

**ANALYSIS OF CLIMATE RESILIENCE AMONG THE LIVESTOCK
DEPENDENT COMMUNITY AT SATAO ELERAI COMMUNITY
WILDLIFE CONSERVANCY, KAJIADO COUNTY, KENYA.**

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

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ABSTRACT

Currently, climate change is a phenomenon of titanic concern for livestock dependent communities. In particular, climate variability is associated with increased droughts occurrence and intensity in arid and semi-arid areas resulting in rangelands degradation and livelihood loss for pastoral people. This has an impact on productivity of livestock farming and sustainability of pastoral livelihoods. As such, an assessment of climate resilience of livestock dependent communities at the household and landscape level is necessary in order to find out a way to improve adaptive capacities among livestock farming communities. This study focused on Satao Elerai Conservancy (Kajiado County, Kenya) as a case on how community wildlife conservancies can be used as structural interventions to building climate resilience for livestock-dependent communities in dryland areas. Objectives of the study included: (i) to characterise socio-economic and land use arrangements in Satao Elerai Community Wildlife Conservancy, (ii) an evaluation of management actions geared towards building climate resilience of livestock production systems in the conservancy and (iii) an analysis of prevailing policies on climate resilience among livestock-dependent communities. This was an inductive research where both quantitative and qualitative methods of data collection were used. To characterise socio-economic and land use arrangements, semi-structured questionnaires were administered to all 120 household heads registered as members of the conservancy. To evaluate the management actions a focus group discussion of 22 members of the management committee coupled with 10 key informant interviews was conducted. The study also analysed various policy and legal instruments focusing on their provisions on climate change, livestock production and wildlife conservation. The data was analysed using Statistical package for Social Sciences (SPSS) and presented in averages, percentages and rankings to generate the information. The study found out that the community of Satao Elerai held a strong concern of their inability to survive in small parcels of land in the face of continuing threats of climate change and variability. This made them amalgamate their land parcels and identified three (3) land use types namely: livestock rearing and settlements, wildlife conservation and crop farming allocated on the basis of suitability and viability within the conservancy. The study also found out that the zonation was further backed up with a five-year management plan that stipulates how the various operations of the conservancy were to be carried out anchoring them to the provisions of the Wildlife Conservation and Management Act, 2013. Eighty-eight (88%) percent of the respondents indicated that the conservancy has been achieving its main purpose of integrating livestock rearing and wildlife conservation thus demonstrating their strong support for the land use arrangements in the conservancy. The study concludes that amalgamation of land parcels into group conservancy cannot be assumed to be the panacea to climate variability, however, it enables pastoralists create the necessary adaptive capacity for building their resilience through collective land use planning and livelihood diversification. This study recommends for the implementation of planned adaptation strategies that will enhance the resilience of livestock dependent communities to the impacts of climate change. There is need to harmonize the policy environment at national and county level to support and facilitate the implementation of the identified strategies that are tailored on specific locations and targeting particular livestock production system in use

DEDICATION

I dedicate this thesis to my loving wife Nailantei, my daughter Miriam and my son Milia together with all my brothers and sisters who have always been very supportive and a great source of inspiration and motivation.

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TABLE OF CONTENTS

DECLARATION.....	i
ABSTRACT.....	ii
ACKNOWLEDGEMENT.....	iv
TABLE OF CONTENTS	v
LIST OF FIGURES.....	vii
LIST OF TABLES	vii
ACRONYMS.....	viii
CHAPTER 1: - Introduction.....	1
1.1 Background of the study.....	1
1.2 Statement of the Research Problem.	3
1.3 Research questions.....	4
1.4 Research Objectives.....	4
1.5 Justification.	4
CHAPTER 2: - Literature Review	6
2.1.1 Drylands and their socio-economic importance to Kenya.....	6
2.1.2 Livestock production in ASALs of Kenya.	7
2.1.3 Drought in Kenya and its implication on Livestock production.....	8
2.2.1 Managing a resilient livestock production system in the face of climate change.	10
2.2.2 Land use and land tenure change in Livestock dependent communities in Kenyan drylands	12
2.2.3 Community wildlife conservation as an adaptation practice in the drylands of Kenya..	13
2.2.4 Challenges facing Community Wildlife Conservation in Kenya.	15
2.3.1 Climate Change Framework Policy (CCFP), 2016.	16
2.3.2 Climate Change Act, 2016.....	17
2.3.3 National Climate Change Action Plan (NCCAP), (2018-2022).....	18
2.3.4 Climate Change and Livestock Production – SDG 13	20
2.3.5 National Livestock Policy	20
2.3.6 Kenya Agricultural and Livestock Research Act, 2013.....	23
2.3.7 Wildlife Conservation and Management Act 2013.	23
2.3.8 National Wildlife Strategy, 2030.....	24
2.3.9 Community Land Act, 2016.	25
2.4 Analytical Framework.....	26
2.5 Conceptual Framework.....	27
CHAPTER 3: - Methodology.....	29
3.1 Study Area.	29

3.2. Data collections.....	30
3.4 Sampling methods.....	30
3.5 Data Analysis.....	31
CHAPTER 4 - Results and Discussion.....	32
4.0 Introduction.....	32
4.1 Social demographics and household characteristics.....	32
4.2 Livelihoods and Land Use Management.....	34
4.2.1 Livelihoods sources and options	34
4.2.2 Estimated family income per month	36
4.2.3 Drought incidences in Satao Elerai Wildlife Conservancy in 6years	37
4.2.4 Land use and land tenure preferences	39
4.2.5: Livestock Grazing Arrangements	41
4.2.6 Current range condition within the conservancy area	43
4.2.7 Effect of land subdivisions and fragmentation on Household herd size.	44
4.2.8 Livestock population and numbers	45
4.2.9 Livestock Household herd dynamics and recovery since 2010	45
4.2.10 Milk production during Wet and Dry season (First 3 Months).....	46
4.2.11 Resource dynamics and change	47
4.2.12 Encountered incidences of Human-Wildlife conflict (HWC) for the last 6years	48
4.2.13 Governance and benefit sharing.....	50
4.2.14 Involvement and participation in governance/management.....	51
4.3. Management Actions in the Satao Elerai conservancy.....	53
4.3.1 The management plan.	53
4.3.2 Pasture and Grazing Management.....	53
4.3.3 Wildlife conservation and coexistence.....	54
4.3.4 Water sources management	55
4.3.5 Environmental protection and Ecological Management.....	56
4.3.6 Social Empowerment and Capacity building.	58
4.3.7 Actions to be addressed.	58
4.4 The policy and legal instruments for building climate resilience	60
CHAPTER 5 – Conclusion and Recommendations.....	62
5.1 Conclusion	62
5.2 Recommendations.....	64
References.....	65
8.0 Appendices.....	i

LIST OF FIGURES.

Figure 1: Indicating the diverse livelihood sources

Figure 2: Respondents on Income

Figure 3: Summary of benefits obtained

LIST OF TABLES

Table 4.1: Social demographics and household characteristics

Table 4.2: Drought Experiences in 6 years

Table 4.3: Where livestock graze during wet and dry season

Table 4.4: Where livestock water during wet and dry season

Table 4.5: Current range conditions

Table 4.6: Land subdivision on House hold herd size

Table 4.7: Current livestock herd composition and size

Table 4.8: Causes of household herd increase

Table 4.9: Changed in resources within the conservancy

Table 4.10: Respondents indication of conflicts

Table 4.11: Place of conflicts

Table 4.12: Benefits received

Table 4.13: Involvement in decision making

Table 4.14: Community meetings.

ACRONYMS

ACC – African Conservation Centre

ALOCA- Amboseli Land Owners Conservancies Association

ANOVA – Analysis of Variance

AWF- African Wildlife Foundation

CBC – Community Based Conservation

CLA – Community Land Act

CSA – Climate Smart Agriculture

FAO – Food and Agriculture Organization

FDG – Focus Group Discussion

GDP- Gross Domestic Product

IFAD – International Fund for Agricultural Development

IPCC – Intergovernmental Panel on Climate Change

IUCN – International Union for the Conservation of Nature

KALRO – Kenya Agricultural & Livestock Research Organization

KDLP – Kenya Livestock Development Program

KWCA – Kenya Wildlife Conservancies Association

KWS – Kenya Wildlife Service

LULUCF – Land use Land Use Change and Forestry

NAPA – National Adaptation Programme of Action

NGO – Non-Governmental Organization

NRT – Northern Rangelands Trust

NWDCR – National Wildlife Dispersal Corridor Report

PDNA – Post Disaster Needs Assessment

SDG – Sustainable Development Goals

SECWC – Satao Elerai Community Wildlife Conservancy

SES – Social – Ecological Systems

SORALO- South Rift Association of Land Owners

SPSS – Statistical Package for the Social Sciences

UNEP – United Nations Environment Programme

UNDP – United Nation Development Programme

UNFCCC- United Nation Framework Convention on Climate Change

WMO – World Meteorological Organization

CHAPTER 1: - Introduction

1.1 Background of the study.

Arid and semi-arid lands (ASALs) occupy over forty percent (40%) of the earth's landmass (Western, Groom, & Worden, 2009). The ASALs of Africa are known to be facing the highest vulnerability to climate change and variability (UNEP 2013). In Kenya, they cover close to 90% of the its surface and accommodates nearly thirty-six (36%) of its total population (Republic of Kenya 2015). Pastoralism, the dominant land use in the ASALs, provides a livelihood to millions of pastoralist (swift et al., 1996 & Said et al., 2011). These ASALs also experience both spatial and temporal climate variability resulting in incessant drought events which significantly affects livestock production and livelihood sources (Zamani et al. 2006; Le Houerou, 1996; Oba and Lusigi, 1987). However, research has shown that weather events cannot be exclusively blameable for drought related risks and losses (IOM, 2014)

In Kajiado County, Kenya, Maasai pastoralists have historically moved seasonally within eight large socio culturally defined parcels of land averaging 2731 km² known as sections (Katampoi et al., 1990). The spatial and temporal access to the grazing resources were managed using a centralised system, administered by traditional elders. Under this system, the elders reserved areas for grazing across seasons throughout the year and regulated the use of watering points (Spencer, 2004). However, colonial rule and post-independence policies undermined this traditional management system (Rutten, 1992; Lesorogol, 2008). In addition, land subdivision, fragmentation and sedentarization have reduced pastoralists' mobility in the region (Niamir-Fuller & Turner, 1999; Boone, 2005). This then results in smaller parcels of land which cannot support mobile pastoralism leading to overgrazing and land degradation. The above mentioned phenomenon has restricted the Maasai movements in search of water and pasture to only group ranches and individual parcels of land (Louise et al., 2011). This breaks the ecosystems ability to recover its vegetation cover, even during relatively better rains, and therefore culminates in a loss of resilience to climatic variations.

In the early 90s, according to Nkediye (2011) pastoralists were viewed to be resilient to climate variability particularly drought since they automatically regained their stocks during periods of relatively good precipitation. However, in the recent years, this perception that pastoral dependent communities are resilient to the above mentioned hazard is facing growing analysis as the production systems experiences immense pressure from both socio-economic, environmental and other external factors (Nkediye et al., 2011). Some of the mechanisms

employed by pastoralist to curb or prevent the effects of drought were: maintaining sizeable herds, ensure access to drought refuges, and assignment of cattle to relatives. Maasais' maintained big herd sizes to ensure that enough livestock would survive to restore the stocks after the drought period (McPeak, 2005).

In almost all pastoral areas, the resilience associated with huge herd sizes has been highly weakened due to population growth and reduced per capita herd size (Lamprey and Reid 2004; Sindiga, 1984). The pastoralist also had access to vast lands, which were used as drought reserves (Homewood et al. 2009). However, these land parcels were gradually lost to agriculture and extreme wildlife conservation which excludes livestock grazing activities (Brockington 2005; McCabe 2003). This is worsened by uncontrolled urbanization (Behnke, 2011) coupled with sedentarization which led to intensification of land use resulting in range degradation which further reduces pastoral resilience to climate variability particularly drought (Nkediye et al., 2011). Research also shows that land subdivision and fragmentation affects livestock mobility which in turn reduces herd productivity and increase the vulnerability of pastoralists to drought risks, especially among poverty-stricken households (Worden, 2007).

In the early 1970's (Western,2009) the push for subdivision of pastoral lands was government policy which provided for the privatization of land and improving range productivity as a way to commercialize rangelands. This policy which was opposed by pastoralists was founded on the concept that the Maasai culture was premised in the importance of stock numbers as opposed to quality and production capacity resulting in overstocking and rangeland degradation. Pastoralists holds a continuing concern of their inability to survive in small parcels of land (Western et al, 2009). Despite this, it is observed that most pastoralist have increased support for land subdivision (Ntiati, 2002) for some reason among them; panic of losing their lands to intruders, pressure from population growth, increasing poverty levels, alienation of land for crop farming and strict wildlife conservation (Manzoleillo-Nightingale and Western, 2006). Today, close to 11% of Kenya's landmass is occupied by conservancies which are approximated to be 160 in number with 76 of them being community conservancies spread in 28 counties across the country (KWCA, 2016). However, the accelerating pace of land subdivision may threaten the existence of these conservancies. This is a clear threat to pastoralism and wildlife conservation as land use options (Groom, 2009).

Community Wildlife Conservancies has been described as sanctuaries, Conservancies or group ranches established on community land and managed by communities for purposes of wildlife

conservation, this does not include reserves managed by a Council on land held by such council in trust for the community (KWS, 2013). In Kenya, Community Wildlife Conservancies were introduced in early 1990s, on recognizing the importance of community participation in conservation (Komu, 2013). More recently, in Kajiado there has been an increasing desire by communities to form their own conservancies (Kipkeu et al., 2014). This is premised on the demand stimulated by the livelihood and other economic benefits that are being enjoyed by members due to the establishment of these communal conservancies (Samson et al., 2014). These benefits range from gainful employment, support in education and health matters, enhanced infrastructural development, to business and enterprise, which contribute the factors that reflect the community's desire to engage in wildlife related enterprises (Samson et al., 2014). Additionally, the emergence of community conservation resulted from the acknowledgement of the failure of protected areas to take the interest of communities into consideration. As such the communities showed no interest in supporting or abiding by the conservation guidelines (Pimbert & Pretty, 1997; Kiss, 2004). However, it must be recognised that these conservancies' aimed at providing encouragement for the management of biodiversity resources sustainably through the linkage of their maintenance with the benefits of the wellbeing of the surrounding communities (Salafsky & Wollenberg, 2000).

