studied in an aggregate and broad base, while local forces synthesis into regional powers has been understudied (McCusker and Carr., 2006).

Most theories discussed above deal with economic and statistical modeling of land use and land cover without making reference to two important factors within the Somali context. The politics of land use change and the political economy that drives the capital and wealth involved in the transformation of land is well captured in the literature. Other theories also deal with simulation modeling and remote sensing. Why is political and political economic analysis in connection with land use and livelihood important? Let's look at the driving forces of LULC. The driving forces of LULC are categorized in various classes (political, economic, social, and environmental). Land-use changes happen in a political context with institutional arrangements involved. The society and the environment co-involve economic and livelihood activities; thus, a feedback mechanism is created with the political economy spectrum (Meyer and Turner. 1994).

The political economy of land use and land cover change can be observed from the historical precedence and current dynamics that exist generally in Somalia and specifically in Baidoa. Negative changes in land use and land cover changes over time were partly triggered by drought and famine in Somalia among other factors such as political processes, institutions and structures. Alex De Waal (2000) discusses the challenges of democratic anit-famine in Africa which is complicated by the nature of the famine, the political history, anti-famine measures, the prevalence of war and the level of international aid (De-wall, 2009). This holds quite true in the Somali context for the past 30 years with the onset of some major famines (1992 and 2011). The complexities were fueled by a series of political

actions that were taken by the regimes and the opposing rebels before and after the collapse of the government. Historically, the government of Siad Bare took measures that dispossessed land from its owners in favor of cooperatives affiliated with the government. Cooperative laws were created and passed by the then parliament to dispossess land from its rightful owners. This played out until alienated pastoralists and peasants toppled the government. While rebel clans wreaked havoc and rampage looting to whoever they encountered especially in the inter-riverine area (Mukhtar, 1996). The drive for capital accumulation and scramble for land expansion by the rebels but the government a pure example that political economy was an engine to changes in the way land was used among the agro-pastoral communities in the inter-riverine area.

Capital driven political economy can also be observed in the charcoal business that Somalia is well known for. This has negatively affected pastoral and agro-pastoral land. Over the past violent decades in Somali history since the onset of the civil war, charcoal among three other natural resources production resources, bananas and fisheries was at the center of what remained from the economy of Somalia. These resources have played a role in funding the conflict to perpetuate dominance and resource accumulation by the elites involved. Competing militias have fought one another for control of production and trade through the control of relevant lands, but also expanding to the lands of minority groups. While these resources funded the conflict, it also represented an important source for non-conflict income that helped the country recover, however the environmental and social costs out-weigh the benefits. What does this mean to land use and land cover change? Powerless indigenous agro-pastoral communities were bearing all the burden. They lost

crops, the land and the animal, thus playing smart to adapt, they employed livelihood strategies by working in the charcoal business. doing the hard labor and earning a living (Webersik and Crawford, 2012).

The charcoal market represents one of the most lucrative businesses generating millions of dollars per year. It has been recognized by the UN the Somalia government as an illegal business and there are UN resolutions that banned the logging, burning and trade of charcoal. The illegal charcoal trade exposes Somalia's political economy as a driver of conflict fueled by local, regional and international interest. Linking this to land, it's the land that is being illicitly exploited from connected interest groups. The Gulf Cooperation Council states, sit at the center of this illicit charcoal trade. They buy it for domestic consumption for Shisha and other uses while local political actors including Al-shabab earn hard currency to fund their activities. One study from the UN has indicated the demise of the acacia bussei, a slow-growing hardwood tree that has long been the backbone of the country's multi-million dollar trade in charcoal (Gridneff, 2018).

Land use dynamics can also be tied to the power and control struggle between the Somali nomadic groups and the settled agro-pastoralist (nomads vs agro pastoralist). The desire of nomadic groups to impose cultural and political hegemony on the settled agropastoral group in around the inter-riverine region in the south. Nomadic groups predominantly from the northern part of Somalia have always pushed a narrative of a single language and a mono culture among the Somalia. In fact the people of Somalia have always been divided into the southern agro-pastoral groups (the inter-riverine people) and the northern nomadic groups which have distinct cultural, linguistic and social structures. The

political ambition and the power scramble for the nomads is even believed to have created the currently used 18 Regional boundaries in Somalia. It was a politically motivated move to give land to northern nomadic communities. For example the Alta Juba Region was divided into Bay, Bakol and Gedo Regions, and an entire region called Gedo was given to a specific clan. (Muktar, 1996).

C. Agro-pastoral challenges in Africa

Pastoral nomadism, a significant land use of the Horn of Africa, is adapted to variable forage supplies and water distribution, especially in Africa where a huge portion of the world's arid and semi-arid region lies. How have nomadic communities survived in these marginal and harsh lands? Because it is attributed to their opportunistic mobility and diversified livestock husbandry. Pastoral communities have in the past been regarded as the wealthiest among the rural populations; however, today they are the world's most vulnerable groups (Nori and Baldaro, 2018). They have long suffered from what has been termed as 'complex emergencies', a term that emerged from Africa in the late 1980s (Duffield, 1994). Recurrent and protracted droughts and famines are a common feature of African rangelands. Examples can be illustrated in many parts of Africa from the Sahel (1969-1973, 1983-1984). These incidents claimed lives and livelihoods. Scholars attributed in their different debates that the following deteriorated; overgrazing, sedentarisation of nomadic communities, water infrastructure development without taking the ecology into consideration, compressing the nomads into smaller and more fragile lands. Since recurrent

and protracted crisis are not new in the pastoral way of life, they have survived because of ecological, socio-economic and cultural adaptive strategies they employed during the crisis.

In Sub-Saharan Africa, where the livelihood economy is predominantly an agro-pastoral system, climate-human-induced droughts reach a famine phase classification (Ifejika et al., 2008). For example, Amnesty International reported that tens of thousands in Angola have been exposed to droughts and commercial cattle farming. Residents were forced to eat wild leaves due to a deteriorating situation of food insecurity. The government of Angola has confiscated communal grasslands for industrial agriculture with no alternative means being left for the indigenous communities (Deprose, 2019). A similar case where communal lands have also been commercialized happened in Northern Uganda, along the border of South Sudan. The people of Acholi in the area experienced land enclosures and land grabbing by the state and transnational corporations for what was termed as 'accumulation by dispossession.' This has deprived them of their livelihood and triggered massive displacement. Capital driven land enclosures for food and biofuel production are for export purposes by the transnational corporations. (Martiniello, 2019).

Pastoralists in the Horn and East Africa have also experienced 'complex emergencies' as conflicts, droughts, humanitarian crises, and famines. A study in El Gedaref region eastern Sudan that analyzed climate, land use and land cover and livestock seasonal migration routes revealed that temperatures are hotter in the area. This has had implications on the pastoralists, predominantly cattle headers. The most significant implication was conversion of natural vegetation into large scale mechanized agricultural lands. The study suggested that the found LULC changes in the livestock routes may

trigger irreversible loss of biodiversity and depletion of other ecosystems, essentially oxygen provided by the vegetation. Most LULC studies in the area have contributed to resolving land management and governance issues (Sulieman and Elagib, 2012).

One of the wealthiest wildlife populations in East Africa, Tanzania and Kenya, the Maasailand has experienced a massive land transformation during the last century through conversion of rangelands into cropland. The drivers of such transformation that heavily impacted the lives and livelihoods of pastoral communities has been attributed to government policies, land tenure, unpredictable climatic conditions, and human population growth. The increase in population is envisaged to be the future driver of these transformations. One other bottleneck that the study unveiled is the privatization policies that led to the villagization and sedentarization of the communal grazing and rangelands of mobile pastoral communities. The process, the migratory routes and the grazing resources have been lost (Msoffe, 2010). It has also been noted that conversion of one land use to another has negatively affected the pastoral communities. For example, clearing grazing land for cultivation can displace pastoralists further and put them in a fragile state.

Since the conversion of vegetation to agricultural lands has been happening at an increasing speed, some studies explored ways and processes of forest recovery. A four year study in East Africa qualified the patterns of forest recovery after clearing and three years of cultivation of most evergreen forests in Uganda. The study was conducted in an abandoned agricultural land due to droughts and famine. This East African site was only lightly disturbed, yet tree recovery was occurring slower than in heavily degraded sites described from South America. The rate of recovery looked to be heavily determined by

interplay between tree seedlings and P. purpureum and A. pubescens, tree varieties (Chapman, 1999). Reforestation has proved a significant way of recovering the lost vegetation. Ethiopia is also undertaking a large-scale campaign of reforestation by planting a billion trees. Wildlife, rural societies and pastoralists can greatly benefit a strong habitat with adequate ecosystem services.

The Afar region of Ethiopia, Darfur of Sudan, the Kenya-Uganda border, and southern Somalia represent ample examples of LULC affected areas (Catley et al. 2013). In the Afar Region, people responded to these environmental calamities by blending livestock production to cereal exchange, and livelihood diversification (small business creation, casual labor wages, and farming) to sustain their livelihoods. They also logged trees for charcoal production for domestic use and trading (Belay et al., 2005). Agropastoralism has not only been widely recognized as a mitigating and hedging strategy but also an improvement mechanism of resilience and climate adaptation strategy. The practice reduces grazing pressures on rangelands (Sanz, et.al., 2017). Agro-pastoral communities in the inter-riverine area of Somalia confronted some aggravating factors and limited livelihoods; agricultural stagnation was a predominant factor; as Mukhtar (1996) explained, Reewin and Bantu communities historically faced forceful removal from their arable lands by the successive governments. An enormous number of them turned from landowners to waged laborers of their land under the Siyad Bare regime. After the fall of the administration, these people again fell into the traps of power mongers as they were unarmed. Therefore it is not of surprise that they were the most significant number of victims of the 1991/1992 and 2011 famines (Majid and Mcdowell . 2012).

D. Agro-pastoralist livelihoods and resource capture in Somalia

The Somali pastoralists are scattered across four countries in the Horn of Africa, where they cross the borders between Kenya, Ethiopia, Somalia, and Djibouti. The movement across borders has been a coping mechanism for agro-ecological challenges faced by the agro-pastoralists. It is driven by pasture and water availability. These communities also share similar ecology, culture, and livelihood patterns (Nori and Baldaro, 2018). According to the FAO (2016), the Somalis' livestock sector is the most significant contributor to Somali livelihoods, with over 60% of the population engaged in the livestock sector, where around 40% of the people are involved in agriculture. Pastoralists are concentrated in the North and Central areas of Somalia, where agro-pastorals happen to exist in the Southern regions (FSNAU, 2014).

The collapse of Siad Bare's central government in Somalia in 1991, descended the country into a protracted political, civil war and social unrest. All institutions broke down. Though some management of pastoral and agricultural resources has been established in Northern pastoral regions, the south remains unregulated (Nori and Baldaro, 2018). The problem has been worsened by periodic floods and droughts that affected the livelihood resources (Sage, 2002).

Bay, the study region, is located between the two major rivers of Somalia, namely, the Juba and Shabelle. It has fertile soil and a relatively moderate climate that has the potential to accommodate dryland agriculture (USAID, 1980). Throughout the centuries,

the Region has maintained a subsistence-based agro-pastoral economic system where most of its rural inhabitants are agro-pastoralists. Crop cultivation and rearing of animals are the combined sources of livelihoods for almost all households (Putman, 1985). The agro-pastoral production method is favored by factors such as topography, climate, natural vegetation, and land potentiality (Massey, 1987). Animal herders not only use the variety of vegetation species for animal feeding, but also take advantage, including to resist droughts and harvest them as a source of income in forms of charcoal, firewood and construction for housing (Al-Najim, 1991).