1.2 Statement of the Research Problem.

Climate change has grown into an area of strong concern for livestock dependent communities (Polley et al 2013; Reeves et al, 2013). The greatest challenge for pastoral communities is dealing with the unpredictability of rainfall both within and between seasons (Bobadoye et al., 2016). Increasing frequency of drought events and dry spells have made it difficult for pastoralists to maintain their assets (livestock). This is attributed to increased pasture regeneration failure and water scarcity resulting in livestock deaths triggering severe food shortage in the ASALs of Kenya. Kagunyu (2014) discussed that, Kajiado County has experienced various drought incidence since 1990, which have become too common in the last two decades. According to a study by Ogara (2016), pastoralists in Kajiado have always responded to climate change using adaptation strategies that largely emanates from within. However, these strategies have not proven to be quite reliable to building climate resilience of pastoral livelihoods to deal with the temporal and spatial predictable impacts of climate change. According to Western (2009), pastoralists holds a continuing concern of their inability to survive in small parcel of land. This was also the situation with the community of Satao Elerai

which before 2004 their land was divided into 8 private parcels. The privatization of land which was occasioned by the subdivision of Kimana group ranch resulted in reduced land size which affected the predominant livestock based livelihood. It reduced livestock mobility and increased human-wildlife conflicts incidences within the area. The reduced land size coupled with recurrent drought events made it difficult for the communities to sustain their livelihood particularly livestock. In efforts to address the drought menace that threatened their livelihood and with the aim of sustaining the wildlife within this area, the community amalgamated their individual parcels and formed the Satao Elerai Conservancy for communal use and management. This model of integrating livestock and wildlife conservation has been practiced in the community for more than a decade raising a concern on whether this arrangement is aiding in building pastoralists resilience the impacts of climate variability.

This study focused on assessing the resilience of livestock-based livelihoods to climate variability through an integrated livestock and wildlife production system, within community wildlife conservancies. The information generated from the study is expected to inform researchers, policy makers and other stakeholders in developing climate resilience models and livelihood security for pastoral communities.

1.3 Research questions.

- i. What characterises socio-economic and land use arrangements in Satao Elerai Community Wildlife Conservancy?
- ii. What are the management actions geared towards building climate resilience for livestock productions systems in Sato Elerai Community Wildlife Conservancy?
- iii. What are the prevailing policy and legal framework for building climate resilience for livestock depended pastoral communities in Kenya?

1.4 Research Objectives.

- i. To characterise socio-economic and land use arrangements in Satao Elerai Community Wildlife Conservancy.
- ii. To evaluate conservancy's management actions geared towards building climate resilience for pastoral livestock productions systems in satao elerai community conservancy.
- iii. To analyse the adequacy of prevailing policy and legal framework for building climate resilience for livestock depended pastoral communities in Kenya.

1.5 Justification.

Kenya is currently warming at a rate 1.5 times more than the global average (Christensen et al 2007). Extreme weather patterns that has seen the country witness longer dry periods and

stronger rains have heightened the possibilities of droughts and floods respectively (Few et al., 2006, Williams and Fuck, 2011). Between 1977 and 2016, Kenya has witnessed a declining trend in wildlife numbers with a loss of up to 68% and a simultaneous increase in rangelands (Ogotu, 2016). However, the number of cattle particularly for Kajiado County has decreased by 41.9% while that of goats have increased by close to 40%. The decrease has been occasioned by a change in weather pattern resulting in a decline in rainfall and rise in temperatures. Consequently, there has been an effect on the use of land and cover alongside other significant factors on the populations of livestock and wildlife.

The increase in temperature and longer dry periods has had negative consequences on pasture which in turn has had devastating impacts on livestock. In response, communities have had to adapt to the consequences of climate variability by opting to breeds that are less vulnerable to the consequences of climate change. Camel is another option but has not yet picked up in Kajiado but the rearing and sale of donkeys has increased. The loss of coping strategies increases the vulnerability to the impacts of climate variability, therefore there is great necessity for practices that build their resilience. For instance, the mobility of livestock is noted to have environmental benefits including spurring of growth of pasture and the conservation of biodiversity (McGahey et al. 2008; Davies et al. 2010). This with other resilience building activities such as access to markets and diversification of livelihoods for pastoralists improves their life quality and minimizes their vulnerability. Key in building resilience in rural communal resources is good governance anchored on well-developed policies and resource use mechanisms. Satao Elerai conservancy was selected for the study because it was once subdivided but amalgamated again and harbours a relative population of pastoral communities who largely depend on livestock production as a livelihood. Further, the conservancy lies in a wildlife corridor (Kitenden Corridor) linking the Kilimanjaro Forest Reserve in Tanzania to Amboseli National Park and beyond.

It is also a well-managed conservancy that can be used as an example of best practice which other drylands stakeholders can take and replicate in other drylands areas. It can guarantee improved range condition, ecosystem health and sustainable pastoral livelihood. However, the pressure for subdivision is building in Kajiado County, particularly within the Amboseli ecosystem. This threaten the existence of the conservancies in the area, and concomitantly pose a great danger to the wildlife and people who are depended on the pastoralism and wildlife conservation as a source of livelihood.

CHAPTER 2: - Literature Review

2.1 Introduction

2.1.1 Drylands and their socio-economic importance to Kenya

Drylands which comprise arid, semi-arid and dry sub-humid areas are found in all continents across the globe (Cervigni, 2016; IFAD, 2016). They occupy more than 40 percent of the earth and provide homes to over 2 billion people, mostly in Africa and Asia (Prävālie, R. 2016; IFAD, 2016). This implies that one in every three people in the world have their homes in the drylands.

Despite the relatively high levels of aridity, dry lands are characteristic of an array of biodiversity with a variety of plant species and animals (IUCN, 2012; IFAD, 2016). Large proportion of the human communities that live in the drylands depend on natural resource-based livelihood activities including pastoralism. In this respect, the drylands play key roles in the global socio-economic systems – they are significantly vital to global food and nutrition security which relate to the fact that about 44 percent of the world’s cultivated landmass is situated in the drylands (Cervigni, 2016; IFAD, 2016). Equally important, drylands support ecosystems including rangelands, grasslands and semi-desert, and more than a quarter of the world’s forest area are located in such areas (IFAD, 2016). About 50 percent of world’s livestock is found in the rangelands which are also homes to most wildlife. While livestock production dominates more arid areas, crop cultivation mainly occurs in dry sub-humid part of the global drylands. In Africa, the drylands constitute approximately 43 percent of the landmass, in which 75 percent of the area used for agriculture are located and inhabited by half of the continent’s population.

Despite their immense socio-economic and ecological importance, drylands are facing various risks resulting from complex combination of environmental and anthropogenic perturbations. These include unsustainable farming practices, industrialization, mining and overgrazing, as well as, desertification, drought, water stress, extreme rainfall events, wildfire and diseases amongst other (Prävālie, R. 2016; IFAD, 2016). These have far reaching and severe effects on communities that live and are dependent on natural resource found in such areas. These are strongly reflected in the increasing poverty, food insecurity, population migration and growing conflicts which ultimately do not only increase risks and uncertainties but also threatens well-being of most rural communities that depend on livestock-based livelihoods. These are typically observed in the developing counties (Opiyo *et al.*, 2012; Prävālie, R. 2016; IFAD, 2016).

In Kenya, drylands, particularly arid and semi-arid lands (ASALs) constitute about 49 million hectares, translating to about 80% of Kenya's landmass, and they dominantly cover northern and eastern regions of the country. These expansive areas provide homes to about 14 million Kenyans and over 70 percent of the livestock population in the country. The predominant land-use systems include pastoralism, ranching and wildlife conservation (Kenya Land Alliance, 2015). In this relation, these areas are mainly inhabited by pastoral communities that mainly depend on natural resource-based livelihoods.

In such areas, livestock is regarded as the living bank for most households. Largely, pastures and water are the most important resources in such areas given that livestock production is the most appropriate land use practice, as well as, most depended on economic activity (Flintan, *et al.*, 2013; Omollo *et al.*, 2017). These communities have mastered their traditional strategies for managing such resources to ensure spatial and temporal availability and access, including livestock mobility, livestock diversification and keeping large herds (Nyariki *et al.*, 2009; Flintan, *et al.*, 2013; Omollo *et al.*, 2017). In Kenya, livestock is equally linked to the social behaviours and lifestyle of most of communities, for instance the Maasai community in Kenya for whom possession of livestock is a guarantee for varying degrees of sustainable production and the stability of the household income and economic growth. Livestock therefore play multiple roles towards food security, achieving social well-being and enhancing and stabilizing agricultural production and economic stability among households within communities in the ASALs of Kenya.

2.1.2 Livestock production in ASALs of Kenya.

Livestock production is a major sub-sector of agriculture upon which Kenya's economy is dependent (Anderson and Masters, 2009; Mapfumo *et al.*, 2013). This is so especially among communities that inhabit ASALs of the country such as Maasai community (Macharia *et al.*, 2015; LiDeSA, 2015). Livestock production is not only a key economic activity but also the most appropriate land use practice in such areas (Omosa, 2005; Macharia *et al.*, 2015). Pastoralism as the main livestock production system in the ASALs of Kenya is dependent on availability and access to water and pastures. The insufficient and unreliable rainfall patterns in such areas limits crop-cultivation resulting to dominance of pastoralism or nomadic pastoralism as the most practicable land use practice and livelihood (Omosa, 2005). The main stock includes cattle, goats and sheep, and they are kept in diverse and various proportions. Pastoral communities in such areas have adopted various approaches to make the best use of the scarce water and pasture resources (Wasonga, 2009). In this respect, pastoral production

has been largely defined as system that allows spreading of risks, enhances flexibility through mobility, communal land use, keeping large and diverse herd sizes, as well as herd separation and splitting (Omosa, 2005; Wasonga, 2009). In this regard, pastoralism has been defined as a highly flexible system that has evolved over the years. It is also lauded to be an efficient mechanism in the exploitation of transitory water and pasture in ecologically marginalised circumstances together with poor economic conditions (Umar, 1994; Omosa, 2005).

Despite its fundamental importance in the ASALs, livestock production it is most affected by droughts to which many pastoral communities lose large herds of their livestock and take long time to rebuild the stock after drought period (IPCC, 2014). The ultimate effect of this is the inability of such communities to reliably and sustainably depend on livestock production for their livelihoods. In Kenya, for instance, such severely destructive droughts were experienced between 1999 – 2000; 2004 – 2006; 2008 – 2009, and were marked by massive livestock mortalities and therefore livelihood problems especially among pastoralists and agropastoralists in the country (Huho and Mugalavai, 2010). In the recent past, these droughts have become more frequent, longer and severer, resulting to higher vulnerabilities, and mortalities during such extreme climatic events (Huho and Mugalavai, 2010; LiDeSA, 2015; IPCC, 2014). The far-reaching adverse effects of climate change and variability in the ASALs of Kenya have significantly weakened livestock production as the main source of livelihood (LiDeSA, 2015; ASDR, 2017).

Additionally, land-use patterns in Kenya have changed over time. Nyariki and colleagues (2009) opine that the change has significantly changed from a significantly pastoralists lifestyle to a more sedentary one characterised of agropastoral production, ranching and cultivation. Consequently, the change has seen the productive capacities of these lands and livestock experiencing negative effects. Land degradation has in turn become the order of the day in these lands. The situation is exacerbated by a rise in population and over-cropping. Overgrazing in particular, has had serious ramifications on biodiversity (Nyariki *et al.*, 2009; LiDeSA, 2015).

2.1.3 Drought in Kenya and its implication on Livestock production

Kenya's economy is most dependent on agriculture, which is highly sensitive to weather and climate-related hazards, including drought and floods which contribute to soaring food insecurity in the country, especially in ASALs (IPCC, 2014; UNDP, 2018). Such areas experience highest level of food insecurity and malnutrition rates, implying high levels

vulnerability and therefore dependence on food relief, especially during drought periods (UNDP, 2018). Livestock production in a pastoral and nomadic-pastoral approaches is the mainstay in the ASAL environments in Kenya (Macharia *et al.*, 2015). These practices are highly dependent on availability and access to water and grazing resources which are sparsely distributed within such expansive areas. In the recent decades, there have been increased insecurities and resource-based conflicts particularly over access to the two fundamental resources for livestock production – water and pastures (IPCC, 2014; UNDP, 2018). These have not only resulted from climate change but also other environmental and human caused issues including sub-division of formally communal grazing sites into privately owned small parcels, urbanization and industrialization and conversion of dry season grazing zones into crop-cultivation farms (Wasonga, 2009).

Droughts in the most common disasters in Kenya, and this is due the geographical location of the country which inherently makes it prone to cyclical droughts and floods. In the recent decades, such droughts and floods have been reported to increase in intensity and frequency over time, a trend which is expected to continue, resulting to much more adverse effects on livelihoods among livestock-dependent population in the country. As has been extensively experienced in ASALs of Kenya, the unusually long and recurrent droughts lead to decline in vegetation cover and biomass production, which ultimately result to drop in carrying capacity of rangelands. In a broader perspective, the effects of climate change are cross-cutting to all sectors of the country's economy and the wider population (Mbogo *et al.*, 2014). However, the most affected sectors include livestock, agriculture (crop-cultivation) and water as stated in the post disaster needs assessment (PDNA) report (GoK, 2012). Distinctly important, the report shows that livestock valued at about KShs. 56.1 billion succumbed to drought between 2008 and 2011, alongside losing additional KShs. 643.2 billion due to emergent constrictions within the production and supply chains. Such losses mainly relate to decline in production of meat, milk as well as water, feed and veterinary services. Prior to this, studies had reported that it cost the government up to KShs 7 billion to obtain and distribute relief food to affected people during the 2006 to 2007 drought, while the financial losses amounted to over KShs 22.5 billion during the 1999 to 2001 drought (Mbogo *et al.*, 2014). These clearly indicate the cost of drought to the livestock sector in the countries – it has significantly slowed down economic development as a lot of resources are channelled to address emergencies and provide relief foods at the expense of development.

Impacts of drought are exacerbated by deep-rooted and widespread poverty, deteriorating attention to traditional coping mechanisms and increasing human population. More often than before, heavy and intensive rains tend to follow severe droughts that are accompanied by several other challenges including destructive floods and occurrence of malaria and other water borne diseases (Mbogo *et al.*, 2014). Lack of pastures and water directly leads to deteriorating livestock health and weight, as well as drop in milk and meat production. The ultimate result of these is increased vulnerability and starvation among livestock-dependent households. Further, amplified struggle for limited grazing and water resources habitually result to inter-communal conflicts, insecurity, worsening the already unbearable poverty conditions (Huhó and Mugalavi, 2010).

2.2.1 Managing a resilient livestock production system in the face of climate change.

About 80% of Kenyan land has been classified as arid and semi-arid lands (ASALs) and is characterized by low erratic annual rainfall and nutrient deficient soils (GoK, 2012; Kaindi *et al.*, 2019). In such areas, livestock production in a pastoral and agro-pastoral approach is the most suitable land use practice (Macharia *et al.*, 2015; LiDeSA, 2015). Pastoral approach enables efficient and effective access and utilization of sparsely distributed water and pasture resources, as well as exploitation of other natural resources in such diverse environments. Over the years, pastoral communities, which are the dominant occupants of such areas have been using various traditional approaches of managing natural resources, particularly pastures and water.

Some of the notable risk-spreading approaches traditionally used include livestock diversification and keeping livestock in large numbers to take advantage of the heterogeneous nature of their disequilibrium environment as well as a way of insuring against livestock loss when severe droughts strike, livestock mobility to enable utilization of high-quality pasture and water which are sparsely available, and setting aside dry season grazing zones (Swift 2001; Watson and van Binsbergen 2006; Opiyo *et al.*, 2015). However, these traditional approaches have become less effective and undependable due to socio-economic and environmental changes such as conversion of traditionally dry season grazing lands into crop lands, subdivision of communal grazing into individually owned parcels, population growth and urbanization, which is fast expanding in some of ASAL areas in Kenya. In order to respond to these changes, communities have been changing their way of practicing pastoralism (Schilling *et al.* 2012).

The trends of droughts in Kenya have significantly changed, in the 1960/70s the country witnessed drought once in every ten years. This has changed seeing the country experience drought once every five years in the 1980s and once in every 2–3 years in the 1990s. Currently, the trend has become unpredictable (Huho and Mugalavai, 2010; Nkedianye et al., 2011). ASALs are highly vulnerable to climate change and related vagaries, as well as unsuitable anthropogenic practices. For instance, Kenyan ASALs are threatened by degradation which occurs through complex combination of climatic and anthropogenic stresses, such as unsustainable farming practices, mining and overgrazing.

Increasingly frequent and recurrent droughts, as a major manifestation of climate change and variability, have created new set of challenges that exacerbate vulnerability of pastoralism as a means of livelihood (IPCC, 2014; ASDR, 2017). It has made it more expensive and complicated to address the perennial poverty, undernourishment and the entire food insecurity among households that inhabit ASAL regions in Kenya. Past studies have, for example instance, indicated that drought has occasioned decline in land productivity, agricultural yields and investments. Many pastoral communities in ASALs lose large herds of their livestock to drought and take long time to rebuild the stock after the drought period, which they again lose in the next round of drought (IPCC, 2014). The ultimate effect of this is inability of such communities to reliably and sustainably depend on livestock production for their livelihoods.

It has been projected that impacts of drought will increase in the pastoral areas and related social and economic pressures (Opiyo *et al.*, 2015). This indicate the need for building resilience capacities of pastoral communities, which require understanding of existing community level adaptation and coping responses. The most common livestock species kept by pastoral communities in Kenya are include cattle, sheep, goats, camels, and donkeys. The composition of the herd is always diverse in terms of kind and class of stock kept. Along-side keeping livestock, some households in ASAL areas have ventured into irrigated smallholder crop cultivation, particularly along the riverine areas, with sorghum, maize, green grams, cowpeas, vegetables, watermelon, pumpkins, gourds, and bananas being the most preferred crops (Opiyo *et al.*, 2015).

Several reactive and proactive adaptation and resilience building strategies have been identified and promoted to respond to the socio-economic and environmental changes. Some of these include livelihood diversification which encourage pastoral communities to venture into alternative livelihoods such as crop cultivation, as well as non-climate-sensitive activities such

as microbusiness, casual labor, artisan activities, and formal and informal employment (Opiyo *et al.*, 2015). Other strategies comprise harvesting of wild fruits, training in livestock health provision to be able to manage drought and livestock diseases (Mugunieri *et al.*, 2004), educating their children as a means of diversifying their livelihood (Opiyo *et al.*, 2015).

2.2.2 Land use and land tenure change in Livestock dependent communities in Kenyan drylands

In the last decades, pastoral and agro-pastoral areas have increasingly experienced changes in land use and land tenure systems. Some of the common land use and land tenure changes include conversion of grazing land into crop lands, expansion of road networks into pastoral areas, industrialization and urbanization and sub-division of communal grazing lands into small parcels owned by individuals (Catley *et al.*, 2013). Such changes are inappropriate in pastoral systems and therefore significantly threaten pastoral production systems, particularly by failing to pay attention to the socio-economic and environmental meaning of pastoralism. Livestock production in a pastoral approach does not only provide the main source of income and subsistence for most households in ASALs, but also, makes significant contributions to the country's economy; supports social and cultural norms, values and institutions; and ensure optimal use of scarce and dispersed natural resources through mobility (Ayantunde *et al.* 2011).

The defining features of pastoralism are significantly jeopardized by fast changing trends in land use and land tenure systems, and therefore the access and utilization of natural resources, more so in cases when poor and/or inappropriate planning has occurred, for instance, the recently observed expansion of smallholder cultivation in formally dry season grazing sites in Kenya. Some of the key driving factors for expansion of crop cultivation include population growth, immigration and settlement into pastoral regions, increasing droughts, need to diversify livelihoods. Despite encouraging crop cultivation, most of the crops are comparatively less reliable due to failures as a result of lack of/or and unpredictable rainfall, pests and disease among others (Arale Nunow 2013). There is also increase in establishment of private area enclosures for ranching or private drought reserves in the rangelands. This is highly influenced by the increasing imbalance in livestock distribution with wealthier pastoralists often driving privatization processes.

Despite the fact that these are the driving factors for land use and land tenure change, they have the similar impacts on pastoral systems. Some of the common consequences of these changes include reduction and limited access to grazing land, increased fragmentation of communal

grazing and water resources in areas that already under pressure. Most commonly, pastoral landscapes that are converted into other uses happen to be the most fertile being those that can be irrigated along rivers and which had before appropriation been crucial dry-season areas for grazing livestock and were essential for pastoral resilience against drought and related vagaries (Galaty, 2011). Also, indirect consequences of land use and land tenure changes include: escalating resource-based conflicts due to competing interests and intensifying rangeland degradation resulting from increased pressure declining; disruption of customary structures for managing natural resources.

Generally numerous factors are instigating the above-mentioned changes and effects of land and land tenure. Actions need to be taken so as to control further inappropriate trends in land use and tenure, thus enhancing the economic, social and environmental values of pastoralism. Some of the important factors that need to be addressed in order to strengthen pastoralism include the perception that pastoralism is an inefficient land use practice, lack of appropriate tenure security in rangelands leading to the privatization and individualization of land and vulnerability to externally driven land appropriation. This has driven a scramble for land and resources in some places in order to take them before others do. This has destabilized and weakened customary tenure systems that then find it challenging to maintain order and management over the resources that remain (Catley *et al.*, 2013).

2.2.3 Community wildlife conservation as an adaptation practice in the drylands of Kenya

As defined by the International Union for Conservation of Nature (IUCN) a protected area constitutes geographical area that is clearly defined and managed through an authority targeting to attain lasting conservation of nature together with its associated ecosystem benefits (Day *et al.*, 2012). Such areas are broadly reserved for the purposes of conserving the biodiversity, while allowing communities to obtain benefits including good and services from the protected resources in a controlled approach, to enhance their livelihoods and general well-being (Mutanga *et al.*, 2015; Tomicevic *et al.*, 2010). Wildlife conservation does not only focus on protection of diverse wild plant and animal species but also their habitats (IUCN, UNEP and WFN. 1991; Redford and Stearman, 1993). While it remains fundamentally important to create these protected areas, there have been cases in which the process of creating those areas have resulted to displacement or forcing some communities to relocate, resulting to limited or no access to resources from such areas including wild meat, pastures and firewood (Fischer *et al.*, 2011), ultimately leading to an adverse detach between the detached community and

neighbouring protected areas (Strickland-Munro *et al.*, 2010). A set of policies known to promote such coercive conservation practices (Igoe, 2004), have been mainly reported in Africa (Büscher and Dietz, 2005). Basically, any protection or conservation process that does not incorporate local communities or seek their participation have in most cases resulted to adverse perceptions and undesirable attitudes of the local communities on protected or conserved areas and resources. This roots from the community feeling that they have been deprived of their rights to access and harvest benefits from the protected areas. Ultimately, these have been reported to result to various resource-based conflicts and violence including rise in prohibited hunting, habitat encroachment and degradation (Graham *et al.*, 2005; Romañach *et al.*, 2011). In such instances, the communities adjacent to the protected areas therefore become direct threat to environmental protection and conservation as they develop negative perceptions about the protection practices and become protagonist to the authorities managing the protected areas (Strickland-Munro *et al.*, 2010; Holmes, 2013).

Having recognized the importance of community in protection and conservation practices, innovative and participatory approaches have been developed and encouraged, leading to community wildlife conservation (McClanahan *et al.*, 2005). Such approach value community views and interests, they do not only incorporate their suggestions but also allow them to actively participate in decision making and actual conservation processes. These approaches recognize the important connection that local community have with the neighbouring protected or conserved areas and resources where a win-win situation is achieved under which the community members participate in protection and conservation of natural resources, as they benefit from harvesting goods and services from such resources (Vodouhê, et al., 2010). The relationship between local community and wildlife conservation is significantly important for successful wildlife conservation practice, which is highly dependent on perceptions and attitudes of the community members (Allendorf, 2010; Mutanga *et al.*, 2015). This implies that responsible wildlife conservation authority should invest in understanding perceptions, as well social and economic status of the people as a way to inform how wildlife management practices should be approached (Dickman, 2005; Tessema *et al.*, 2010).

As pointed earlier, the goals of community conservation is the provision of a supportive environment for the management of biodiversity resource sustainably and by linking its maintenance with benefits to the livelihood of the surrounding communities (Salafsky & Wollenberg, 2000). In the past, the goals of community conservation have been achieved through enterprises having linkages with wildlife including tourism and harvesting resources

among others (Hughes & Flintan, 2001). Durbin and Ralambo (1994) contend that community conservation forms part of protected areas but also lies beyond the borders of the protected area. The practice of covering non-protected areas was informed by the acknowledgement of the fact that restrictions to the protected areas alone excluded community participation leading to a low sense of ownership, consequently, leading to their lack of support and adherence to conservation guidelines (Kiss, 2004). Hostilities have been recorded in jurisdictions with strict protection (Robbins *et al.*, 2006). As a result, it became apparent that there was a need for the inclusion of communities in conservation efforts (Ancrenaz *et al.*, 2007). Communities are highly reliant on livestock, and limited income diversity leaves many vulnerable to resource shocks, such as drought (Esilaba, 2005).

2.2.4 Challenges facing Community Wildlife Conservation in Kenya.

A lot of wildlife species are threatened in Kenya, some are even facing potential distinction (Kiringe and Okello 2007). Most of the wildlife are found in areas that are also shared and used by communities. In this regard, communities have embraced and participated in wildlife conservation programs in order to protect the threatened wildlife species while also benefiting from natural resources that exist in their environments. Wildlife conservation aim to protect plant and animal species together with their habitats (Redford and Stearman, 1993). Efforts by communities to conserve wildlife has faced numerous and complex challenges. Addressing some of these challenges need multi-stakeholder approach (Musyoki, et al., 2012).

Rapid expansion of urbanization and population growth have led to conversion of rangelands and wildlife areas into settlements and urban centres and land sub-division, sale of land and the conversion of the use of land from pastoral use to other uses. For instance, other factors have also contributed to the conversion of the use land, the expansion of neighbouring towns t include Kajiado as metropolis as provided for by Kenya Vision 2030 (Government of Kenya, 2008). Infrastructural development, particularly roads and fencing are causing new set of challenges to wildlife conservation.

Human activities have also led to the encroachment of lands previously occupied by wildlife is further complicate wildlife conservation, leading to more wildlife-human conflicts. In addition, myths, for instance, the portrayal of hyenas negatively by the West as an animal feared for various ills in Africa has led to a negative image, and the consequent hindrance to the conservation of hyenas

Some communities in the pastoral set ups have misconceptions about conservancies and are uncertain about how they work, are managed and how benefits are shared, thus limiting their interest and commitment. Also, the government support of conservancies is limited, and conservancies are excluded from national development plans and budgets (Kenya Wildlife Conservancies Association, 2016). This is also relating to lack of supportive policies that threatened prosperity of conservancies and natural laws are not well harmonised. Establishment and managing conservancies is expensive and time consuming. This bring a big challenge as most of them are largely dependent on outside funding as there are a lack of programs aimed at ensuring their sustainability (Kenya Wildlife Conservancies Association, 2016).