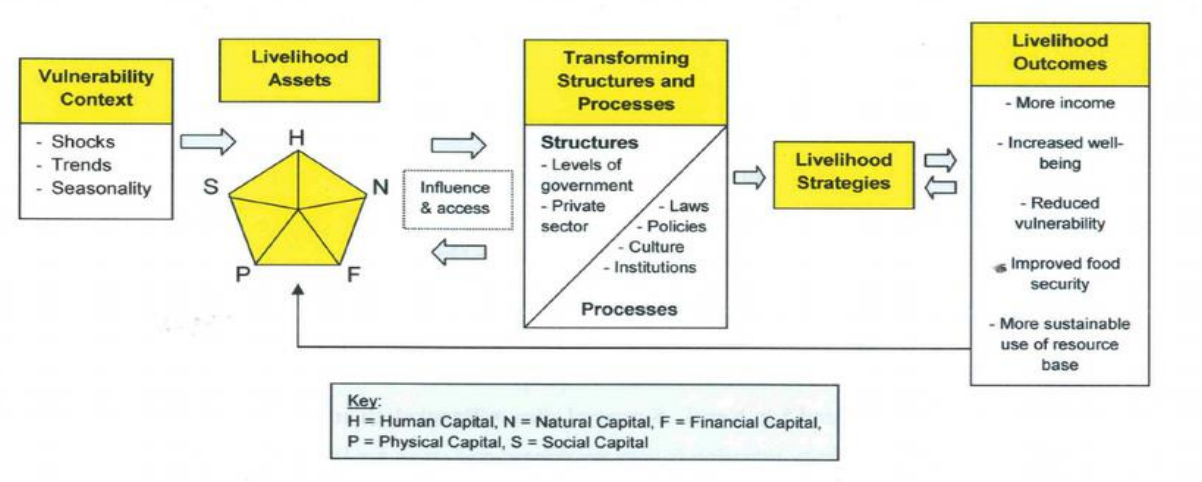
E. The DFID sustainable livelihood framework and land use change

Sustainable livelihood consists of people, resources, and the means of living, such as food, income, and assets (Chambers and Conway, 1991). Agro-pastoralism, on the other hand, is a form of social organization based on the growing of crops and the production of livestock as the principal means of economic activity and practiced by settled and nomadic communities. The type of herds reared depend on several factors, including culture, climate, topography, and available natural resources.

This study will use the DFID sustainable livelihood framework for qualitative analysis to better understand the shocks, trends, and seasonality faced by the natural resource (in this case, land). The framework adopts the definition of Chambers and Conway of livelihoods (see the description above). I operationalize the definition of livelihoods to capture the complexities surrounding the effects of land use/cover changes on the

livelihoods of agro pastoral communities in Baidoa, Somalia. Livelihood assets are human, social, natural, financial, and physical capital. People use strategies to use these assets to maximize their livelihood outcomes (e.g., improved wellbeing, more income, reduced vulnerability to shocks, and improved food security). Organizational policies, institutions, culture, and laws are the external influencers of the livelihood assets, strategies, and outcomes. The vulnerability context is the shocks, trends, and seasonality (droughts, floods, etc.).

Figure 1



The DFID Livelihood

The DFID livelihood framework elaborates that within a particular vulnerability context, people/individuals exploit livelihood assets of different combinations (financial, physical, and natural). The assets are used within circumstances influenced by institutional structures and processes in order to pursue a range of livelihood strategies, with a

measurable livelihood outcome. How does this link to land use change? The ownership of a livelihood entitlement for a particular community and the way these livelihood assets are conditioned may be affected by the changes in land use and land cover. Thus the vulnerability context is the vantage point where the livelihood assets (e.g. land) impact linkage on LULC is established within the DFID framework.

Our study examined the 'Capitals' of Baidoa agro-pastoral community, especially the natural capital land, and asked questions of shifting land use and land cover as a result of both internal and external drivers. The study also identified that communities need support in building resilience to adaptively manage a changing context. Why this framework for our study? We aim to generate complexities around land use change and recommendations that can improve conditions or opportunities for the agro-pastoralist. This has also been reflected in other studies such as one by Bui and chreinemachers (2011) who worked with re-settlers in Vietnam who had to move for Dam construction on the Da River. Based on conclusions drawn from re-settled and host community's experience and deploying Sustainable Livelihood Approach, the researchers' recommended better information for host families on resettlement processes and compensation being paid in instalments rather than lump sum figures. This highlights how SLA can be understood as a basis for development interventions (McLean, 2015).

In a paper by Scoones (2009), the livelihood framework has some limitations, it's a static picture that does not take into account the structures and processes that these changes (in our case land use change) are embedded in. It does not consider the global forces and can neither explain agrarian change (Scoons, 2009). There are a broader set of

forces involved in changes in land use and land cover from the perspective of political economy. For example the state which has dictated how land has been used in the past. The different markets and the political capital involved in the deforestation activities. Scoones (2009) also discusses decline and fall of livelihood perspectives; he asks the question, where debates about livelihoods discourses and their sustainability ended up? Another question from Scoones looked at why are livelihood perspectives seemingly not as prominent today compared to a decade ago? Different failings have been highlighted. Notable among them are that livelihood frameworks were often dismissed as too complex and not compatible with the real world challenges and decision making processes. The livelihood approaches also did not perform well in big shifts of global markets, however did well in the local context, thus political economists illustrated the danger of naïve localism and idealistic liberal analysis that ignored the structural forces of class and capital (Scoones, 2009). Ashley (1999) also made a similar conclusion; the processes and structures discussed in the framework can do a better job at household level, however fails to unpack the structures and processes at policy level. . For example when we look at government policies, markets and local institutions are diverse and each significant in its own right. To group these under one broad heading does not make a lot of sense ((Ashley, 1999)...

CHAPTER III

STUDY METHODOLOGY

A. Qualitative methods

Recently, qualitative methods have enjoyed a period of extensive growth and become an established and well respected research approach across a number of discourses and contexts (Barbour, 2018). Qualitative methods can be used for a number of applications to provide an in-depth understanding of the research issues that embrace the perspective of the study population and the context they lie in. It is pivotal for exploring fresh perspectives in understanding a complex phenomenon for unveiling the beliefs, motivations and behaviors of a community, for the socio-cultural norms. Therefore, this research method is the most suitable for answering the 'why and what' questions (Hennink & Bailey, 2020). This research was qualitative and an extensive literature review to detect the effects of land use/cover changes on the livelihoods of agro-pastoral livelihoods in Baidoa District communities. The qualitative method will provide a sheer and robust socio-scientific triangulation of land use/cover change phenomenon. The method will explore the natural setting of land use/cover changes and makes sense of the interpretation that the people provide. Qualitative approaches tap into the heads of the respondents to understand their experiences but also have direct access to the contents on their heads (Silverman, 2020). It will also focus on social realities and conundrums arising from human exploitation of land use/cover changes. The study time coincided with the beginning of a large-scale locust infestation, but also the surge of the noble coronavirus, known as Covid19 pandemic.

B. Data collection and analysis procedure, March 2020.

The study collected two types of data. Desk review from an extensive and investigative literature about land use and land cover changes in the study area and fieldwork in the form of qualitative data. Several techniques of qualitative method was utilized, including:

1. Household interviews:

The study interviewed 40 agro pastoral household heads using a semi-structured questionnaire. The households were identified together with village committees. The researcher approaches the interviewees at their place. Female headed households are also included in the interview.

2. Focus Group Discussion:

Focus groups may generally be defined as any group discussion as long as the researcher is actively encouraging, and alternative to, the group interaction (Kitzinger and Barbour et.al. 1999, p. 20). FGDs will be used to get the participant's option vis a vis the theme under study. Two focused group discussions will be conducted. One group will consist of 7 members of agro-pastorals who will be exclusively men. The other group will consist of 7 members as well, who will be women. This will allow extracting gender perspectives on the topic. The age group of the FGD participants will be considered. Older adults will be included to provide historical perspectives on the issue. The selection

criterion will be observed: Participants should be agro-pastorals and have lived in the area for the past 50 years, have the history, memory of the study site, climate evolution, agro-ecology and any land use and livelihood changes. FGD will help establish interactive discussion among the participants spearheading verbal expression of thoughts along the theme under discussion (Hageback et al., 2005). A limitation of this method could be that people could be reluctant to share their experience in a group setting, as that having several participants competing to tell their individual detailed stories is probably to produce 'noise'. This way, data is quite complicated to order and attribute to individual speakers (Kitzinger, and Barbour 1999). Another limitation could be that a few focal participants can dominate the discussion leaving no space to others. This has been solved by extensive encouragement from the researcher to speak up and not to leave anyone behind.

3. Key informant interviews

Key informant interviews (KII) are qualitative in-depth interviews with people who know what is going on in the community. The purpose of key informant interviews is to collect information from a wide range of people—including community leaders, professionals, or residents—who have firsthand knowledge about the community. These community experts, with their particular knowledge and understanding, can provide insight on the nature of problems and give recommendations for solutions. In this case, five (5) key informants will be contacted; District Mayor, NGO Coordinator, a traditional elder (a community leader), an academician from a local university with a specialty on land, and a businessperson in livestock. They are regarded as professionals and people with good

knowledge of the local context and the topic under discussion. This will allow us to dig-deeper and cross-validate the pertaining issues with the focus group discussion. The key informants have been carefully selected as they are regarded as people with first-hand knowledge and experience about the agro-pastoral community. The diversity in the key informants also adds the flavor of providing a wide range of perspectives.

4. Participant observation:

This is one of the methods of conducting ethnographic research. Ethnography is **a** form of qualitative research on studying communities in their own environment. It is driven by the interest of being there and observing events and processes while they occur. The basic method is participant observation (Flick, 2018). This is a pivotal technique of extracting the most out of the subjects and context under study. The research team will be deployed in the field during the study to carefully examine the emotions, reactions, and responses of the research subject. This will bring a close and intimate familiarity of the research team to watch cultural and living practices through intensive involvement. They will be people from within the area and will collect information that has not been captured during the interview. Full participation in the community, and spending time with them will validate the collected data. Field notes: The researcher will take field notes using recorders and manual handwriting during the interview. We intend to use photos for illustrative purposes.

C. Data analysis:

In this section the study used an approach that described and interpreted participants' views such as content and thematic analysis. Coding and narrative analysis was considered for the analysis.

Coding is the categorization of the collected data. Themes and sub-themes will be assigned to codes with UPPER case alphabets. The category will be based on a pre-set list of themes derived from the literature that is open to probes. For example, 'drivers of LULC,' 'coping mechanism,' and 'implication of LULC' could be potential codes. All the data will be observed in a systematic way and code ideas, themes, and concepts as they fit a category. Additional codes might add as they frequently appear in the conversation. Serial number/codes will be assigned for each note, the date, name of the respondent will be kept together with the field note to maintain track of the data collected. The coding will help organize the data, establish commonalities, relationships, and patterns. These patterns will be linked to the study framework to test conformity. A verbatim quotation will be used based on a set of preconditions including clarity, readability, giving voice to the participants, and deepening understanding of readers (Corden and Sainsbury, 2006).