Successful and sustainable conservation of wildlife require concerted efforts from all stakeholders, they also well-trained, efficient, and responsive guides who support community initiatives in conservation (Musyoki et al., 2012). Such teams would be key in creating awareness and educating community members on appropriate approaches to respond to wildlife-human conflicts on the process of wildlife conservation. Such services are largely lacking thus weakening on conservation efforts.

2.3.1 Climate Change Framework Policy (CCFP), 2016.

The (CCFP) which was developed through the adoption of overarching mainstreaming approach is aimed at enhancing adaptive capacity and resilience to climate change and promotion of low carbon development in all sectors and all level of Kenyan governments. The policy clearly recognizes Kenyans continuing vulnerability to climate change which threatens to undermine the recent development gains and the threats it poses to long-term development goals. In particular, it provides that ASALs comprising of close to 89% of Kenya landmass, are fragile ecosystem and the lack of or inadequacy of government investment increases their vulnerability to climate change.

Kenyan's livestock production system particularly in the ASAL, is predominantly dependent on natural systems such as rain fed pastures and water. These systems are extremely climate sensitive, making them vulnerable to the impacts of unpredictable rainfall patterns and recurrent drought frequency, more incidences of livestock morbidity and mortality have been experienced as a result of reduced availability of pasture, diseases increase and lack of market and off-take programs. The policy therefore recommends that mechanisms for sustainable utilization of natural resources should be put in place to enhance climate resilience and adaptive capacity to protect Kenyan's natural capital. It also provides for the mainstreaming of climate

resilience into national and county governments. It recognizes that devolved governments provides new opportunity to reorganize climate change governance through diversifying and implementing appropriate climate change responses to building resilience.

2.3.2 Climate Change Act, 2016.

This Act provides for regulation and enhancement of climate change response mechanism that enables achievement of low carbon emission. The objectives of this Act are to manage, regulate, and enhance the maintenance of normal functioning, despite the adverse effects of climate change, and the sustainable development of Kenya. The Act further highlights resilience to climate variability as the ability of maintenance of a competent function and the subsequent return to somewhat normal range functionality even in the face of the impact of climate variability. This act is to be applied to all sectors of the economy to among other things; Climate change responses to development planning, enhance adaptability to climate variability by human and ecological systems and integrate climate change into the exercise of power at all levels of governance and enhance the climate change governance cooperation between national and county governments.

This Act provides for the establishment of the National climate change council which will among other functions be responsible for; advising both national and county governments on policy for climate change response and resilient development, amend and harmonize the sectoral laws and policies to achieve the objectives of this Act, administer the Climate Change Fund and Set targets for regulation of greenhouse gas emissions. The Act further provides for the formulation of a National Climate Change Action Plan which will be approved by the council to generally prescribes measures to guide Kenya to achieving low carbon sustainable development, adapt to and mitigate climate change and strengthen approaches to climate change research and technology transfer.

The council shall identify priority strategies and disaster risk reduction related to climate change and advise both the president and county governments on mainstreaming climate actions into strategic areas. For implementation of these mainstreaming measures with regard to devolution, County governments shall integrate the duties of this Act and the National Climate Change Action Plan and take national and county priorities into account which will be coordinated by a county executive committee member in charge of climate change affairs. The county government shall submit a report on the implementation of climate change actions to the County Assembly at the end of every financial year. Climate change risk and vulnerability will be integrated into all forms of assessment with technical advice as required by this Act.

The Act further provides that if one is suspected to have caused adverse effects of climate change mitigation, the prosecutor may apply to the Environment and Land Court. The Court may prevent an act that is harmful to the environment and provide compensation to a victim of a violation relating to climate change duties. It requires that public awareness and public consultations and contributions shall be included in the development of laws and policies relating to climate change. The Act provides for the establishment of a climate change fund to finance climate actions and interventions. It also stipulates that incentives may be given for climate change mitigation and promotion of climate change initiatives.

2.3.3 National Climate Change Action Plan (NCCAP), (2018-2022)

The NCCAP outlines the measures that will be taken in addressing the consequences of climate change in the mid-term planning period. The NCCAP recognizes the change in climate patterns with erratic weather conditions that have led to the loss of agricultural productivity, infrastructural damages, and loss of lives among others. The implementation of the policy calls for mainstreaming of climate variability into the key functioning sectors both at the county and national government levels. Particularly, it promises the delivery of Kenyan's National Determined Contributions (NDCs) for 2018-2022.

In its context setting the plan appreciates that climate variability has had devastating impacts on the country's economy. Among the economic effects of climate change is the high levels of loss of livestock due to drought witnessed in the period between 2007-2017 where drought related livestock losses neared an estimated amount of US \$ 108 billion. It also acknowledges that the impacts of climate variability are felt at the lowest level (household), the situation gets worse in the ASAL regions that primarily rely on livestock as a source of livelihood. In its 1st strategic objective of reducing risk to communities resulting from climate related disasters such as drought and floods at households and community level, it proposes that action should be taken to improve individuals' drought coping ability.

Such proposed action includes an improvement of drought early warning that must be people centered both at county and national levels. With this policy in place, more people (50% increase) have accessed climate information services. It also proposes water harvesting and storage prioritized. In its 2nd strategic objective on increase food and nutrition security by enhancing productivity and resilience of the agricultural sector, particularly livestock, one of the proposed action is too improve productivity in the livestock sector through the

implementation of climate smart agricultural (CSA) interventions. By the year 2023 the plan expects to achieve improved productivity of pastoralists where 10,000 hectares of rangelands will be re-seeded in 23 ASAL counties. Have annual ASALs water harvesting and storage increased by 25% from 16m³ to 20m³ via small dams and water pans and 700m³ through large multiple dams. It also aims at having an improved animal disease control and surveillance coupled with increasing climate oriented livestock insurance from 18,000-105,750. As a mitigation measure the plan proposes that manure management improved for 267,000 households for instant through adoption of biogas technology by 80,000 households and at least 200 abattoirs.

The plan further proposes for the diversification of livelihood to a changing climate. It expected that during its implementation not less than 521,500 households are supported in the adoption of diversified ventures that enable sustained livelihood and nutritional security. At the same time more support is provided to small-scale farmers with an aim of transiting them to a more specialized and market oriented output in 13 priority value chains including drought tolerant value chains.

The third objective of the plan seeks to enhance the blue economy's resilience in the water sector that ensures access to and use of water for agriculture, manufacturing, domestic use, wildlife and other uses. The plan acknowledges that access to, and quality of water is projected to decline because of climate change impacts particularly drought. It proposes to increase annual per capital water availability from 647m³-1000m³ through development of water infrastructure e.g. dams, water pans and untapped aquifers. It also proposes for enhancement of household access to water and food security through water harvesting. For instance, the plan indicates that during its implementation period livelihoods systems get improved on 60,000 hectares of degraded land through development of water pans and ponds.

The plan also stipulates the need to increase resilience for wildlife through conserving land areas as wildlife habitats. It expects that at least 20% of terrestrial and inland especially areas important for biodiversity and ecosystem service conserved. Have 30,000 hectares of wildlife habitat conserved to support a broad range of wildlife and plant species under changed climate condition. It seeks to have reduced human wildlife conflicts by 50% from 2018 KWS baseline and secure 20% of dispersal areas of migratory pathways for wildlife that have been identified on the national wildlife dispersal corridor report (NWDCR), 2017. As an enabling action the plan proposes for land use planning and zonation to segregate and identify land use types

suitable for certain areas including wildlife conservation. It also proposes for the development and implementation of a water harvesting policy for institutions and households among other relevant regulations and strategies.

2.3.4 Climate Change and Livestock Production – SDG 13

Goal 13 of the SDGs calls for urgent and accelerated action by countries as they implement their commitments to the Paris agreement. Kenya has ratified this agreement and in 2016 communicated her nationally determined contributions to the United Nation Framework Convention on Climate change (UNFCCC) secretariat. In her submission of the NDC, Kenya has identified six (6) sectors namely; Energy, transportation, agriculture, land use & land-use change and forestry (LULUCF), industrial processes and waste to abate greenhouse gas (GHG) emission by 30% by 2030 relative to the Business As Usual (BAU) scenarios. It is worth noting that this targets don't translate to 30% emissions reduction to each of the identified sectors. It further identifies sectoral mitigation measures that would need to be supported by relevant and responsible government agencies and departments. These sectoral strategies will be vital to achieving the set overall emission reduction target.

It is important to note that the livestock sector has a great potential contribution towards the achievement of the UN-SDGs and its set targets across the 17 goals. However, for purposes of this thesis the researcher dwelt into understanding the linkage between the livestock sector and goal 13 that calls for parties to take urgent actions to address climate change. The goal acknowledges that climate change affects livestock production as it leads to variations in rainfall and temperature affecting animal productivity and health, the availability and quality of pasture and feeds and biodiversity. Due to the above noted impacts, the goal recognizes the importance to build the sectors resilience to climate change. To achieve this target, climate smart interventions are required in agro-pastoralism and agro-forestry to secure animal feeds and livelihood diversification for the pastoral communities. It can also be achieved by improving water management, better grazing management, increased animal mobility, improved animal health, enhanced disease control and stocking of livestock breeds that are drought resistance among other actions. There is also need to develop proper and informative early warning systems and effective insurance schemes for livestock depended communities.

2.3.5 National Livestock Policy

The national livestock policy addresses key areas of livestock from animal genetic resources, feeds, nutrition, diseases, marketing of livestock, food security, research and extension services among others This policy looks at key areas of livestock production including. The Policy lays

foundation for both the national and county government in developing the livestock industry. The policy is a complementary document to Kenya's vision 2030 and the 2010 constitution. Despite the fact that livestock sector has a great potential to contribute to food security, income and wealth generation, the potential has not been fully exploited due to inadequate and uncoordinated policy and legal framework to development of the sector.

Broadly, this policy is aimed at contributing to food and nutrition security improving livelihoods while safeguarding the environment. On animal genetic resources (AnGR) the policy proposes that the national government will undertake a livestock census and develop web-based national AnGR database on breed diversity population sizes, trends and distribution. Undertake periodic surveys to monitor performance of AnGR and strengthen the livestock recording center (LRC) to manage all livestock data. County government will collect, report and maintain database on existing AnGR. It also requires that appropriate human capacity and legal framework be developed for the utilization and conservation of AnGR.

It stipulates that county government should institutionalize the involvement of communities in planning and development of range and pasture rehabilitation programmers, develop strategies for monitoring and control of the deterioration of rangeland and put in place mechanisms for sustainable land management. The two levels of government should strengthen drought preparedness and irrigation promote sound range management practices and appropriate risk management strategies together with putting in place measures to increase resilience and quick recovery. Looking at animal diseases problem the policy proposes that the national government should provide necessary support in control of diseases backed up by appropriate legislations. It should strengthen the veterinary laboratory system to provide technical support for disease reporting in collaboration with county veterinary services and other stakeholders. On the cross-border disease management the policy requires that the national government to collaborate with neighboring countries, to strengthen both national and regional disease surveillance, monitoring and control as well as provide rapid response to check the effects of disease outbreaks.

Looking at the challenges of livestock marketing, the policy proposes that the government should establish an agency to promote marketing of livestock and livestock products. The county governments shall strengthen the capacities of the producers and marketing groups in production, processing and storage of livestock products. It requires that the two levels of government to take measures to improve distribution networks and promote trade in livestock

and livestock products. With the limited value addition that is constraining the marketing of livestock, products the policy requires the government to facilitate the development and transfer of skill in agribusiness and value addition technologies with mechanisms for the establishment and growth of large scale value adding enterprises. The county government should facilitate the adoption of these skills and supporting infrastructural development in order to enhance the growth of industries within the livestock sub-sector. The policy appreciates the low financial commitment set by the government in support of livestock related research. It therefore provides that national government commit to allocate 2% of the national budget towards agricultural research of which 50% will be dedicated to livestock research. Establish a fund for livestock research, commercialization of potential technologies, diversification and enhancement of the funding base for livestock research. It should strengthen and coordinate livestock research agenda and improve dissemination and uptake research finding.

Due to little or lack of collaboration among various extension services providers that has led to lack of synergy, duplication of efforts and conflicts of interest, the policy provides that government should establish harmonized institutional arrangement for management of extension programmer within the livestock sector. It should also create, develop and methodologies for county capacity building together with developing a legislative framework for extension service delivery. Understanding the challenges of finances and funding, the policy proposes that the government should revitalize and expand finance institution including the Agricultural Finance Corporation (AFC) to extend affordable and accessible credit facilities to livestock value chain actors. Mobilize financial resources for enhanced livestock development and develop innovative mechanisms for private sector to extend credit and promote investment in the sector. It also requires that government to put in place the mechanisms to bond livestock financing with appropriate technical support together with having the county government create measures to improve financial literacy of livestock actors in collaboration with financial institutions.

The policy recognizes that livestock insurance services in Kenya are underdeveloped. This is attributed to risk associated with livestock farming, limited awareness of insurance products and high cost of premiums especially in the ASALs. It therefore proposes that government in collaboration with stakeholders establish suitable and accessible livestock insurance schemes together with promoting and encouraging private sector investment in livestock insurance.

The policy further appreciates that Kenyan rangelands and particularly the Amboseli-Tsavo ecosystem are areas where Human-Livestock-Wildlife coexist. The co-existence poses major threats to all the entities involved with regard to competition for resources, transfer of diseases and conflicts amongst themselves. The policy then proposes that the National government should develop strategies to foster co-existence of wildlife and domestic animals in non-protected areas for economic gain. This policy requires that County governments will be responsible for its implementation where individual counties will then develop policies, legislations, strategies and plan to guide the implementation. In particular, the constitution of Kenya 2010, provides for the county governments to be responsible for animal husbandry, livestock sale yards, county abattoirs, livestock disease control, animal control and welfare.

Finally, it is worth noting that the livestock sector in Kenya is governed by over 17 legislations most of which are not updated to conform to current realities. This brings in weakness in the areas of regulation, facilitation, promotion and development of the sector.

2.3.6 Kenya Agricultural and Livestock Research Act, 2013

The Kenya Agricultural and Livestock Research Act of 2013 provides for the establishment and functioning of the Kenya Agricultural and Livestock Research Organization (KALRO). It also provides for the co-ordination of agricultural research in the country. Under the Act, the Kenya Agricultural and Livestock Research Organization is established for the promotion of genetic, biotechnology, livestock and crop research in Kenya.

With the Act, access to research material and implementation of the findings should be expedited. KALRO would thus act as a framework providing recommendations to agriculture related research institutions and the government with the aim of advancing agriculture research. Communities and farmers in particular, are thus in a position of getting science based information for the improvement of production and management of their farm practices.

2.3.7 Wildlife Conservation and Management Act 2013.

This is an Act of Parliament enacted to provide for the protection, conservation, sustainable use and management of wildlife in Kenya and for connected purposes. The Act highlights the role of Conservancies in conserving wildlife on community and private land arrangements and brought with it the recognition of conservation as a form of land use in Kenya. It also provides as a key principle the devolution of conservation and management of wildlife to landowners and communities in areas where wildlife is present. In addition to this principle, the Act also requires that effective citizen's participation, sustainable utilization of wildlife, ecosystem base

planning for wildlife conservation and equitable sharing of benefits accruing from wildlife be considered as vital for proper wildlife conservation and management. The Act clearly stipulates that the ownership of wildlife is held collectively by the people of Kenya through the state under the custodianship of KWS, however, the management of wildlife found outside protected areas has been devolved to community land-owners. It further brought in the establishment of the County Wildlife Compensation and Conservation committees giving an opportunity for communities, County governments and KWS collectively and actively participate in Wildlife management.

2.3.8 National Wildlife Strategy, 2030.

The strategy is a roadmap for transforming conservation in Kenya and a call for action by all. It outlines a transformational vision for wildlife conservation by 2030 and identifies clear strategies, priority goals and key pillars among them creating resilient ecosystem. It provides a framework for coordination and implementation of article 69 of the constitution of Kenya (2010) and the wildlife conservation and management Act (2013). The strategy has given significant efforts to public participation and focuses to bring Kenyans together to dialog on the future of wildlife by inspiring participation for the transformation of the wildlife sector. The strategy is a response to the chronic and emerging challenges facing wildlife today.

This strategy recognizes that Kenya has unique and exceptional ecosystem which are under threat from degradation, immense pressure increase from human population, commercial and illegal use & unplanned infrastructure development. Of particular importance to this study are the savannah ecosystem. Borrowing from recent reports and study like (Ogutu et al., 2016), the strategy acknowledges that the wildlife and livestock states have declined particularly that wildlife have decreased by 68% between 1977 & 2016. It further indicates that climate change can alter migratory routes spatially and temporally by disrupting seasonal change in vegetation cover within the savannahs. A fundamental goal in the strategy is to maintain and improve habitat and ecosystem integrity to reduce biodiversity loss, protect ecosystem function, enhance and increase resilience.

This strategy prioritizes to protect, rehabilitate and restore wildlife habitats and their connectivity to increase the resilience of key habitats and ecosystems. It recognizes the need to increase the extent of land effectively managed by communities and securing of priority wildlife corridors and dispersal areas. The strategy further seeks to promote co-existence to reduce human wildlife conflicts. It requires that management approaches including traditional

/ indigenous knowledge are developed in mitigating human wildlife conflicts. It requires that particular focus to be given on education awareness, integration planning, capacity building of local communities.

Within the 1st implementation phase the strategy requires that alternative consolation programmes to ensure prompt response for loss injury and damage caused by wildlife are developed and promoted. To further promote wildlife conservation the strategy requires that comprehensive incentives package to encourage voluntary conservation particularly through wildlife conservancies be developed and implemented. Finally, it appreciates that there is need to support the training of young students and local community on conservation leadership so as to build the next generation of conservation leaders.

2.3.9 Community Land Act, 2016.

This Act gives effect to Article 63(5) of Kenya's 2010 constitution providing for the acknowledgement, protection and registration of community land rights; management and administration of community land; to provide for the role of County governments in relation to unregistered community land and for connected purposes. The act appreciates the rules and regulations set under article 66 and 40 of the constitution of Kenya (2010) as community land ownership is not absolute. This act has also introduced a new form of land tenure system other than leasehold or freehold which is the customary tenure system. It requires that customary tenure rights are to be recognized, adjudicated and documented for purposes of registration in accordance with the Act and any other written law.

In the Act, provisions for common holding of land is provided, it further states that the common holding has equal force just as the freehold that comes via transfer, allocation or registration. Where land is controlled by clan, family or community, the Act recognises this tenure system and thus provides for similar force as in the latter. Article 40(3) of the Act stipulates that the government cannot acquire community land unless under the provisions of the law.

It is also provided that naturally available resources should be sustainably and productively managed for the benefit of today's and future generations. This management should be done with transparency and accountability with the overall aim of equity in sharing these resources. The manner in which the benefits should be shared by the community needs to be done with the full consultation as provided for in the section. Any investment agreement should include the community and must be approved by at least two thirds of the community. In consideration of the fact that the community members are not environmental experts, the agreement should

be in consultative meetings with relevant stakeholders. A registered community are mandate with the responsibility of registering and making by-laws for the management of their land including regulations on the investment in the land, terms and who may be granted permission to invest in the land and the possible conversions and use of the land.

Further into regulating community land, the Act appreciates article 66 of the Constitution of Kenya 2010 that provides that the State may regulate the use of land. Therefore, the management of community land will be subjected to national government laws and policies relating to the resources in Kenya. The Act further takes special consideration of the pastoral systems and provides that community land in a pastoral community shall be available for use by members of the community for grazing of their livestock. This shall be subject to; the kind and number of livestock, the section(s) where the livestock may be grazed and grazing rotations, a grazing plan and the right of the community to utilize the portion of land in accordance with this Act. The Act stipulates that unless authorized, individuals are not expected to erect or make any investments in community owned land. It thus prevents attempts by private individuals to do any form of development in community land.

Those who do not abide by, or have the authority granted by the registered community to use the land are committing an offence and are liable to pay a fine of 100 000 KSH or less, or imprisonment for a period not exceeding six months. The Act gives strict measures to curb tenure conversion as it stipulates that land held by group representatives with the communities they represent shall be registered as a community and shall not be sold, leased or converted to private land before being registered under this Act. This will significantly delay the rampant land subdivision and fragmentation that has been witnessed in pastoral communities for the last two decades. Research has shown as earlier mentioned in this thesis that it is actually one of the major threats facing pastoral production systems as it cuts off the connectivity within rangelands which is key in providing mobility that sustains pastoralism.

2.4 Analytical Framework

2.4.1 Theoretical Framework

The study was based on the socio-ecological resilience theory that holds that over-time, ecological, economic and social systems gradually become intertwined with equal increase in interaction between the systems (Pisano, 2012). In this study, Kajiado forms part of the system that interacts and depends on the ecological system as it depends on it for the exploitation of

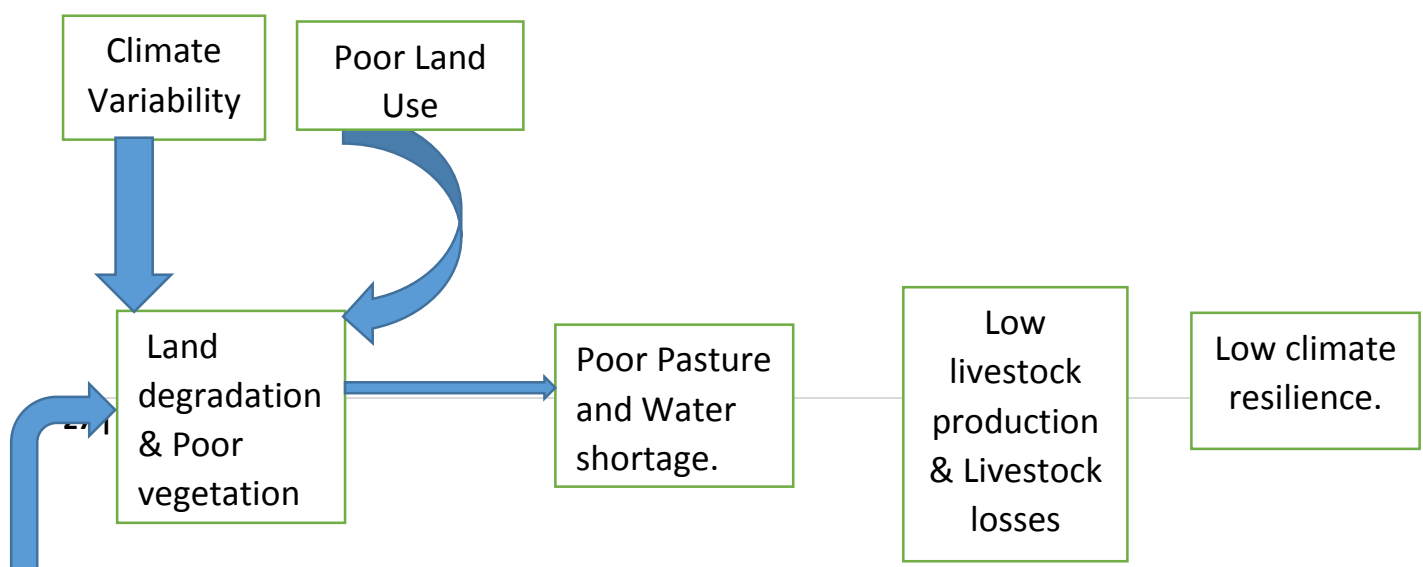
natural resources for its survival. Kajiado thus forms a social-ecological system (SES) (Ambrosio-Albala et al., 2008) with overlapping components that must work together in forming an adaptive system.

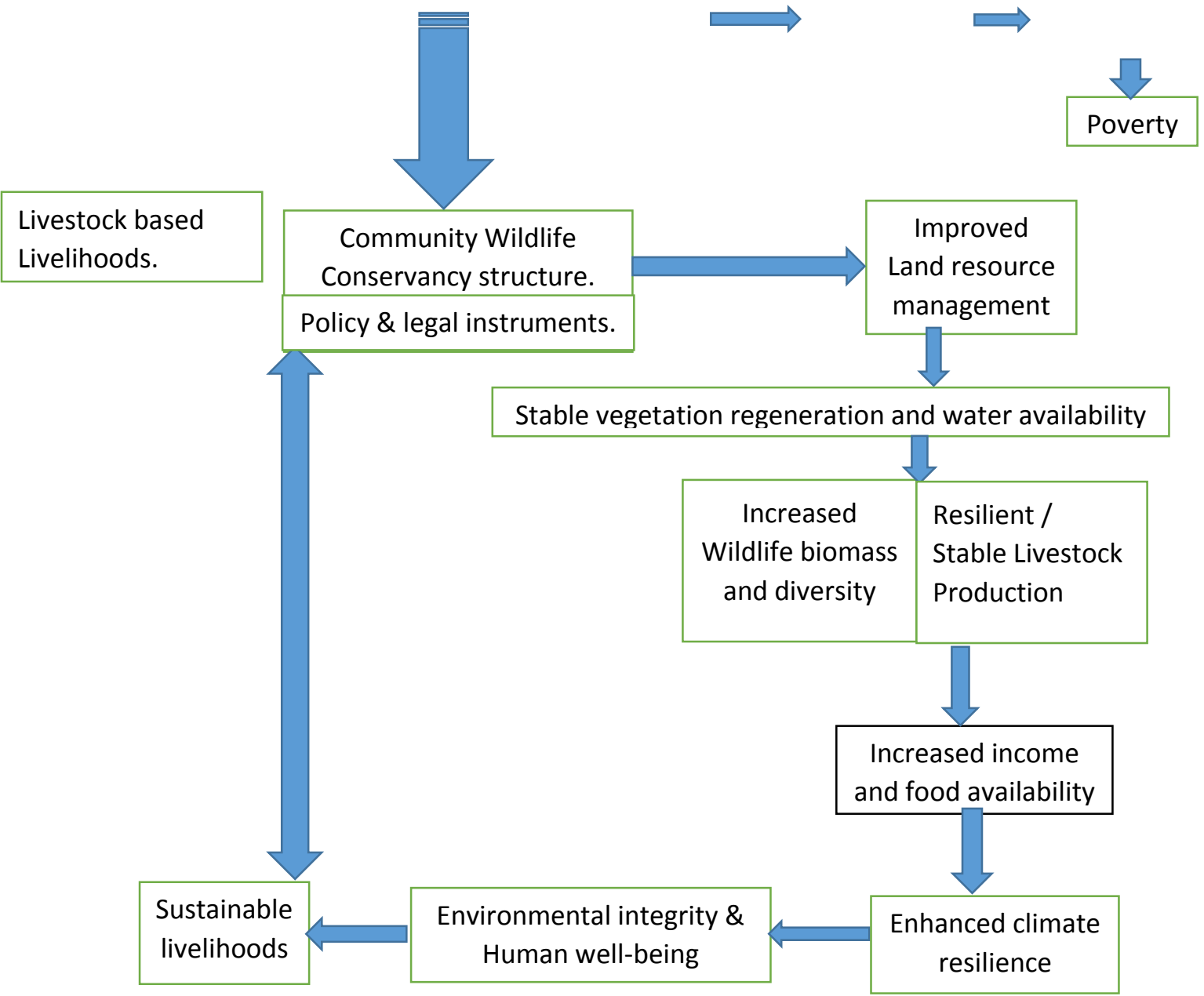
The resultant adaptive capacity of the system is a key element of the resilience of the system in adjusting to the prevailing environmental changes (Carpenter et al., 2008). The resilience of a community is a function of the interaction of all the subsystems (social, ecological and economic) that work together for the survival of the community (Van Den Bergh et al., 1991).