For the drivers of LULC, we analyzed the drivers of land use and land cover changes in Baidoa, Somalia from our key informant, household data, but also focused group discussion. We transcribed responses from the study participants based on what they think have triggered land use and land cover changes in Baidoa agro-pastoral zone. We have crossed checked participant responses to the available academic literature. We have

also looked at if the perceived drivers of the land use and land cover changes are different overtime since we have a time factor in our study.

D. Narrative analysis

This is one of the best approaches of collecting qualitative data in narrative studies (see Czarniawska 2004). In qualitative methods narratives are used in two ways. First, a situation is established in which a narrative can be unveiled in an interview which is not influencing the story that is showcased. The other way is, narratives come from specific interviews or are part of other formats of interviews to be analyzed. For example, when the research subject starts to tell a story while providing answers to interview questions asked. In our land use and land cover study, a major implication is displacement and migration (Flick, 2018). And a prominent way of using narrative is to study issues such as migration. Participants will be inquired to tell about the days when the pasture was green and droughts were minimal and currently when displacement and migration due to complex issues are at the peak. Then narratives will be built in this way. The speech and content of words from their stories will be revised. As participants will explain the matter in their language, the content will be recorded and later translated into English. The narrative analysis will involve the reformulation of story sequences, situations, social, economic, political, and cultural perspectives presented by the respondents.

E. Description of the study area

Baidoa Somalia

The research will be conducted in Baidoa District, the capital of Bay, Somalia. The region lies between the Juba and Shabelle rivers in Southern Somalia. The population of the area is divided into three economic groups, namely, nomadic pastoralists, agropastoralists, and town dwellers. The largest is the agro-pastoral group (Al-najim, 1991). The district lies approximately 256 km northwest of Mogadishu, at an elevation of 441 meters above sea level, 3.11 North latitude, and 43.65 East longitudes. It covers about 40,000 square kilometers. The Bay region borders Bakol, Lower Shabelle, Gedo, and Middle Juba Regions. The Baidoa district is home to 230,000 people (UNFPA 2015). Crop and livestock production, small businesses, and daily wage labor are the primary livelihood resources for the community.

Baidoa was selected for this study due to the land use and land cover changes induced by ‘complex of emergencies’ that have displaced a considerable number of the rural and urban populations. Apart from the dependency of this region in agro-pastoral economy, Bay and Baidoa rangeland’s location in Somalia put a perfect fit for this study. It is located in an area of transition between the hinterlands of pastoral nomadism in the north, and the riverine lands of sedentary tillage in the south. We have also noted that this region was an epicenter to government developmental projects since the 1950s, however, overlooked during the civil war and current government (Al-najim, 1989).

F. Ethical and political considerations

The following ethical principles will be adopted: The study has to justify why interviews of agro-pastoralism are necessary at all. The study must also explain the purpose of the research and under which circumstances subjects participate in it. The researcher must be able to explicate the methodological procedures in the project. The researcher must not make false statements about the importance of the research. The researcher has to respect all laws and regulation of data protection in AUB, international and local contexts. The researcher must weigh research positive and negative consequences for participants. Finally, the researcher has to avoid any harm to participants while collecting data.

G. Trustworthiness

The study considers integrity as the core code of conduct; thus, community entry techniques are adopted. Before collecting the data, research objectives will be sensitized with local authorities, and their consent will be sought. This will allow the understanding of administrative and political structures within the study group. With the help of village and district committees, FGD and KII participants will be invited to a place of their comfort, while the research team will pay a visit to households at a convenient time. The mode of communication will be exclusively the local language. We will ask a member or two to volunteer in our data collection to help us show around.

CHAPTER IV

HISTORICAL APPROACH OF LAND USE IN BAIDOA DISTRICT AND THE ROLE OF THE COLONIAL PAST

During pre-colonialism, Baidoa was part of the powerful Ajuuran Sultanate that ruled large swathes of southern Somalia and eastern Ethiopia, extending from Mareeg in the North, to Qelafo in the West to Kismayo in the South. During the Italian administration, Baidoa was the capital of Upper Juba, the colonial regions that included Geo, most parts of middle Juba and Bakol. The current regional system was created during 1970 by the military government. During this time, Baidoa became the capital of the Bay Region again. After the beginning of the civil war, 1991, the city (Baidoa) was caught in the middle of violent clashes by different rival factions to ensure full control. In January 2009, Al-shabab, recognized as a terrorist group by the United Nations, took full control of the city. They ruled for about three years plus and then the transitional government regained its control.

Somalia in general and Baidoa in particular has experienced changes in pastoral rangelands during and from the colonial era (Al-najim, 1989). One of such changes is attributed to conflict from the past to the civil war. The researcher argued that land has been the vantage point of social conflict and disorder, where the control of land based resources was a factor of war trigger. Historical accounts from the colonial past and during the civil war reveal that the inner-riverine land where the Bay Region and specifically Baidoa district lie has been a contested land by nomadic groups that dominate Somalia. The communities between the two rivers of Juba and Shabelle are mostly from the Digl/Mirifle

clan and they are more settled agro-pastorals. The nomadic communities who predominantly speak a dialect known as ‘Maha’ are different from the agro-pastoralist who speak Maay as the dialect. These two groups are socially, linguistically and culturally different from each other. The land that both groups inhabit is also different. The ‘Maha’ speaking community reside in the North, North East and Central Somalia, while the Maay communities reside in the inter-riverine south of Somalia. This is a fertile region (South-west) with over 14 ecological regions providing a variety of modes of livelihoods; agriculture, trade, pastoralism and agro-pastoralism. The Region has been the breadbasket of the country self-sustaining but also supplying to both in-country and outside. However land use and land tenure dynamics in the region was always a hurdle in Somalia and in the region.

Land-use dynamics in Somalia is rooted in the era of the colonial administrations from the 1890s and the successor governments from the 1960s. A variety of interrelated factors, such as inadequate land policies and their execution, push these dynamics. The colonial governments established legislation that directed parts of North-Western Somalia for crop cultivation; nevertheless, later transferred the communal lands into private lands (Samater, 1989). About one-third of Somali territory, which already had semi-arid characteristics, has been degraded due to the decline of forest cover, loss in soil moisture content, overgrazing, and the felling of trees, soil erosion, and poor agricultural practice in productive areas. Additionally, charcoal trade and socio-political mayhem were identified as contributing factors to the land-use change (Omuto et al., 2014).

In 1975, land tenure rights and control was transferred from the traditional local authorities based on clan to government institutions with the effect of allowing landholders to register limited amounts of land as state leasehold rights for 50 years, and renewable (Roth, 1988). The government justified this move in an effort to attract international agricultural investment while Mukhtar (1996) believes that land cooperative laws during 1974 and 1975, were meant to confiscate and deprive land owners inhabiting the inter-riverine area and give it to other clans in the name of government institutions. The land owners shifted from benefactors to beneficiaries. The laws failed to limit the size of state farms, private companies and cooperatives so that by the mid-1980s, there was not a piece of cultivable land along the two rivers (Juba and Shabelle) that remained unclaimed by state owned projects. The laws also failed to protect small holding farmers from losing their land. The centralization of land administration and management structures and processes negatively affected the intended development it was supposed to yield, nevertheless it opened up land for grabbing through access to a privileged few, with favorable connections with the government and the nomadic pastoral groups (Mwangi, 2017). As a result of such alienation to the indigenous population, when the government collapsed, warlords emerged with a similar intent of depriving land to the minority groups and the communities in between the two rivers. There was a massive rural and urban land grabbing as a way of building up a hegemony of their own. Again, most of these warlords are from within rival clans of the nomadic pastoral groups.

CHAPTER V

FINDINGS AND DISCUSSION

This chapter explains findings of qualitative data analysis and transcription. The analysis has been categorized into five thematic areas: historical LULC changes, current and historical livelihoods, drivers of LULC change, implications of LULC change on livelihoods, and coping mechanisms and strategies.

A. What are the uses of the land now (2020) and before (1974)

The first theme is a brief history of land use and land cover changes before and after 1974-1975, when a memorable drought hit all Somalia and left bickering scars to the heads of the people living in the inter-riverine areas. Even though they were not equally affected as their nomadic pastoral counterparts, they suffered the consequences too. During this drought period, nomadic and pastoral groups from the tribes of the north of the country have been resettled in towns in the inter-riverine area. The central government of Somalia, called that project 'the drought resettlement program'. The drought decimated much of the nomadic sector's means of subsistence and saw eventual resettlement of over 100,000 members in several agricultural and fishing communal lands in the South West of the country where the study area is located (Tsui, et.al 1991). There is also a question of how land is used currently to establish some comparison after 1974 and now 2020. The comparison looks at social, cultural, economic and political changes that arise from within the communities given the hurdles they faced both from man-made and natural hazards.

Most research subjects agreed that sorghum and cowpea were and still are the most commonly cultivated crops with an average yield of five ‘Araar’ in a fair rainy season. ‘Araar’ is the local name of sacks that are used to put the sorghum. Participants estimated that 1 araar is equivalent to 2 sacks which is about 100 in Kilogram terms. This was also dependent on the size of land holding per household. “Despite low population during those days, yield was not enough to suffice post the two seasons” A Household Head, Male, 70 years old. This result is consistent with earlier findings of Porter (1988), whose research done at Bonka Research Station, Baidoa found that, ‘Sorghum is by far the most major crop grown in the Bay Region. It is grown in both cropping seasons (Gu’ (from April to June) and Deyr (from October to December)’) on over 90% of the cultivated land. People also cultivated maize, peanuts and sesame in small quantities as it wasn’t that popular in the Bay Region. Porter’s research also puts those crops of minor significance to the agro-pastoralists in the Bay Region (Porter, 1988). Crop cultivation has slightly shifted since and this will be further explained in the coming paragraphs.

Regarding the size of their land, the average land holding in the Baidoa area was (before 1974) is approximately 1 to 7 hectares per household considering that most of them are smallholder farmers. This estimate from the study participants is in conformity with Porter’s field work at Bonka Research Station during 1988 in Baidoa Somalia. The indigenous community use ‘saan’=’foot’ to express their land holding size. Key informant’s knowledge was used to match the local measurement to the conventional one.

Most farmers practice subsistence cropping by traditional methods on small cultivated areas. Poor inputs thus generate poor yields. The most popular tool used for

cultivation is the ‘yaambo’. It is a hoe with a short and a long handle. It is used for both plantation and cultivation. Participants also noted that all land holding is for individual households and most of the yield is consumed by the household that produced it, whilst some go to the market to buy sugar and clothing. Based on estimates from one KII (the mayor), a small number of farmers trade a volume amount of their sorghum during favorable seasons. Farmers used to store their yield in what’s locally known as ‘Bakaar’. It is a 2 meter deep underground pit inside the farms with no proper stacking and packing in place. The family looks for supplies from the “Bakaar” whenever they finish what they have. The Bakaar storage is common in both Bay and Bakol Regions and was long being used by the farmers. “In a good year, the Bakaar (underground pit) represented the most reliable storage facility that we had during dry seasons. It provided against the hardship and future household commitments such as weddings and funerals or re-used to purchase livestock”" FGD, Female, unknown age. As researchers, we asked about the structure, safety and suitability of such a facility. Respondents mentioned it works fine for them. Such a facility is no longer available in the region because of 2 reasons. There is a minimal excess production that requires storage. And the second reason, metal drums have become an alternative for the “bakaar” for the little harvest they produce. We took a photo from Wikipedia to showcase what the ‘bakaar’ looks like.