This theory was applied to the study by guiding the research on the ways in which the interaction of the people of Satao Elerai, their Wildlife conservation efforts, the management of the conservancy and the economic enterprises within that conservancy overlap and help in building resilience for the livestock based livelihoods in Satao Elerai conservancy.

Livelihoods sources particularly livestock production at household level was assessed. The study looked at the livestock numbers and composition and coupled with other livelihood sources such as agriculture, tourism initiatives and other business opportunities to determine diversification of livelihood options. Aspects of land tenure was also interrogated in relation to the identified land use types since insecurity of land tenure undermines the sustainability of most pastoral communities. The frequency and intensity of drought events coupled with land use changes and practices in the study area and in relation to the ecosystem was evaluated and its impacts to the local livelihoods determined. These parameters were used to determine the community's perception on the model of integrating livestock production and wildlife conservation in situ. An analysis of the above parameters, the conservancy management and the prevailing policy and legal instruments focusing on livestock production, wildlife conservation and climate change was done to triangulate the emerging issues and address the studies objective.

2.5 Conceptual Framework



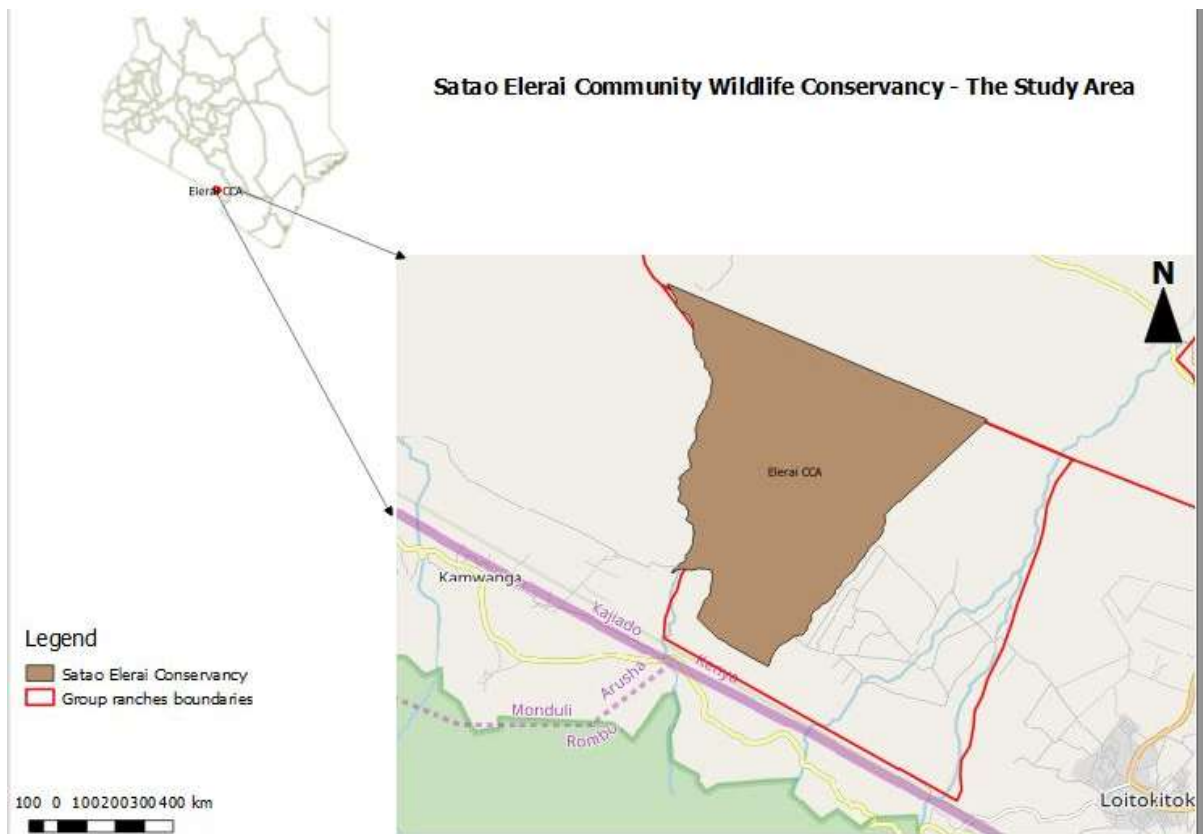


Source: Author

CHAPTER 3: - Methodology

3.1 Study Area.

The study was conducted in Satao Elerai, a Group conservancy covering an area close to 11,000 acres, which is divided into three separate but complementary zones for livestock rearing and settlements (4,000 acres), wildlife conservation (4,555) and crop farming taking 2,000 acres. It has a population of 823 members. The Conservancy was established in 2005 and houses Satao Elerai Camp an eco-tourism facility co-developed by the community and a foreign investor. It is located within Amboseli ecosystem which forms part of the Kilimanjaro-Tsavo landscape. The area has been recognized by UNESCO as a Biosphere that balances the interests of the Maasai community, livestock and Wildlife through co-existence. Livestock keeping, Crop farming, and Wildlife based ecotourism activities are the main sources of livelihoods and income. Geographically, the conservancy is situated on the windward side of Mt Kilimanjaro and receives moderate to low amounts of rainfall. It occasionally suffers periodic and recurrent droughts, seasonal floods and other effects of climate change and variation. The Satao Elerai landscape is predominantly cover with Savannah scrubland interspersed with open grassland. The dominant tree species include the *Acacia tortilis*, *Acacia meliphera* and *Acacia xanthofolia* (yellow fever acacia) from which it derives its name Elerai in Maasai dialect. The Elerai conservation area sits in an African Wildlife Foundation (AWF) identified critical wildlife corridor named the Kitenden Corridor where many Wildlife species especially elephants use the area as a migratory route between the Kilimanjaro forests, Amboseli, Chyulu and Tsavo National Parks and beyond.



Source: Author

3.2. Data collections

The study used both primary data (collected from the field) and Secondary data (collected from official gazetted government documents and literature). The study started with collection of both primary and secondary data. Primary data was collected by administering semi-structured questionnaires to household heads in Satao Elerai conservancy. A focus group discussion of the management committee of the conservancy was also conducted coupled with carrying out key informants' interviews. Key official gazetted government policy and legal instruments were reviewed and analysed. The data variables were coded and organized into patterns for analysis purposes. They included key areas such as social demographics and household characteristics, livelihood sources and options, land tenure and land use arrangements, drought events and land cover change and governance and benefits sharing. The study then used the framework that integrates the socio-economic and bio-physical factors to analyse the resilience of livestock dependent communities to the impacts of climate change in the study domain.

A pilot study was carried out to familiarize with the area of study prior to the main data collection activity and introduce the study to the community.

For objective 1, primary data was collected through semi-structured questions administered to all household heads within the conservancy.

For objective 2, documented secondary information was reviewed and synthesised to cross-examine the operational actions as highlighted in the conservancy management plan coupled with focus group discussion of the conservancy management committee members and key informant interviews within the conservancy.

Objective 3 mainly focused at policy and legal instruments at national level that addresses issues of climate change, livestock production systems and wildlife conservation practices in drylands. They included: climate change framework policy 2016, Climate Change Act 2016, National climate change action plan (2018-2022), National Livestock Policy, Kenya Agricultural and Livestock Research Act, 2013 Wildlife conservation and management Act 2013, National Wildlife Strategy (2030), Community Land Act, 2016 and Climate Action (SDG 13).

3.4 Sampling methods

The carried out a census of all household heads from the study area. According to information from the conservancy senior warden, the conservancy was initially started by 8 families who at the time of the survey had grown to 120 households. Every head of the household was

interviewed using semi-structured questionnaires. The goal of the interviews was to collect relevant data as regards prevailing livelihood sources, livestock production characteristics, land tenure and use practices, ecological challenges and governance in the study domain. This data was collected from the study area with the assistance of 3 local enumerators in the area. These enumerators were trained before the commencement of the data collection exercise so as to ensure that they become fully conversant with the questionnaire and methods of interviewing respondents and appropriate translations into the local dialect (s).

For the focus group discussion, the author called for a meeting of members of the management committee (apart from the chairman and the secretary of the committee who were interviewed as key informants) who were 22 in number having 3 members represent each of the 8 original families.

The study selected 10 key informants a majority of whom were working within the Amboseli Ecosystem. They included people who were perceived to have particular insight or opinions about the topic under study. In this study, the main criteria for selecting the key informants was based on their extensive knowledge in community conservation and pastoral livestock production both today and in the past and their length of stay and work within the Amboseli ecosystem. These individuals were selected from KWS, NGO's, CBO's and others with community projects focusing on conservation and pastoralism.

3.5 Data Analysis.

The research was both quantitative and qualitative in nature. Once the data was compiled it was examined for completeness ready for analysis. The data was then first coded and themes according to the study objectives. Quantitative data, collected using the semi-structured questionnaires was entered and analysed using the Statistical Package for Social Sciences (SPSS) programme package version 20 and was then interpreted in line with the objectives of the assessment. The study used averages, percentages and rankings to generate the information and inferences. Qualitative data obtained from focus group discussion and key informant interviews was categorised and analysed using a logical matrix which compared responses to the same questions by different respondents then conclusions were drawn.

CHAPTER 4 - Results and Discussion

4.0 Introduction

This chapter presents the results and discussion for the three study objectives. It presents the socio-economic and land use arrangements of the communally used and management Satao Elerai Conservancy, measures for managing a livestock – wildlife interface and the results of an analysis of the policy and legal framework for building resilience of the livestock dependent communities in Kenya.

4.1 Social demographics and household characteristics

This study sampled 120 respondents from Satao Elerai Wildlife Community Conservancy (SEWCC) in Kajiado County to complete and get the required information according to the guiding objectives hereby set by the researcher. All the sampled respondents did participate in this exercise and were much cooperative in answering the structured questionnaire. Therefore, going by the return rate this study was successful at a 100% thanking the land owners and management of the Conservancy.

According to the research findings majority 67% (N=80) of interviewed respondents were male and 33% (N=40) women as indicated in table 4.1. From the study findings 40% of the respondents had not attained any formal education with close to (27%) attaining primary, secondary (19%) and (14%) getting to post-secondary education level. A large (86%) percentage of the respondents were married with few under the other two categories on divorced and widowed as summarized on table 4.1. Under the different age categories most (41.7%) of them indicated they were in the age bracket of 18 to 35 years and 35 to 60 years (42.5%) and slightly above 15% were above 60years of age. The aforementioned inferences are articulated in the tables below.

Table 4.1: Social demographics and household characteristics

Particulars	Characteristics	Percentages
Gender	Male	66.7
	Female	33.3
Education levels	None	40
	Primary	26.6
	Secondary	19.2
	Post-secondary	14.2
Marital status	Married	85.8
	Single	6.7
	Divorced	1.7
	Widowed	5.8
Age bracket	18 – 35	41.67
	35 – 60	42.5
	> 60	15.83

All the interviewed persons were purposively sample through the census of all the household heads within the conservancy. According to the interviewed respondents the researcher realized that they were all registered members of the conservancy. The membership is by birth and hereditary along the family lineage and no other category of membership is allowed. This is to allow the members safeguard their land from intruders and to avoid the registration of members through other dubious ways. The findings of the study also show that a majority its members have acquired education which can be viewed as one aspect of social development in the community. Education is also perceived an avenue to other frontiers of life hence it is anticipated that this will reduce pressure over locally available resources as the conservancy members particular the young elite will move to urban centers in search of other opportunities. Nthinga (2008) also pointed out that education is vital to successful conservation initiatives as

well as improving the members' skills and creating employment in the industry. Similarly, Muyanga (2008) points out that education provides an opportunity for pastoral households to diversify their livelihood portfolios especially through employment as a source of wage and remittances. The danger of elitism which is often associated with the growing pressure for land subdivision and privatization cannot also be overlooked. The consideration of women as household heads as shown in the study demonstrates that the Maasai community is progressively acknowledging the place of women in society which has for years been undermined and only men were considered as the heads.

4.2 Livelihoods and Land Use Management

4.2.1 Livelihoods sources and options

According to the study findings as indicated on figure 1, livestock production (60%) was considered as the main source of livelihood followed by crop farming (16%). The other forms of sources were tourism and formal employment at 13% & 5% respectively. This showed that majority of the residents relies on livestock rearing, but also highly supplement it with crop farming and some of them have sort employment elsewhere. The findings concurred with Cervigini (2016) who argued that while livestock production dominates more arid areas, crop cultivation which mainly occurs in dry sub-humid areas is done to supplement it. Wildlife conservation is also considered a source of livelihood as 13% of the respondents admitted to be directly benefitting from the conservation related initiatives as shown in the figure below.

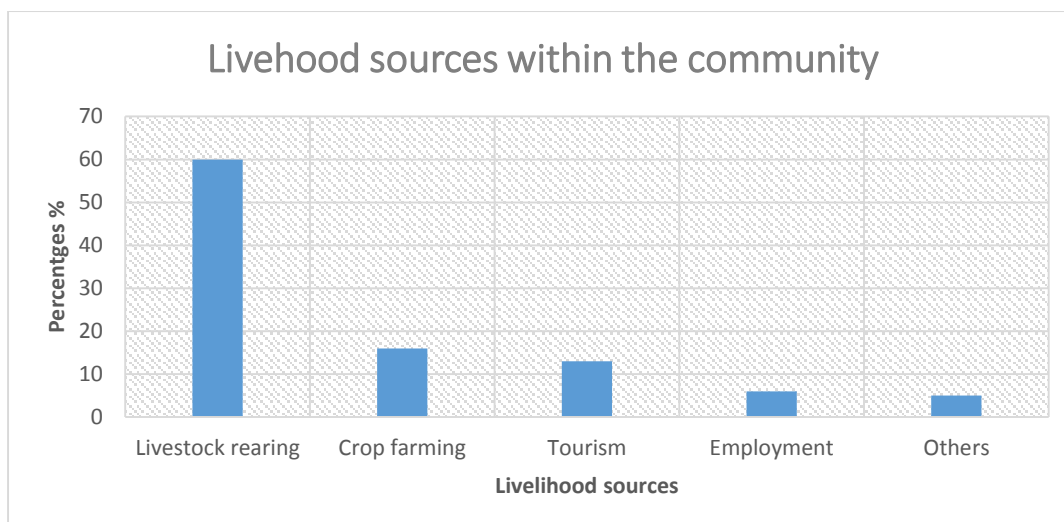


Figure 1: Livelihood Sources

This can be attributed to the fact that the proceeds that accrue from tourism alone are minimum and can only be felt by a few people or have minimal impact to the receivers' in the community. Unless tourism significantly develops and the benefits equally distributed, then the perception might remain the same. Unfortunately, experiences in other parts have shown that this might never happen going by the current status of the tourism sector and the many other factors such as regional security, wildlife populations decline and changes in land tenure in the Amboseli ecosystem come to play. There is also need to redefine benefits accruing from conservation beyond monetary to include pasture reserves which conservancies have been of great help during drought seasons.

It is therefore prudent for the conservancy management to broadly address the issue of compensation and benefits generation through other means like payment for ecosystem services and subsidies, conservation easements and direct compensation from KWS in case of human-wildlife conflicts in the area. It is important to reduce the cost of living with wildlife by which ultimately increases the net benefit as opposed to just focusing on the material benefits. Similarly, (Nyariki et al., 2007) revealed that there is need for communities to benefit from wildlife and also introduce compensation for losses arising from wildlife. The difficulty is that

until the time of the study, the conservancy is not recognized by KWS as a key community conservation area, hence not liable to receive incentives like education support and bursaries from KWS to communities living with wildlife in the area. However, through the provisions of the wildlife conservation and management Act, 2013 and the dialogue with key stakeholders like the County Wildlife Conservation Committee (CWCC), Kenya Wildlife Conservancies Association (KWCA) and the KWS this stalemate could be solved. In the spirit of diversification of livelihoods, agriculture stands out as an option to supplement pastoralism and wildlife conservation. It is important to mention that crop residues from the farmlands play a vital role as animal fodder and more specifically during the dry season. The contribution of agriculture as a livelihood diversification strategy cannot be overlooked in the study area and therefore much more scientifically supported interventions should be directed towards the practice to unleash the much hidden potential. However, a balance need to be drawn knowing clearly that the acreage of land is not increasing and agricultural practices reduces space for livestock and wildlife hence hindering their mobility. As reported by (IFAD, 2016) unsustainable farming practices are among many other risks facing drylands and this have far reaching and severe effects on communities that live and depend on natural resources found in their areas (Pravalie, R. 2016). The community must therefore develop agreeable regulation to control the ever-spreading conversion of land into settlements, farmlands and other land uses to protect the ecologically viable pastoralism. Given the ever-increasing population, frequencies of drought events and the threat from land subdivision and fragmentation, proper land use planning and land allocation is necessary to avoid future crisis and uncertainties.

4.2.2 Estimated family income per month

According to findings members of Satao Elerai Community Wildlife Conservancy in had varied monthly income level in thousands, where majority (36%) had an estimated income of 0-20,000, 20-50,000/- at (31%), and 50-100,000 (24%). Few (9%) had an income estimate of above 100,000/- as indicated on figure 2.

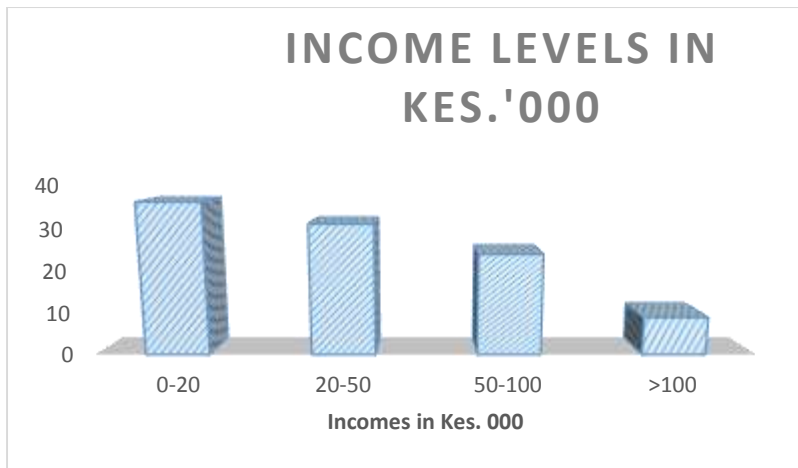


Figure 2: Respondents Monthly Income

The income brackets show that the people of Satao Elerai receives a varied income per household per month. The study focused on the income that members makes from the activities they are engaged in on a monthly basis. Majority of those who indicated to be getting from 50,000 and above had some employment either within the conservancy or outside the conservancy. This agrees with Campbell (1999) who found out that employment is a source of cash income that supplements subsistence from livestock According to Wasonga (2009), households with one or more of their members in formal employment are hypothesized to be less dependent on land and are expected to be less affected by precarious production trends that characterize the pastoral systems and are, therefore, more secure in terms of livelihoods. The other two categories on the lower side were mainly involved in livestock rearing and crop farming with no employment. Some of them could not clearly depict their monthly income but could give the approximate amount of money they could get after the sale of either livestock or crop produce and we could use that to derive an estimate of their monthly income.

4.2.3 Drought incidences in Satao Elerai Wildlife Conservancy in 6years

Table 4.2 below indicates a general review of climatic variations within the study domain, with particular reference to drought events that have an impact on productivity standards in situ. According to the summary in the table below majority of the respondents indicated that between the year 2009-2010, the drought was very severe which was followed by the 2015-2016.

Table 4.2: Drought experience in 6yrs

Year	Severity
2009-2010	1
2015-2016	2
2013-2014	3
2011-2012	4

From the most severe to the least severe

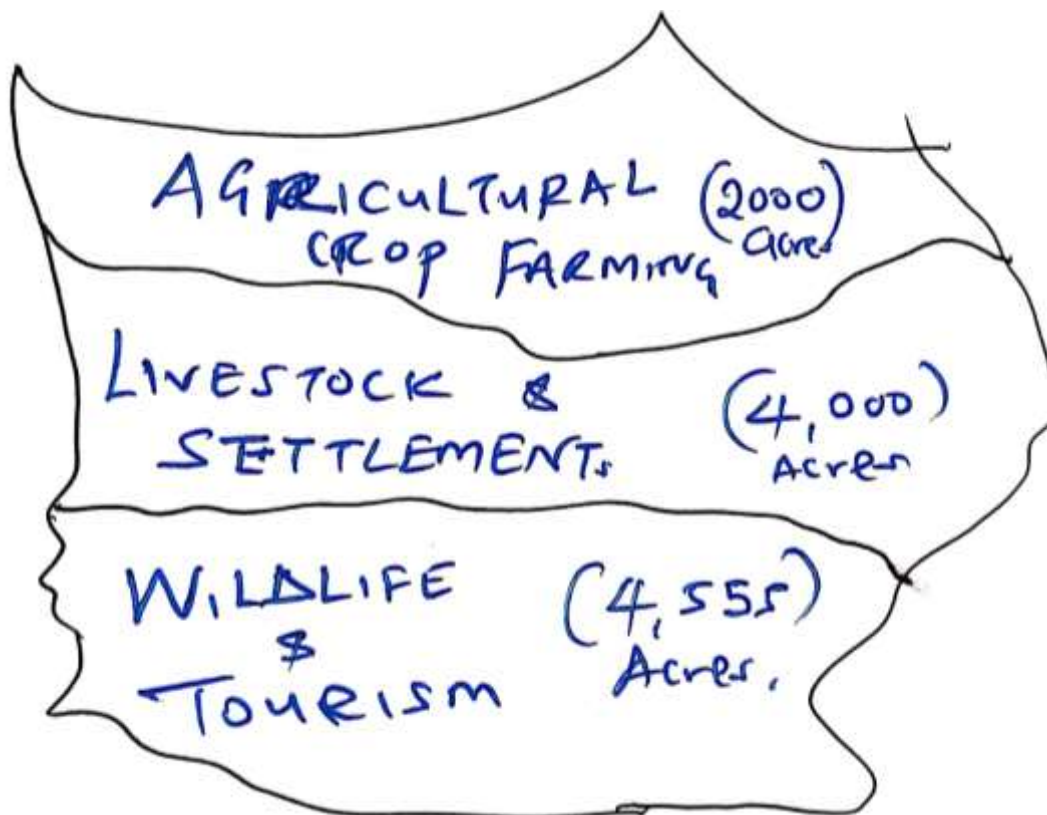
From the respondents, the two most severe drought periods were separately unique. The 2009-2010 one had hit the community to the point that they moved their livestock as far as Mombasa county (then district) in search of water and pasture. During that drought the herders from the conservancy and others parts of Loitokitok sub-county lost their herds to a devastating point that some families were left with zero stock. According to one interviewed KII *“The droughts are becoming too long and very frequent. Before the year 2,000 it used to be experienced like ones in 10years, nowadays we have droughts in every year and after every 3 years we experience very severe ones”*

The results agree with (Huho and Mugalavi, 2010) who argued that in Kenya severely destructive droughts were experienced between 1999 – 2000; 2004 – 2006; 2008 – 2009, and were marked by massive livestock mortalities resulted in livelihood problems especially among pastoralists and agro-pastoralists in the country. According to the consolidated analysis by the World Meteorological Organization (WMO), the year 2016 was confirmed to be the hottest on record and this was also experienced in the conservancy and its environs. Despite the fact that the year was hot and dry leading to pasture insufficiency and water scarcity, members of Satao Elerai conservancy did not move far from their conservancy. In fact, a majority of them indicated that they actually didn’t move from the conservancy land area and they registered minimum livestock mortality and loss. This can be attributed to the fact that in 2016 the management and planning of natural resource utilization particularly pasture had improved and strengthened. According to the Conservancy grazing committee manager, Key informant interview KII - 004 *“Yes, we have experienced drought in various years but notably the 2009 one was the most severe. We had to migrate to Tanzania and to Mombasa areas in the coast. However, for the other years we didn’t move from our, land we had properly managed our land through rotation hence we managed until the rains were received”*. The community members were much more respecting the land use rules and regulation and therefore guaranteed sustainability of the resources such as pasture. The conservancy management had also

developed more water points like boreholes and secured the natural water sources like springs oozing from Mt Kilimanjaro into the conservancy.

4.2.4 Land use and land tenure preferences

According to the data collected from members of Satao Elerai Community Wildlife Conservancy (SECWC), all the respondents (100%) indicated that they are under communal tenure system, and utilizes the land as a community with no individual land ownership documents. The conservancy land has been zoned into three (3) land use types. These are areas demarcated for livestock grazing and settlements, wildlife conservation and crop farming as shown in the hand-drawn map below.



A hand-drawn sketch map showing the zonation of the 3 land use types. (Source, Author) According to the respondents, it is important to note that allocation of land areas for the above mentioned uses was not only based on suitability of the land use practices, but also taking advantage and having a consideration of the predominant land use type in the neighbouring communities and landscape. For instance, the area demarcated for wildlife conservation borders Oltiyani and Noolarami conservancy that connects to the Amboseli national park. This is important in the sense that it acts as a buffer zone between the park and the Satao Elerai community hence preventing or rather reducing the threats of human wildlife conflicts. It is

also the area that the community's eco-lodge or camp is located hence takes advantage of the wildlife movement from the park to the conservancy therefore sustaining their eco-tourism activities which generate income for community. This therefore can be termed as a win-win situation for the Amboseli ecosystem and the people of this community. It also acts as a grazing reserve and a grass bank for the community for use during dry seasons.

Speaking to the conservancy senior warden and through a discussion of management committee, study found out that the zonation was done following particular criteria. For instance, the area demarcated for crop farming borders Tanzania on the slopes of Mount Kilimanjaro. It is an area that is arable for crop farming particularly maize and potatoes and the farmers here attribute that to low temperatures and relatively sufficient rainfall received on the Kilimanjaro side. There are also a lots of permanent streams and rivers following from the mountain which are used for irrigation farming. The area also has less wildlife presence particularly the browsers hence minimal incidences of crop raiding except on the lower sides bordering the livestock grazing zone. Fundamentally, the crop residues from the farms also acts as fodder for the livestock particularly during dry season and for those without livestock it is a source of money as they do sell the fodder to herders thus sustaining their families. The farmers here also take advantage of the casual labour provided for the Tanzanias' living adjacent to the crop farming zone.

The area demarcated for livestock rearing and settlements is in between the two other land parcels. This therefore acts as buffer between the wildlife conservation area and the crop farms thus preventing destruction of crops by wild animals. It is also the areas with the necessary social amenities like schools and health centres together with infrastructure such as roads for access to trading centres like Kimana, Loitokitok and Olchoro. Both permanent and temporary settlements are also located in this zone with the latter much more close to the conservation area during dry season as livestock is allowed to graze in the conservation area.

Notably, there is no system that can claim perfection and so some challenges have also been experienced including but not limited human wildlife conflicts i.e poaching, crop raiding, predation and deaths and injuries of persons. Drought events that culminates to pasture insufficiency, water scarcity and loss of livestock have also been threatening the people of Satao Elerai. Animal diseases were also identified as a challenge although with members linking the conservancy grazing system where wildlife and livestock a time graze together to be contributing to the transfer of vectors and diseases from wild animals to domesticated flock.

Land subdivision and fragmentation is one major threat facing the Amboseli ecosystem but according to the research findings a majority (86%) of the members of the conservancy prefers communal use of the land particularly the areas demarcated for livestock grazing and wildlife conservation. However, having this land use planning and management has in a huge way contributed to their triumph over the challenges as it has increased their adaptive capacity hence building their resilience. Agarwal and Perrin, 2008 states that collective action through local organizations influences the ways in which households and communities respond to and cope with climate risk. The members also expressed that having the land amalgamated and communally used has acted as a land tenure security measure in the face of growing grabs and dispossession that has been experienced in subdivided areas in most of the Kenyan rangelands.