Figure 2

Photo of a woman coming out of ‘Bakaar’.

The structure of the Bakaar is quite poor while safety can be questioned since there is no proper stacking. The sorghum lies on the ground of the hole making it susceptible to insects and other harmful bacteria to contract. Through participant observation, researchers observed similar make up and structures of such holes dug in the field, however study respondents noted that, Bakaar usage is seldom compared to 1970s and 80s because of 2 reasons. There is a minimal excess production that requires storage. And the second reason, metal drums have become an alternative for the “bakaar” for the little harvest they produce. The researcher also noted that people of old age are more likely to still use such facilities for storage. One participant mentioned “we believe our food will be safe and healthy when beneath these halls” KII, Male, 70 years old.

Study participants also believe that back in the days, their land's potential, climate, and natural vegetation made efficacious use of both animal production and hoe cultivation systems. However, they also understood about ecological networks and its significance for farming. For example, leaving big trees around the farms, birds and other biodiversity is a way of protecting the ecological network. Researchers understood this from participant observation and the informal conversations they made with the respondents.

We closely looked at cultivation and animal husbandry practices and observed a distinction of gender roles in household practices in both current and historical context. For example, women tend to do soft labor intensive jobs as the community perceived while men perform hard labor intensive jobs. This split of tasks and their magnitude is solely based on the perception of the communities. Women do household chores, such as waking up early in the morning and cooking for both men and children while men herd camel animals away from the village and water the animals. Some tasks are alternated between both genders based on need. Both men and men travel long distances to fetch and transport water on camels and donkey carts. Both genders also cultivate farms during plantation, and harvesting. Women are also involved in herding cattle, this is according to the study participants and participant observation. Some activities are for the children both boys and girls. This includes herding smaller animals like goats and sheep. It was also interesting to observe that when moving and migrating the household and the animals from one village to a nearby one or lands with potential for grazing animals, women alone de-assemble the 'Aqal Somali' – the traditional house for the rural communities – and they alone re-assemble it (see photos below).

Figure 3

somali woman building ‘Aqal Somali’, Wikipedia

Figure 4

completed ‘aqal Somali’ Wikipedia.

Participants were also asked about their livestock rearing and production practices. They mentioned that cattle was before/after 1974 the common animal reared in the rangelands (estimated around 80% of the Bay Region). Pastoral communities in this region also raise mixed herds of camels, cattle, goats and sheep. These households maintain a mixture of animal types in order to take advantage of the availability of different plant species and forages in terms of livestock feeding habits, resistance to drought and other socio-economic uses. However camels provide milk throughout the year and the camels have the highest market price. The researcher also asked about how it starts to own both land and animals, i.e. which one comes first. It was obvious for them to say, land is the baseline and the primary holding for a typical household in our community. It's acquired either through purchasing or claiming it and then legalizing it through taking ownership credentials from the state. The household then plants and cultivates the particular land, then

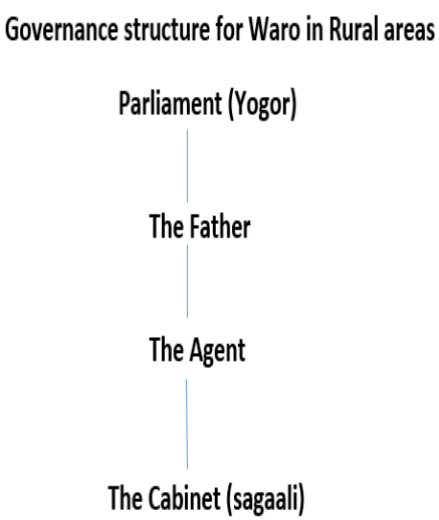
cuts the harvest. Here is where animal ownership comes into play. A fair portion of the harvest is marketed to buy goats/sheep, cattle and camels, this was the case before 1974.

Current farming and livestock rearing practices were also uncovered from the participants. This section is trying to explore the current land use systems. Participants provided a requisite insight on areas of Good Agricultural Practices (GAP), current cropping system and the magnitude of their produce. Farming practices largely remain subsistence and traditional in nature, but also smallholding in scale. Most of the responses have been affected by the real time locust crisis during the interviews. For example our question about yield size was affected by an ongoing locust infestation, therefore, there was a low yield expectation. We dug deeper into the locust invasion. Young and adult participants did not know much about the locust, nevertheless, the elders provided a bit of history but also the impacts of the locust. They mentioned that last they saw an invasion of such a scale and magnitude as some 40 years ago. A man noted “They (locusts) travel in a million crowds with destructive behavior”. We asked about their techniques and ways of managing and mitigating such a crisis. They echoed that manual ways such as smoke, loud voices, sand and sometimes bullets are used to disperse the locust. To this particular community, that is what resilience means.

Figure 5

Earth Dam at Boonka, Baidoa, photo credi: NRC

Figure 6



Study participants alluded to that they currently segregate their land into several categories. Farm lands, pasture lands, forest in small proportion, waro (hand dug water storage earth dams) and small villages locally known as ‘gereero’. This system of land use caters for both pastoralists and agro pastoralists during the wet and dry seasons.

‘War’ is a land use type that is common in the Bay Region. It represents the water bodies. The power structure looks quite state of the art and it’s still used among the communities. There is a water management governance structure in place in every village. An elder in the village noted, “Our ‘waro’ are managed like a government and it has all the necessary layers, but also the structures”. For the governance of any particular water storage facility in the villages, the community represents the parliament and they are locally referred to as ‘Fatiir’. The sub-villages of Baidoa town that we visited for the purpose of our study have about five hundred population sizes each. The parliament chooses the father

of the dam, who will represent as the president. The president nominates an agent who will serve as his prime minister. The agents together with the father then appoint a cabinet of about six to nine members that will manage the day to day activities, but also overlook the proper use of the water stored in that particular dam. The cabinet is locally known as 'Fatiir'. The father and the agent have an oversight and dispute resolution role. The system works quite perfectly as we have witnessed in our participant observation. This has also been observed through informal conversation during our participant observation. Participants hailed the system as both protective and sustainable for the proper utilization of the water. There are penalties and fines in place for those who are found to be breaking the rules and regulations. In a dig-deeper question, we asked about the penalty of someone who waters his animals without the permission of the cabinet, and they responded it to be roughly a 3 year old female camel which will be slaughtered for the management of the 'Waro'. We also talk about the role of women in the governance of such institutions. Unfortunately, due to their patriarchal structure, there is no role for women in management, even a single member.

B. Livelihoods

The second theme looks at the livelihood economy of Baidoa communities again before and after 1974 and the year 2020. In this part, we asked the study participants, income before and after 1974, and how much they earned and currently 2020, income sources and how much they earn.

Under this theme, we looked at livelihood sources but also systems of the Baidoa agro-pastoral communities. Our target is at the household level, since it is the locus or the immediate context of livelihood generation. The target communities lie in Baidoa rural and context so, rural and urban livelihoods are focused. At the end of this section we shall look at sustainable rural livelihoods.

The questions under this theme looked at livelihoods before and after 1974 and currently 2020. This is to bid for making a comparison, but also see the change that took place overtime. Participants were asked about what was their source of livelihoods before and after 1974 and currently, and how much did they earn to make a living. During the 1970s most of the economic activities they engaged in were subsistence based, so the farms and the animals made up an enormous portion of their livelihood source. The rangelands in the Bay region also make a notable livelihood asset that is used for three main economic activities: livestock grazing, rain-fed farming and wood collection. An elder noted that "land holding for farming is the primary asset and one can buy animals from selling the farm yield". During 1974, there was a little bit of a trade which was largely butter. Agro-pastoralists exchanged sorghum to sugar and animals to clothes and other essential needs.

During the 1970s, agro-pastoral communities in Baidoa mostly earned their living through multiple ways. The crops grown were consumed internally by the household. Animals were milked, but also slaughtered occasionally and crops sold at the marketplace in a tiny proportion. Nevertheless, the magnitude and intensity of selling crops was quite seldom unless the then powerful military government forced so. One participant noted that "farmers had to sometimes sell their produce to the government even when they were not

willing to do so". The Somali government during the time had large and famous warehouses in the southern side town of Baidoa for the storage of sorghum and maize for both export and internal distribution. Baidoa's current district mayor, who was a junior official at the Baidoa municipality during the 1970s, recalled "The government used to force the farmers to sell their harvest to them". We asked why the farmers were not willing to sell their produce to generate some cash. The mayor responded "due to the subsistence nature of their culture and economy, they preferred to either consume or exchange the surplus to animals and clothes with little preference to cash". We specifically asked about livelihood generation during dry, but also wet seasons. During the wet season the obvious response regarding livelihood sources was farming, whilst the dry season is mostly unemployment season for the rural household. They consumed the reserve of the wet season.

The agro-pastorals also focused on migrating a little bit further into the inward pastoral zone of the Region and neighboring lower Shabelle and Gedo regions close to the rivers leaving behind elderly, women and children. Men migrate with the animals, mostly cattle that can't withstand thirst beyond three days. A man in his 50s explained, "I had a lot of cattle, I herded them around Baidoa during wet season, but have to migrate to near the banks of the Juba and Shabelle rivers during the dry season." He continued "cattle is vulnerable unlike the camel that can resist without drinking water for about a month". We instantly asked about current livelihood activities during both wet and dry seasons. Agricultural production and harvest during the wet season. And for the Dry season, agro pastoral households generate their livelihood from casual labor, petty trade, firewood sales,

and house mudding. Some households make a living through receiving remittances from family members abroad. Remittance has played a pivotal role in the Somali economy after the civil war broke out and myriad Somali communities flocked overseas in search for better lives. Most of the families who were able to flee and resettled another country left some of their immediate or extended families behind and thus sending money back for living. “Remittances have been the lifeline of thousands of families over a long period of time since the beginning of the civil war” KII, Male, 55 years old.

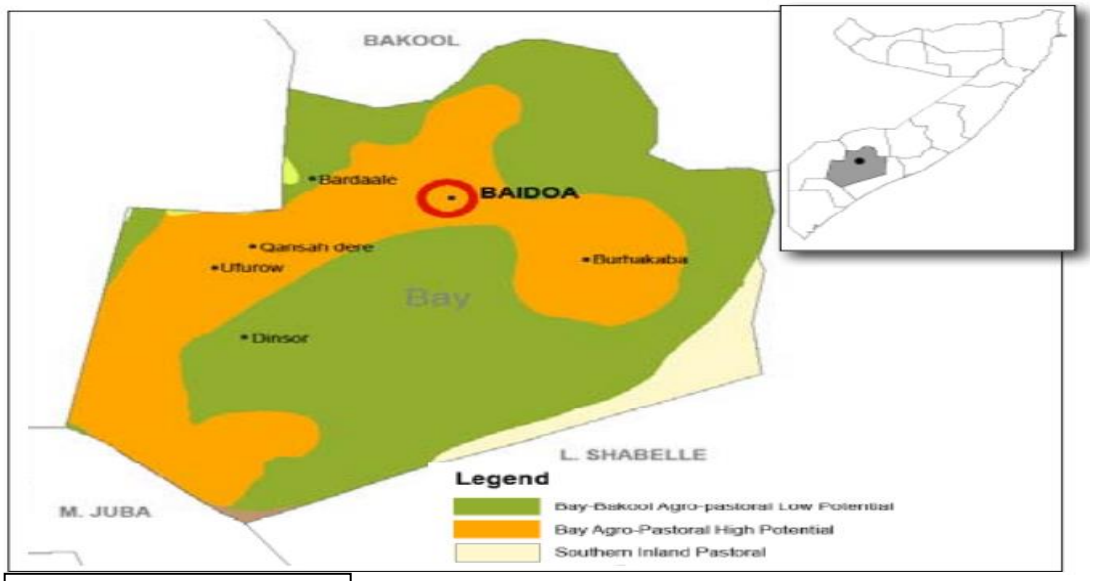
We looked into the ecological sustainability of their livelihoods during the 1970s. As explained in our statement of the problem, there was a famine in the 1970s with some other small-scale drought. Participants with a good account of memory expressed that the environment was quite susceptible even during those days with no shortage of crisis. The locals called this famine “Dabadheer”. The word translates the prolonged time of the famine which lasted around a year. Even though it heavily affected the north and northeast pastoral parts of Somalia forcing the resettlement of pastoral population to riverine towns, it also had effects in the Bay region. This could be the arid and semi-arid nature of their land. It is also noteworthy that a strong governance system can alleviate suffering during a crisis. An elder noted “the government was a fast responder during the crisis with an emergency feeding center already in place”. During those days, aid agencies like the UN did not directly provide the communities, but instead supported the government. The elder continued, “No internally displaced persons in overcrowded camps, since the government could reach out communities at their place of residence”. The phenomenon of ecological sustainability of rural livelihoods in Baidoa context is currently largely overshadowed by

humanitarian aid and development organizations. We will come back to the current context analysis shortly.

The elders at the villages we interviewed recall that the base of the livelihood system during the 1970s was sorghum. The town is at the center of the sorghum belt regions, namely, Gedo, Hiran, and Bakol. According to the below Food Security and Nutrition Analysis Unit (FSNAU) map, the city is located in the middle of the high agro-pastoral potential livelihood zone. The town produced enough for itself and the rest of Somali during the wet season, except when droughts and famine struck. Sorghum is one of such crops that are quite resistant to dry spells and it does not need a lot of water to grow. This is a semi-arid crop that perfectly suits the ecosystems of Baidoa town and Bay region. We asked about the role of markets in livelihood generation during those days, one participant noted "people had a little understanding about market based economy and sorghum was not planted as a cash crop". The participant continued, "With civilization and a more understanding of business based livelihood systems, cash crops such as sesame, sunflower, and nuts are now produced to sell them at the market". In comparison to today, most of the agro pastoralists influx to the town of Baidoa due to complex crises and stressors. We will analyze the why section further in our subtheme 'drivers of land use change'.

Figure 7

BAIDOA AND SURROUNDING LIVELIHOOD ZONES



FAO, FSNAU, 2019.

Current livelihood discourse and its provisions in Baidoa are dominated by donor handouts, out migration to search for better livelihoods, and town dwelling to make a living. Thousands of families displaced leaving nothing and no one behind. An NGO worker that we interviewed as one of our key informants explained their role in life saving and development practices for the then agro-pastoralist, but now largely Internally Displaced Persons (IDPs). “We target and extend our reach to the most vulnerable that have been deprived of their land and animals”. “The NGO changed the role of the government as the first responders during the crisis to provide relief”. The agro pastoral households that represented the industry and livelihood generating machine during the old days now are in Internally Displaced Persons (IDP) camps depending on donor money, casual daily labor and small scale businesses. Baidoa is currently home to 517 IDP sites housing roughly 392,

274 IDPs (cccm, 2020). Displacement trends are still continuing. A considerable number of the agro-pastoralists in this region also displaced to Mogadishu in search of better livelihoods. People have lost their animals due to protracted and consecutive dry spells. Conditional and unconditional cash transfers from Nongovernmental Organizations and the UN is a livelihood source for many of the previously agro pastoral, but now IDP population. Some of the IDPs are still engaged in farming practices, however most of the animals were lost, whilst some cultivate other people's farms to generate income. We asked to segregate how much they generate from farm produce, and off season jobs.

The connotation of giving global north donor handouts to the impoverished Somali population has come into light after the collapse of the Somali central government and the country descended into a bloody civil war. The United Nations Operations in Somalia mandate during 1992 right when the civil war broke out was an intervention aimed at saving the lives of those experiencing rampant looting of livelihood resources. The people we interviewed in Baidoa remember the horrors of the impact of the civil war when the fleeing government forces looted the reserves in the 'Bakar', then the chasing warlords took the rest of the reserves leaving nothing behind. We elucidated this in the literature review. During that period the West also came to know the Somalis more intimately as thousands of them had migrated to North America and Northwestern European countries. The country became a refugee generating hotspot. The key informant NGO worker of the study who also happens to be from the diaspora recalled, "We ran from our farms in the outskirts of the town (Baidoa) to refugee camps in neighboring Kenya where we waited for relocation

to the United States (US)". He continued "I now work for a US funded humanitarian project to support the most vulnerable in the same town that I fled 30 years ago".

The NGO worker further elaborated the aim of donor projects in Somalia. He said "with good faith, the US and other western donors spurred a new policy trend that aims at directing aid money to the areas of refugee-generating conflicts to keep the refugees in their region". He recalled the loss of hundreds of thousands of migrant refugees in the Mediterranean Sea and the Red Sea. There are specific donor projects that are aimed at peace building, governance building and stabilization. The aid industry is worth millions of dollars each year, however there are counter arguments of the effectiveness of aid money in achieving its desired goals. The business man we interviewed as our key informant was a pro-business propelled solution to the crisis in the country. He argued "aid money resulted in more dependency and left the people lazy waiting for a handout rather than working for him/herself". The aid dependency conundrum has been largely debated in the academic literature especially in the global south. The business man continued "self-reliance is rarely discussed among the IDP and refugee population". "The tendency of getting free handouts yields a lame and unproductive mentality", he added. .

To make sense of the aid dependency syndrome alluded to by the businessman KII respondent, we asked other participants at the household level and the FGD, if they feel they are more dependent on the donor aid. A woman on a small table with some vegetables for sale responded "the dependency of aid is quite mythical to me, she asked, how can I depend on an income that i am not sure when it comes and when it cuts off?" "I just receive when it comes and inject into my business and household basic consumption, otherwise it is

not a primary source for me" she added. The aid dependency syndrome among refugees and IDPs in camps have been discussed for some time in Somalia. A scientific paper that has been published by Kebreab, 1993 debunked perceived dependence syndrome as a myth. The author noted "In spite of the unfavorable conditions, the refugees succeeded in maintaining their independence and cultural identity". He is a strong advocate of resilience building through a participatory (community and government led) approach. We shall talk about resilience building in the 'coping strategy' sub-theme.

Small scale business also provides a livelihood source for the internally displaced agro-pastoralists. The researchers observed around the camps, and some small businesses mostly dominated by women can be seen flourishing. The women sell small retail food stuff, sweets and other handmade crafts with their household yard at their residence. We specifically approached them with questions of income generation and livelihoods. They responded by making some small amount of money that maintains the business but also feeds the family. When asked about how much they make from it, the women responded, 2 dollars a day. This is not the case for other respondents that made less than 2 dollars a day from other activities such as cultivating other people's farmlands, house mudding, and donkey carts. According to the World Bank, an average household in Somalia makes $220 per month for living. Other livelihood sources include firewood collection, and charcoal,

Before 1974, the Bay Region was one of the major exporting regions of charcoal to Mogadishu, the capital city. Timber for building and animal fencing is also produced uncontrolled with massive exploitation that has depleted the potential woody resources. This has led to increased soil degradation, and thus the soil surfaces are left unattended for

erosion. The mixed acacia species which covered about 33 percent of the region is the one preferred for charcoaling (Al-najim, 1989). Firewood is also collected for cooking purposes among the households we interviewed. Agro-pastoralists also used firewood for heating during the cold night. Children use it to read and study the light of the firewood over the night. It is an easy and cost effective domestic cooking option. We followed up with a question of, if they are aware of the consequences of cutting trees for charcoal and firewood. They responded "we understand the importance of trees as an important livelihood asset. "We seldom cut live trees, we rather use dry ones for small scale firewood and charcoal burning". A man continued "organized business cartels exploit large trees for charcoal, this is unacceptable". It is clear that indigenous population understand the importance of the ecosystems surrounding them. They blamed the state for giving the licenses to these business cartels for giving the licenses to operate.

We also looked at the sustainability of rural livelihoods in the current fragile context. Due to the protracted nature of the crisis in Somalia, the rural livelihoods have long been endangered by a susceptible environment that can't maintain the rural assets that the livelihood depends on. The animals and the farmland are the basic assets and the researchers noted that agro-pastoralist abandoned their land while losing the animals as a consequence of the drought. We have also discovered multiple causative factors which we will discuss further in our 'drivers of land use change' subtheme. Donor programs are shifting developmental overtime while still responding to emergency cases. Aid agencies are engaged in building the sustainability of rural livelihoods for Baidoa agro pastoral communities by providing some safety nets through their durable solutions programming.

This includes supporting water infrastructure facilities such as berkeds, shallow and borehole rehabilitation. There is also animal restocking through cash labeling and direct distribution. The cash labeling allows the beneficiaries to buy the type of animals they want from the market, while the direct distribution just gives project specified animals to those who lost their animals. The effort from the aid agencies are aimed at building the sustainability of the vulnerable Baidoa rural livelihoods.

C. Drivers of Land Use and Land cover change

The third theme looked at drivers of land use and land cover changes. This is the most critical part where we addressed the perceived triggers of land use and land cover changes in the study area. The people are considered those with the best knowledge and experience in terms of changes to their land, and livelihoods. Analyzing and understanding of changes in land use/cover is significant for modeling effective strategies to preclude further decline of natural resources (Kindu, et. al. 2015). We identified the interplay of several drivers from both literature and study participants' narratives.

Study respondents identified a multitude of causative factors as the drivers of land use and land cover change in Baidoa district, over the period 1974 to 2020. Over 90% of the study respondents believe population growth/urban land expansion, land enclosures, climate and environmental factors (droughts, famines and floods), protracted conflicts, deforestation, institutional policies, humanitarian agencies, lack of land tenure policies, the most recent locust infestation and shifts to an urban livelihood economy are all factors that discouraged farm cultivation. The researcher followed up with why farmers become

discouraged from cultivation. From their responses, it was clear that they were becoming more sedentary, however even disappointed due to consecutive seasonal failure and animal loss. This can also be explained as a shift in the Land Use system, as a huge portion of farmland is not cultivated anymore, thus pushing the woody and bushland to cover previously cultivated areas. We also identified limited Good Agricultural Practices (GAP) as a trigger of land use/cover change.

1. Population growth

From participants' understanding, population growth correlated with LULC. Increase in population among other complex driving forces triggered migration of farmers from their farmlands to a sedentary lifestyle in the urban centers. The researchers have also noted that the little produce could not sustain a living for a growing household. According to the study respondents, the population has increased, however the study participants could not make sense of the increase statistically. In that regard, it is necessary to triangulate it with the available population statistical trends. Human population growth can be explained in terms of certain socio-political and economic conditions that encourage it. For example, an economic context that makes big households valuable to subsistence cultivators. The responses from study participants' regarding population growth are supported by data obtained from the national census and UN. While the total population of the Bay Region was estimated at 393,153 persons in 1975 (CSD, 1983) and 450,986 in 1980 (CSD, 1984), this had risen to 792,182 in 2005 (UNFPA, 2014). Corresponding figures for Baidoa district are unfortunately not reported. However, these figures represent rapid population

growth at the region level. The population more than doubled from 1975-2005, despite the loss of population associated with conflict and out-migration.

Currently, the Population Estimation Survey of Somalia (PESS) from 2014 is the most recent nationwide population estimation exercise undertaken in Somalia. The United Nation Population Fund (UNFPA) had drafted population data in 2005 where the population of the district of Baidoa was estimated to be 227, 761 persons, while the Bay region was estimated to be 792, 182 persons.

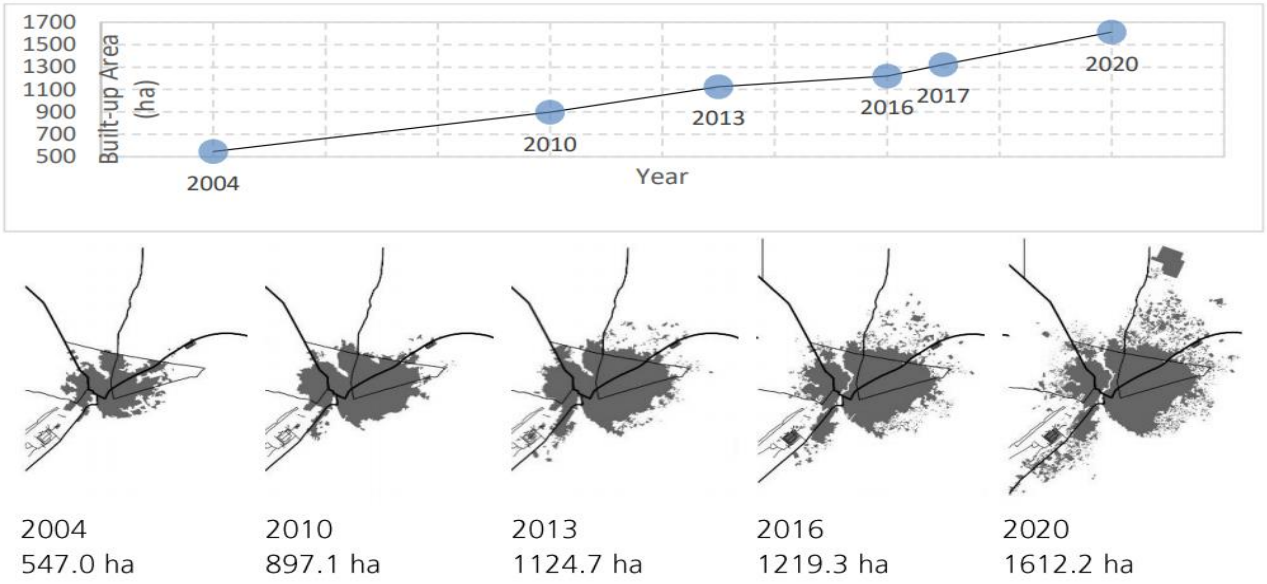
2. Urban land expansion:

As alluded by the respondents, urban expansion is directly linked to the proliferation of population size. This relationship is reported by study respondents, and confirmed by available data.

Since Baidoa was/is surrounded by farmlands, the expansion of the city happened at the expense of the farmland size. The researchers asked, how has augmentation in population has affected land use/cover change? One respondent answered “during the past, our farm sizes and pastureland were big in size, however, currently, given the expansion of Baidoa city and other small villages, our pasture and agricultural land size is shrinking”. He continued “The city has grown bigger due to the massive additional population over time”. This can be partly due to migration from neighboring regions (such as Bakol) into Baidoa.. A woman in her 60s when we visited her household that is now in urban Baidoa mentioned “my current home was my farmland and a small fence for my cattle. Now every corner of

the premises of my home is residential". Population growth has driven the expansion of urban built-up areas. See Figure 8.

Figure 8



Baidoa Urban growth for the past 16 years, Unhabitat

Recent urban profiling of Baidoa town from the United Nation Habitat indicated that Baidoa land is distinguished between the alluvial plain in the west and the floodplain in the east which is mainly semi-arid with shrubs and little vegetation. The town has augmented partly due to displaced migration. The World Bank made a similar conclusion on the growth of urban cities in Somalia, especially Baidoa. This is attributed to the

significant forced migration fueled by insecurity and cyclical natural disasters (Pape, et.al.., 2019).

3. Land enclosures

Enclosures to access grazing land is a common practice in Bay and Bakol Regions. This has been happening for so long among the agro-pastoralist in the region whereby a family or an individual encloses a big portion of the communal grazing land for their own exploitation. This is also linked to the clan dynamics that exist in the context where he or she is well respected because of his clan. Some of the elders indirectly acknowledged they had massive swathes closed only for their household to exploit: "Al-shabab has demolished and abolished my enclosure" one elder noted. This use of enclosures has caused overgrazing of other communal lands, inflicting pressure on the land, hence negatively affecting land use and land cover change. Over-grazed areas also experienced successive dry periods that forced the pastoralists to migrate to further lands. Additionally, the over-grazed areas were quite susceptible to a rare flooding that has been seen in the area. The irony was the individuals who enclosed a communal land can sell back the grazing to the community during the dry season. Communal land enclosures can be tied to the individual agro-pastoralists trying to maximize their interest in the utilization of the grazing land at the expense of others. As the land is also associated to a particular clan, it's easier for some clansmen to illegally exploit large swathes of land without legal ways.. The practice of enclosing a communal land for individuals has been vividly explained by English Biologist Garrett Hardin where he wrote a famous paper which has

influenced attempts to comprehend human use of the environment. He coined the popular phrase ‘the tragedy of the commons’ in arguing that though the communities are composed of rational individuals trying to maximize their own best good, this rationality is individual and primarily at the expense of the other individuals.

Researchers asked the participants about the benefits of the long held tradition of enclosing a communal land for a family or an individual. The elders were not hesitant to defend the practice and mentioned that when communal grazing land is left open and unrestricted exploitation, the resources are depleted quite quickly before the next rainfall replenishes it, therefore if enough land is restricted, it can save the community later on when the dry season comes. They also made clear that grazing is sold to those who didn’t enclose any land. Clan power dynamics play a vital role in who can enclose a particular land and who can’t. Recently Al-shabab has completely banned the enclosure of communal lands with no proper land tenure rights in place. There are benefits associated in enclosing a land and we will explain it in the subsequent section. The researcher also suggests that is noteworthy that setting up a formal land tenure system that accommodates the needs and interests and on the other hand minimizes conflict over land of the indigenous population is significant to tackling land use challenges.

4. Deforestation of communal lands

Landless youth and poor families are involved in cutting trees for firewood and charcoal for sales. Deforestation has negatively contributed to land use and land cover

changes. The practice of felling trees is exerting an extra burden on small forests in the area. However, firewood and charcoal are significant livelihood and energy sources for the households we interviewed, especially those displaced from their farms and lost animals. Jobless youth and women were among the most involved in firewood collection and charcoal trade. The firewood and charcoal is normally used for cooking food. For the rural communities, they also use it to warm their households when experiencing cold. The children and other learners at the Quranic learning centers use it as a light during the night to study. However, according to the district mayor, who we interviewed as a key informant, expressed a concern about cutting big trees for charcoal and other housing materials. “Baidoa used to be a chief supplier of charcoal to Mogadishu " Baidoa mayor. We looked at literature on charcoal trade in Baidoa during the government of siyad Bare. Gil Shepherd, 1988, explained when wood lands near Mogadishu were depleted, charcoal production and transportation from Baidoa was a better choice for the Charcoal cooperative because of the proximity to the capital city Mogadishu, some 245 KM.

For the locals, they are/were worried about the disappearance of their famous trees for charcoal burning by these cooperatives who came from outside of their context. The locals are well versed on the importance of the trees for their lives and livelihoods. They make use of it in a sensible manner while protecting big trees from cutting. They are quite dependent on trees not only for their animals, for shelter and housing materials and some other materials such as park-rope, agricultural implements/farming equipment, domestic furnishing and utensils and water and milk containers. The trees that were used to be selected for the lath wall of huts which used to be common in the urban areas also mostly

disappeared for felling it for charcoal. Shepherd (1988) further explained among the Bay region people the past land to be classified under traditional customary arrangements as private farmland, as communal clan or village land or as a remote open access land that is closely associated with a particular clan. The Somali government in an attempt to create a modern nation-state out of clan and triple clusters, abolished the clan as a political entity and with communal clan land rights abolished too. The communal land is now used as open access and owned by the state. The only thing that the government retained was the sanctity of private farmland. Failing to limit the size of state land has resulted in state sponsored cooperatives to freely cut valuable trees for the indigenous. The elders in the Bay region have expressed the end of customary property rights in the following terms. We are directly taking their excerpts from Shepherds paper since it is relevant to the current happenings.

"All the problems started after the Somali flag came. We used to look after our trees. All grazing belonged to one settlement or another and we had our own grazing reserves. Only our own people were allowed in. The British allowed boundaries between different groups, and people owned their grazing reserves and fought for them. That is why, when the republic came, it cancelled all the grazing reserves: to stop the fighting. In the old days we would kill people who came and grazed in our area without permission. For those just passing through there was a corridor area. Someone would come and request passage rights, and they would be allowed through. But they had to keep moving, more or less they could not settle. Everyone knew everyone else from the area by sight, so strangers were easy to identify". (Shephered,. 1988)

The irony here is the move to abolish the customary laws was motivated by the quest to stop inter and intra communal fighting over land and water without thinking of the dire consequences that it can bring. The government forgot that the indigenous community is the best/primary guardian of their land. The consequence was complete strangers from other parts of Somalia, some of them affiliated with the state could cut trees close to the villages and turn them into charcoal and trade it. Some of the elders we interviewed are living witnesses of those acts during those days. They equated the acts of the strangers and the government like coming to someone's family and taking their animals without any agreement. A key question that the villagers during those days asked was, is there anything that has no boundaries in this world. State sponsored deforestation of valuable trees has resulted in a steady change in land use and land cover inflicting environmental calamities to the locals. The practice of cutting trees lessened a bit when the government collapsed and the country descended into civil war. The clan power that defeated the government returned to govern the communal grazing land. However, some minority clans such as those who lived in the Bay Region suffered an occupation from other clans. This again affected the communal lands. Most of the refugees and the displaced communities we spoke of are ecological refugees that were disproportionately affected by a long unfolding multi-layered crisis including deforestation.

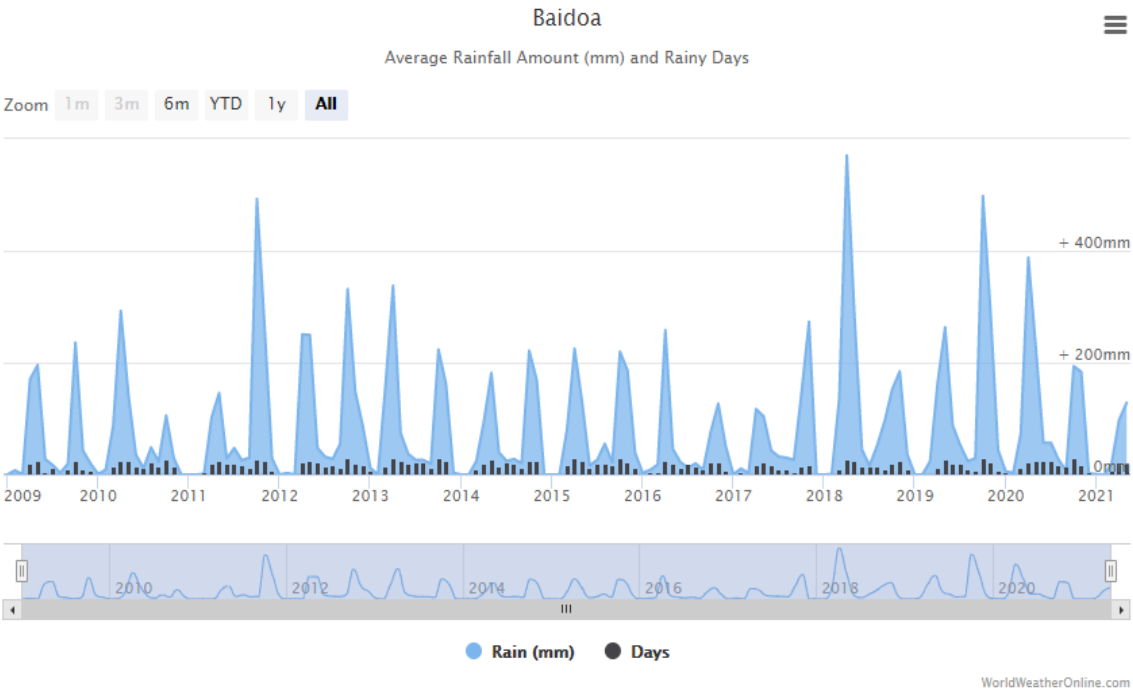
5. Climate and environmental factors

Participants expressed poor rainfall and prolonged periods of droughts pushed livelihood resources to the brink of collapse, where at some point it collapsed for many

communities. This has negatively affected LUC because for example Rainfall plays a crucial role in rangeland rejuvenation and crop production. Baidoa lies in a semi-arid dry zone that receives scant and inadequate rainfall during the two rainy seasons (GU and Deyr) and remains mostly warm during the entire year. There was a consensus among the focus group participants that poor performance of rainfall has triggered droughts and famine and in turn negatively affected land cover and land use change. “The people in this community are agro-pastoralist whose livelihoods economy primarily relies on agro-farming and animal husbandry, these two combined provide food on the table, despite this, rainfall under performance over time precipitated by changes in weather patterns has worsened our living conditions" (Focus group participant, 2020). Another participant narrated “back in the days, the villagers were rarely displaced to refugee camps as a result of drought, we rather moved south to North up to the Shabelle and Juba rivers to look for pasture and water”. The researcher followed up with a question “Why the influx now, why not move to the river banks like before? “A few of us still move, however the riverine communities are not much better than us” he replied.

Rainfall data from worldweatheronline.com shows an average yearly rainfall data of Baidoa. It depicts the average rainfall performance over the past 10 year. 2012, 2018 and 2018 are better years receiving above 400 mm. 2011 and 2017 were years of famine.

Figure



Chief among the drivers of land use change that the participants echoed is the recent desert locust infestation. The desert locust is one of the most destructive migratory pests in the world, rapidly consuming most vegetation in its path, including crops and pastureland critical to maintaining the food security and livelihoods of populations (USAID, factsheet. 2021).

The desert locust that recently invaded Somalia and this region (Bay) has also significantly affected farmers and pastoralists, ripping off what is left on a land that was already suffering from multifaceted crisis. “Baidoa with no shortage of crisis already, the recent infestation of new generation of locust pest large swathes of crop pasture land have

suffered damage during the Deyr 2020 season" said by an FGD participant. "The locust has caused further displacement of what is left of the farmers in the nearby villages' ' he added. It has created a new influx of IDPs from the remote rural areas to Baidoa town. The desert locust sweeps crops and other trees on a mass scale. The timing of the locust (June and December 2020) is also quite bad, given it is the harvest time for the farmers. "We had to harvest unripe crops to save a little bit," said a woman. This is also a main driver of land use and land cover change alluded to by the study participants. It is believed that heavy rainfall and flooding from tropical cyclones in Northern Somalia in Nov 2020, provided a favorable condition for breeding the locusts (FAO, 2020).

Figure

Desert locust in Baidoa, 2020.

6. Protracted conflicts

The phenomenon of protracted conflict appeared after the civil war broke out when the Somali military government was overthrown by rival clan factions. Study respondents were asked to what extent they regard conflict as a driver of land use and land

cover change. The response was quite obvious from the participants that conflict is a major trigger of LULC. They recalled the plight of 1992 droughts that was purely made, according to leading historians. “Our sorghum in reserve was confiscated by the fleeing government troops, mainly the ‘Marehan clan’ and the chasing clans ‘ the Hawiye’ took what is left, leading a famine to people in this town (Baidoa)” this is according to an FGD participant. This information is concurred by leading scholars in this context such as Mukhtar (1996) in one of his articles. Mukhtar believes the famine was neither the consequences of natural nor climate change, rather an excessive resource looting, rampage and an orientation towards clan occupation that aimed to ethnically derive Reewin (South-west ethnic clans) from their properties and replace them by other ethnic clansmen. After the occupied Hawiye clans were liberated from the Region, Baidoa and its surrounding enjoyed a relative peace, though internal conflict among the Reewin community was quite common. Calamities reappeared when Alshabab gained traction in this region. Al-shabab forced agro-pastoral communities from their land for not paying fees at one point and for not supporting them (Maruf and Joseph, 2018). This meant that there was no production, but to displace other areas. It also mean farmland being replaced by woody areas as it was abounded. Participants were quite uncomfortable talking about this. However significant literature is available in this regard.

D. Implications of LULC to livelihoods

The fourth theme looks at the implications of those changes in land use and covers changes to the lives and livelihoods of agro-pastoral communities in Baidoa Somalia.

What are the implications of Land use and land cover changes to the livelihood that exist in the study area? Our narrative analysis shed light on that. Analyzed results indicate displaced migration, desertification and recurrent drought, loss of livelihoods such as the animals and crops, land abandonment, soar in poverty levels were among the implications.

1. Displacement migration:

Driven by a combination of conflict, cyclical climate, underpinned by poor governance, food insecurity and environmental degradation, displacement migration in the region is high, protracted and dynamic in nature (cccm, 2020). This is not only the case with Baidoa, but widely in Somalia and in East Africa. Given the daily displacement trends, any data we provide here could be quite outdated. Currently 2021, it is believed that Baidoa is home to more than half a million people who are mainly internally displaced persons (IDPs). Statistics reveal an incredible soar in IDP population size. This is also linked to displacement migration from rural, but also neighboring regions. “Displacement has been a big trigger of urban expansion that has happened in the last few years” quoted from a lecturer from one of the local universities. Notably, not only the built-up areas, but also the compact nature of IDP settlement, the overall density of the city has increased too. `"This (migration) is a direct result of the changes that happened to land use patterns over a period of time” (Salah, 2020). The most recent displacement trends into the town show 8303 persons coming to Baidoa from Jan 2020 to Sep 2020 (cccm, 2020). These people are displaced for insecurity, lack of food and seeking better livelihood opportunities. According

to the district mayor, “the recent displacement came after the community leaders disobeyed the instruction of Al-Shabab and Al-shabab stormed the villages and allegedly destroyed some public buildings and looted most of the belongings of the community including grain storages, food and non-food items. AS forced communities to vacate the areas. This is clearly a forceful eviction.

The displacement trend is also shaping Somalia’s urban landscape and contributing to its urbanization rate, Baidoa is no exception. According to The Camp Coordination and Camp Management cluster run by International Migration Organization, Somali Program, 483 IDP sites added to Baidoa town in Feb 2020 compared to the last site verification conducted in August 2019, there was an increase of 48 IDP sites (cccm Cluster., 2020). The town has expanded due to the additional IDP settlements and the incoming IDP population. While we regard this as an implication of land use change in the nearby rural areas and neighboring region, it can also be referred to as a driver of Baidoa urban land use change, thus having a cyclical relationship. The new IDP settlements are pushing to the agricultural, pastoral and woodlands. Regarding displacement migration as a driving factor or as an implication to land use change depends on who we ask the question. To the IDPs, who also happen to be rural agro-pastoralists, it’s an impact of land use change in their respective areas, because they would not have displaced should insecurity, drought and other factors not compelled them to do so. To the host communities of urban Baidoa, the displacement migration is a driver of their land use change (especially urban landscape). Since our study focuses on the agro pastoral communities we regard displacement migration as an implication not as a driver per se.

2. Loss of livelihoods:

Changes in LULC reported in Baidoa district have adversely impacted agro-pastoral livelihoods that depend on livestock and/or crop production**.** Livestock are primarily kept for subsistence food production and to some extent generate cash to purchase other non-sorghum food, clothes and consumer goods. During harsh periods of droughts, livestock provide a means of survival by the means of consumption and sale. The camels also represent prestige to the Somali families. Most of the households we interviewed suffered the loss of their animals as a result of myriad factors, including famine, drought, flooding to some extent and other environmental factors. "I have lost 50 cattle during the 2011 famine" an FGD participant. She continued "cattle are less resistant to lack of water and forage and it can't stay without water beyond 2 days maximum". This statement is in line with the study of Porter et al. where they concluded that the major influences on the distribution of livestock within the Bay region are water and forage, while the availability of forage is dependent on rainfall and the soil type (Porter., et.al., 1988). Another FGD participant echoed, "Baidoa agro-pastoral zone was graced with a large population of cattle, now it's vice versa due to recurrent droughts". Not only the region was familiar with cattle, camel sheep and goats were abundant too. According to a census from Feb 1982, there were approximately 320,000 camels, 370,000 cattle, 360,000 goats and 40,000 sheep in the Bay Region (HTS, 1982). The cattle type mostly found in the area is the East African short-horn Zebu type.

"Droughts had more than a 10 year lag with minimal impact, however since the 1990s, it's more frequent with a 5 year lag" FDG participant. Agropastoralist abandoned

their grazing and agricultural lands due to successive seasons of crop failure and lack of forage rejuvenation. The community that once had a massive animal herd lost everything but camels. Camels are more resistant to prolonged periods of dryness. The consequence also links back to displacement migration. The affected communities were mostly displaced to Baidoa and Mogadishu.

On the other hand, cropland, pastureland and woodlands degraded and the agro-pastoralists abandoned it. “When your crops successively fail, the motivation of planting it again fades away” a household head farmer. The researchers asked if their more like sedentary lives at the IDP camps discouraged them from planting again. They replied “most of us abandoned the land with little hope to plant it again because the land had degraded” they continued “few of us still go back and plant with little harvest”. How has this affected the overall production of sorghum and other crops of the region? The researcher asked. “It affected negatively, for those of us who are still involved in planting, we can’t produce a yield that can sustain the household” a women-headed household. We also asked what normal household consumption looks like. The notion of extreme poverty can be felt from around the household and their conversation. A family of 7 lives on less than 2 dollars a day, while eating one time per day was also reported among some of the households. Some of them skip to ration food. We shall explain the coping mechanism in the subsequent theme. The claim of the households is confirmed by the findings from a report from the World Bank, Baidoa has the highest proportion of poor households (84%). In terms of food security, the city has the highest food poverty incidence 69% (Pape, et.al., 2019). The

situation has not been better off since, because of the increased influx rate of IDPs, insurgency, and scant rainfall.

E. Agro-pastoral coping strategies

The fifth theme looks at coping mechanisms that the community employed during challenging times. There were two sub questions in the coping strategy theme. How communities coped with the crisis before 1974 and how they are coping now. A comparison of resilience outlook is made of the coping way.

Researchers discovered three types of coping categories amid land use and cover change. 1) Community based/organizational coping strategy 2) diversification of income generation and non-essential domestic assets 3) humanitarian and development assistance. We also looked at how coping is different before/after 1974 and currently 2020.

The first category embeds the Somali culture of interconnectedness and interdependence. Closer connection among family members, friends, relatives and the community and clan at large is quite prevalent. There is also an established connection and grouping through religious alliance. This system works in a reciprocal way where networks are significant during crises whilst members of such groups provide contributions when there is no crisis. Bourdieu defined the social network as a social network where aggregate actual or potential resources are linked to the ownership of a durable network of more or less institutionalized relationships or mutual acquaintances or recognition (Bourdieu and Richardson 1986).

The Baidoa agro pastoral communities have long survived through such capital and social networks. One of the households we interviewed noted, and we quote “In the past, one’s possession was everyone’s possession, meaning he/she had to provide a portion to his/her poor brother/sister”. He continued “a certain community that belongs to the same clan were interdependent and connected in terms of the need of relief and recovery”. A fascinating excerpt from an elder that showcased the generosity of these communities was “When a new family is established, and marriage happens, all of their holding in terms of animals and farmland was paid by the community through contribution”. Participants alluded to a strong social capital and bonding among community members during the old days (referring to 1970s) helped relief and recover from crises such as land use/cover change. Social bonds are significantly studied in the literature. Robert Putnam referred in his article ‘Bowling alone: the collapse and revival of American community’-social capital refers to the bonds between people who are from homogenous community members and involves principles and norms such as trust, reciprocity and cooperation. These ties result in a sense of belonging to a group, tribal unit or a nation (Putnam, 2000).

The second type of coping strategy is diversification of income generation and non-essential domestic assets. Agro-pastoral households who once used to be the benefactors turned into beneficiaries. Men are engaged in low skilled jobs such as masonry, stone breaking, charcoal burning, carrying people’s items in exchange for some money and driving motor bikes and tuk-tuk. While women are mostly involved in hawking in the market, selling firewood and working in other people's homes as domestic workers. Children are mostly shoe shiners and cabbage carriers from homes.

The third coping strategy is reliance on external assistance. Those negatively impacted by the land use/cover change have partially got access to humanitarian assistance (HA). The study participants pointed to HA as a prevalent coping for their communities. Moving from villages to IDP camps in search of humanitarian assistance was the last resort before they abandoned their land.

F. Coping, Resilience and vulnerability: Linking back to the DFID framework

Given the fragile context of study, Baidoa and the socio-economic vulnerabilities (the recurrent shocks, trends and seasonality), the study explored livelihood resources exploited in Baidoa such as land, animals and other natural capital. The communities also employed a combination of livelihood strategies such as livelihood diversification, out migration to urban centers, dependency on social networks and bonding and humanitarian assistance. The institutional process, such as the state laws, customary laws that exist in Baidoa and the governance of 'waro' that we earlier discussed are of a particular interest that feed back to a sustainable livelihood framework.

Livelihood adaptation, vulnerability and resilience-The capability of a livelihood to be able to cope and recover from stresses and shocks is central to the definition of the DFID sustainable livelihoods. Resilience in the face of stresses and shocks are significant for both livelihood adaptation and coping (Davies., 1996). Those who are unable to cope (temporary adjustments in the face of change) or adapt (longer term shifts in livelihood strategies) are inevitably vulnerable and unlikely to achieve sustainable livelihoods. Given

the researchers analysis on the historical and current response to shocks and stresses, it is easier to assess resilience and adaptation and coping.

The concept of resilience also emerged from the FGDs and KIIs, when discussing coping strategies. Resilience means different things to different people. For the Baidoa Agropastoral communities, resilience meant their ability to absorb, but also adapt to shocks and protracted crises. With resources such as the social capital, income diversification, humanitarian aid, and other resources, these communities endured a protracted crisis. It enabled the household and communities to efficiently function in the face of shocks and stresses. The households stressed on the capacity to absorb crises and their ability to minimize exposure to shocks and stresses through preventive measures and appropriate coping strategies to avoid the negative impact of land use and land cover changes. Among the absorptive capacities are the social capitals and bonds we discussed, access to remittances (which is quite prevalent in the Somalia context), and access to informal safety nets, cash savings and humanitarian and development assistance.

CHAPTER VI

CONCLUSION AND RECOMMENDATION

The study focused on exploring the effects of land use and land cover change to the livelihoods of Baidoa agro-pastoral communities. The study used qualitative data in the form of focus group discussion, key informant interviews, household level interview using semi-structured questionnaires, narrative analysis, and participant observation. Five key thematic areas have been focused. The history of land use change (looking at 1974 when a major drought struck the study area), agro-pastoral community livelihoods (looking at income sources overtime and livelihood systems), drivers of land use change, implications of land use change and finally the coping strategy.

The findings of the study reveal the dynamics in the history, livelihoods, drivers of land use/cover change, implication to livelihoods and coping strategy in Baidoa, Somalia. Agro-pastoralists were mainly subsistence in terms of livelihood economy, whilst currently they are displaced persons in camps in the towns. Sorghum remains the staple crop in the region for the farmers while cattle, camel, sheep and goat are the animals kept. Currently most of the animals were lost due to successive failure of rainfall. For the drivers of land use/cover change, climate and environmental factors such as deforestation, charcoal production, population growth and urban expansion, land enclosures and land tenure rights were identified as the major driving factors of land use/cover change. This has implicated loss of livelihoods and displacement migration among the agro-pastoralists. The study identified community and organizational coping strategies as the most significant strategies that are deeply entrenched in

the Somali culture. The affected communities also coped with the calamities in the form of seeking humanitarian aid from urban areas like Mogadishu and Baidoa Town.

The study recommends the following. Government should revise the existing land cooperative laws that favored cooperative and state affiliated persons. Land cooperative laws during 1974 and 1975, were meant to confiscate and deprive land owners inhabiting the inter-riverine area and give it to other clans in the name of government institutions. Was discussed in the literature review. These laws were never replaced are still in the books. Should the government gets stronger, these can again be implemented at the expense of the endogenous communities. Laws should be altered be in-line with the aspirations of the indigenous communities who belong to the land. On the issue of deforestation, the parliament already passed laws that banned cutting down trees, this should be enforced. Al-shabab currently enforces these laws for their own purposes. Humanitarian agencies should focus on relief and resilience programming at the same time by sequencing and layering of their interventions. This protects the gains made in reliance building and relief efforts. IDP should be incentivized to cultivate their land again and the government and aid agencies should support them with drought resilience crops and animal restocking. Government should secure rural areas to curb security related displacements. Development agencies engaged in durable solutions for the IDPs should lobby for voluntary resettlement with decent housing. This should be coupled with farming and animal keeping at household level.

APPENDIX I

QUESTIONNAIRE: INTERVIEW GUIDE FOR HOUSEHOLDS

(ENGLISH)

Specific for HH data

Name: _____ Size of land owned:

_____ Ha.

Age: _____ Gender: _____

Family Size: _____ Animal Stock Size:

_____

All information will be kept confidential and not to be disclosed to anyone.

This is for filling purposes only, it shall not be discussed in publications.

History of Land use and Land Cover Changes (LUC)

1. How did you use your land before 1974?

   What crop type did you cultivate? Livestock type reared/domesticated? How much did you use to produce in terms of crops (ton/ha) and animals (Heads/year).

2. How do you use your land now, in 2020?

What crop type did you cultivate? Livestock type reared/domesticated? How much did you use to produce in terms of crops (ton/ha) and animals (Heads/year).

Livelihoods

3. What was the source of income for your family before 1974?
4. How much did you earn (in monetary/butter terms) before 1974?
5. What was the source of income for your family now, in 2020?
6. How much do you earn now, in 2020?

Drivers of LULC

7. What do you think off as the driving forces of LULC?

Implications to livelihoods

8. What do you think of the implication of LULC to livelihoods?

Coping mechanism

9. How did you cope during and after LULC before 1974?
10. How do you cope LULC now, in 2020?

APPENDIX II

INTERVIEW GUIDE FOR FGDs

Specific for FGDs

FGD Category

☐ Men ☐ Women

All information will be kept confidential and not to be disclosed to anyone.

History of Land use and Land Cover Changes (LUC)

1. How did you use your land before 1974?

   What crop type did you cultivate? Livestock type reared/domesticated? How much did you use to produce in terms of crops (ton/ha) and animals (Heads/year).

2. How do you use your land now, in 2020?

   What crop type did you cultivate? Livestock type reared/domesticated? How much did you use to produce in terms of crops (ton/ha) and animals (Heads/year).

3. What is the difference in terms of LULC?

Livelihoods

4. What was the source of income for your family before 1974?
5. How much did you earn (in monetary/butter terms) before 1974?
6. What was the source of income for your family now, in 2020?
7. How much do you earn now, in 2020?

8. What are other livelihood sources for your family?

9. How humanitarian aid and development assistance does affected your lives?

Drivers of LULC

10. What do you think off as the driving forces of LULC?

Implications to livelihoods

11. What do you think of the implication of LULC to livelihoods?

12. How displacement migration did affected LULC?

Coping mechanism

13. How did you cope during and after LULC before 1974?

14. How do you cope LULC now, in 2020?

APPENDIX III

INTERVIEW GUIDE FOR KII

Specific for FGDs

KII Category

☐ The Mayor ☐ NGO coordinator ☐ Traditional elder ☐ Academician

☐ A livestock business man

All information will be kept confidential and not to be disclosed to anyone.

History of Land use and Land Cover Changes (LUC)

1. How did you use your land before 1974?

   What crop type did you cultivate? Livestock type reared/domesticated? How much did you use to produce in terms of crops (ton/ha) and animals (Heads/year).

2. How do you use your land now, in 2020?

   What crop type did you cultivate? Livestock type reared/domesticated? How much did you use to produce in terms of crops (ton/ha) and animals (Heads/year).

3. What is the difference in terms of LULC?

Livelihoods

4. What was the source of income for your family before 1974?
5. How much did you earn (in monetary/butter terms) before 1974?

6. What was the source of income for your family now, in 2020?
7. How much do you earn now, in 2020?
8. What are other livelihood sources for your family?
9. How humanitarian aid and development assistance does affected your lives?

Drivers of LULC

10. What do you think off as the driving forces of LULC?

Implications to livelihoods

11. What do you think of the implication of LULC to livelihoods?
12. How displacement migration did affected LULC?

Coping mechanism

13. How did you cope during and after LULC before 1974?
14. How do you cope LULC now, in 2020?

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