Finally, from the study findings as it was indicated by 88% (N=106) respondents is that since the conservancy was set in 2004 it has been achieving its key objectives of wildlife conservation and livestock production which therefore indicate that the members have a positive perception towards the role of conservation on pastoral production building strong coexistence among them.

4.2.5: Livestock Grazing Arrangements

From the findings as shown on table 4.3 majority 93% (N=109) of the respondents indicated that during wet season livestock are grazed within the conservancy area demarcated for livestock. During dry season 61% (N=73) of Satao Elerai Wildlife Community Conservancy members indicated that they grazed within the conservancy area demarcated for livestock while 28% (N=33) of the respondents said that they grazed within the conservancy area demarcated for wildlife. Some of the respondents indicated that they graze outside the conservancy both during the wet and dry season at 8% and 11% respectively.

Table 4.3: Where animals graze during wet and dry seasons

During the wet season	Response %	During dry season	Response %
Demarcated area for livestock within the conservancy	93%	Demarcated area for livestock within the conservancy	61%
Demarcated area for wildlife within the conservancy	0%	Demarcated area for wildlife within the conservancy	28%
Outside the conservancy	7%	Outside the conservancy	11%

According to the output shown on table 4.4, 97% (N=116) members who were interviewed indicated that during wet seasons they watered their animals within the conservancy water points for livestock and during the dry season 91% (N=109) showed that they watered their livestock within the conservancy water point dedicated for wildlife. Other respondents indicated that they water their livestock in water points demarcated for wildlife both during wet and dry season at 1% and 4% respectively. Some respondents indicated watering their livestock outside the conservancy during both season where 2% in the wet and 5% during dry season

Table 4.4: Where livestock water during wet and dry seasons

During the wet season	Response %	During dry season	Response %
Demarcated area for livestock within the conservancy	97%	Demarcated area for livestock within the conservancy	91%
Demarcated area for wildlife within the conservancy	1%	Demarcated area for wildlife within the conservancy	4%
Outside the conservancy	2%	Outside the conservancy	5%

The above mentioned arrangement further demonstrates that the conservancy its meeting its livestock production goal where the livestock are allowed to access different areas at different times. Having livestock access the area demarcated for wildlife conservation during the dry

season shows the critical role that particular area is playing as grazing refuge during hard times. The arrangement also shows that the community members do not only abide by the rules and regulations but are also supportive of their resource management procedures. It further indicates that the community members are cognizant of the impacts of climate change particularly drought and are using this arrangement as a mechanism to curb its implication and avoid devastating loss of livestock and livelihood.

During this study the respondents stipulated that there was change in movement or mobility patterns within the Amboseli ecosystem and her neighbors'. This was attributed to the recent land use change that have been witnessed in the area particularly after the subdivision of Kimana group ranch which borders the conservancy to the north and the strict government legislations from the republic of Tanzania which restricts pastoralists from migrating to Tanzania in such of pasture.

4.2.6 Current range condition within the conservancy area

The study took vegetation cover as an indicator for range conditions and according to the findings from members of Satao Elerai majority 78% (N=94) indicated that the current range condition within the conservancy ecosystem has changed while 22% (N=26) indicate that there was no change in the last 5 years.

Table 4.5: Current range conditions

Opinion	Percentage	Status	Percentage
Changed	78%	Improved	61%
		Declined	17%
Not changed	22%		

For the respondents who felt that the range or ecological conditions had improved attributed it to the land use planning and management that the conservancy have put forth. The fact that the land was zoned into three different but complementary land use types helped in securing the vegetation cover and reduced environmental degradation within the conservancy. The integrity of the conservancy has also been upheld by the security measures that the management has instituted through the community rangers who are also members of the conservancy.

Climate change where the community experienced reduced rainfall and recurrent drought events was highly attributed to the decline. The increase in livestock numbers both from

conservancy members and the immigrants during dry seasons have also depleted the vegetation within the conservancy. Increase in wildlife species particularly elephants and other browsers which consumes a lot of feeds have led to a decrease on the pasture and vegetation cover on the conservancy land. In particular, elephants' have been falling down trees within the conservancy hence reducing the tree cover and this has also led to an increase in charcoal burning as the people involved claim that they are only burning those that have already been fell by elephants. This led to a total ban on charcoal burning within the conservancy land including for trees that have been fell by wild animals.

4.2.7 Effect of land subdivisions and fragmentation on Household herd size.

Eighty-six per cent (86%) of the respondents reported that land subdivision within their community would affect their household herd size meanwhile 14% indicated that it would not. The respondents were requested to indicate whether this would cause an increase or a decrease and 61% indicated that it would cause a decrease while 25% indicated that this would increase in their stock numbers as shown in table 4.6.

Table 4.6: Land subdivision on Household Herd Size (HHS)

Effect	Percentage %	Particular effect	Percentage %
Affects	86%	Increase	25%
		Decrease	61%
Not Affect	14%		

From the study, those who indicated the decrease informed the researcher that if subdivision is done then it is anticipated that individuals would utilize their parcels separately which will result in fencing and conversion into other land uses. This would cut off the connectivity within the study area hence overgrazing and pasture depletion within the small parcels will be continually experienced. For the respondents who indicated that subdivision would increase their herd size attributed it to better management of individual parcels as opposed to when the entire land is communally managed and utilized.

4.2.8 Livestock population and numbers

The researcher needed to know livestock, types of livestock, production systems, number of animals, livestock challenges and their perception regarding the co-existence of livestock and wildlife within the Satao Elerai Community Wildlife Conservancy.

The herd composition and distribution under the different categories varied with species classes. Most of the cattle in the herd were born (1,950) within the herd and 923 bought by the respondents as indicated on table 4.7. This applied also to the goats (3,047 and 1,459), sheep (3,115 and 1,344), donkeys (125 and 42) and chicken (992 and 393) born and bought respectively.

Table 4.7: Current livestock herd size composition and size

Particulars	Born	Inherited	Bought	Gift	Total
Cattle	1,950	600	923	69	3,542
Goats	3,047	621	1,459	189	5,316
Sheep	3,115	582	1,344	134	5,175
Donkey	125	39	42	6	212
Chicken	992	17	393	49	1,451

Similar to Ogutu et al. (2016) the study found out that the number of shoats is almost triple that of cattle where shoats and cattle constituted close to 75% and 25% respectively. A significant proportion of goats and sheep was bought as a re-bounce strategy from severe drought experienced in 2009-2010 to add up in the herd composition and sustain family needs. The respondents also expressed that it is easy rearing shoats than cattle as they are less hit by drought since they feed on shrubs and leaves hence having diversity of feeds. However, sheep have been reported to be causing grass depletion as they consume almost everything to a point of uprooting the vegetation. Cattle on the other side require much more grass hence when pasture is limited they get highly affected.


4.2.9 Livestock Household herd dynamics and recovery since 2010

As shown earlier in above discussions, the drought of 2009-2010 was the most severe with devastating loss of livestock for the Satao Elerai community. It is for this reason that the study

sort to establish whether the herders of this community recovered from those losses or did not. As reported by mongabay.com on September 17, 2009; one good example is the 2008-2009 droughts in which pastoralists lost over 150,000 herds of cattle and close to 10 million people starved. Drought poses serious challenges to the pastoral economy which account for 90 percent of employment opportunities and 95 percent of family incomes and livelihood security in ASALs of Kenya (ASAL Policy, 2012). And from the findings of this study which was carried out in 2017, majority 91% (N=72) of pure livestock herders in Satao Elerai Wildlife Conservancy agreed that they recovered their household herds since the year 2009-2010. Of those who recovered close to 78% were of the opinion that it has increased with few at 13% expressing that the numbers have been fluctuating where they still experience some loss leading to decrease in their stock.

Table 4.8: Causes of household herds increase according to respondents

Cause of increase	Ranking
Breeding / birth	1
Buying / purchase	2
Reduced deaths	3



From the highest contributor to the least contributor of the increase where 1 is the highest contributor

This increase was highly attributed to increase birth rate within the herds together with the purchase of more livestock to replace the lost ones. Although, not directly linked to the increase the respondents were of the opinion that the reduced livestock deaths due to other factors such as availability of pasture and water, coupled with access to affordable veterinary and extension services stabilized the household herd size. The study corroborates with the findings by (Gaitho, 2010) that points out that drought per se isn't necessarily the only cause of weakened livelihoods among pastoral communities but other intervening variables like anthropogenic factors and socio-economic factors are important.

4.2.10 Milk production during Wet and Dry season (First 3 Months)

According to the study findings it was evident that the livestock production varied with season (wet and dry). On this the study concentrated on cattle and took milk as a specific indicator of productivity where it was shown that on average the herders received 7litres per cow per day during the wet season and 3litres per cow per day during the dry season. The consideration of

three months after calving was advised by the fact that it is the period during which milk production level peaks after which it declines steadily. It is also worth noting that season alone is not the only determinant of milk production in cattle. Other factors such as health status, age of a cow, distance to pasture and water points and the breed determines the production level. It was evident in the study domain that those with the cross-breed between Sahiwal and Maasai Zebu received more milk (10-14litres) than those with pure Maasai zebu during the wet season.

4.2.11 Resource dynamics and change

According to the study findings done in 2017 majority of the interviewed members of Satao Elerai Community Wildlife Conservancy indicated that their resources had changed since the year 2009. 70% of the members indicated there was an increase in livestock numbers particularly shoats, and an increase in the available water resources in the conservancy have also been reported. The members also indicated that there has been an increase in other resources such as dry season grazing reserves, pasture and fodder together with an increase in wildlife species within the conservancy. Agricultural activities have also increased in the study domain as indicated by 58% of the interviewed respondents. The area has also registered an increase in wildlife population which is attributed to availability of pastures and water coupled with the availability of wildlife conservation area and reduced poaching within the conservancy. After the subdivision of the Kimana Group ranch many parcels of land have been fenced off and others converted into agricultural farms and quarries. This has led to the destruction of wildlife habitats thus forcing them to move into the neighboring areas one of them being Satao Elerai hence increasing its wildlife numbers.

Table 4.10: Changed resources within the conservancy area since 2009.

Resources	Increased in %	Decreased in %	Constant in %
Livestock numbers	71	22	7
Pasture	62	28	10
Tree cover	37	51	12
Dry season grazing reserves	66	34	0
Wildlife numbers	93	6	1
Water points	70	18	12

Crop farming	61	8	31
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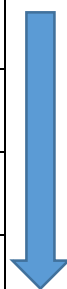
The increase in the above resources is attributed the fact the conservancy management has instituted a robust resource use arrangement and the community members are abiding by and sticking to the set rules and regulation. There is a close connectivity between the increase in pasture and water resources to the subsequent increase in livestock and wildlife populations which depends on two for survival. It is important to note that the respondents attribute the reduction in trees to the increase in elephants within the conservancy thus falling down more trees over time. Finally, the increase in the above discussed resource serves as an indication that the conservancy managed in creating a platform for the community to bounce back to productivity and regaining a healthy landscape therefore building its resilience to climate change and variability.

4.2.12 Encountered incidences of Human-Wildlife conflict (HWC) for the last 6years

Majority of the interviewed respondents indicated that they encountered incidences of human-wildlife conflicts, which according to the interviewed respondents crop raiding and livestock predation were the frequently experienced incidences respectively. This concurs with Ekisa & Okello (2016) who found that both pastoralists and agro-pastoralist reported to have incurred great losses as a result of property destruction by wildlife which is extremely detrimental to people whose livelihoods depend on their crop or livestock. It was also reported that wildlife in the conservancy posed a threat to human life were several incidences of injuries and even death of people were registered.

Table 4.11: Respondents indication of conflicts

Conflict experienced	Rank of conflict
Crop raiding	1
Livestock predation	2
Homestead destruction	3
Poaching	4
Death and injuries of people	5



From the highly experienced loss to the least experienced where 1 is the highly experienced

The study further needed to establish where the said conflicts happened and from what type of animal in the conservancy. According to the interviewed respondents' the conflicts experienced ranged from human injuries, loss of livestock, crop raiding and poaching among others. As summarized on table 4.12, majority of human injuries happened within the conservation areas by elephants where the same species has been reported as being the most involved in Crop raiding in the shambas. Livestock loss has also been reported in the conservancy where most of it is happening in the homesteads as a result of predation by lions and other cats particularly hyenas.

Table 4.12: place of conflict and animal involved

Conflict type	Area of occurrence	Frequency	Animal involved	
Human Injuries	Within conservancy	71	Lion	38
	Outside	33	Elephant	107
	Shambas	6	Browsers	
	Homes	10	Cats	
Loss of Livestock	Within conservancy	48	Lion	102
	Outside	9	Elephant	
	Shambas	9	Browsers	
	Homes	57	Cats	88
	Within conservancy	0	Lion	0
Loss of crop	Outside conservancy	1	Elephant	102
	Shambas	105	Browsers	66
	Homes	9	Cats	0
Poaching	Within conservancy	30	Lion	0
	Outside conservancy	76	Elephant	29
	Shambas	0	Browsers	79
	Homes	0	Cats	19

Despite the above losses, the community here is very disadvantaged because it is not formally recognized by KWS, hence not liable to receive compensation fee and other funds payable by KWS to communities living with wildlife. This opens a platform for further review and implementation of national wildlife policies particularly the wildlife conservation and management Act (2013 amended 2018) to address the threats of HWC particularly to communities living together with wildlife.

4.2.13 Governance and benefit sharing

According to the study findings, majority 56% (N=67) of the interviewed members indicated that they obtained non-monetary benefits from Satao Elerai Wildlife Conservancy arrangement. Close to 22% (N=26) indicated they obtained direct monetary benefits meanwhile 20% (N=24) indicated that they obtained both benefits.

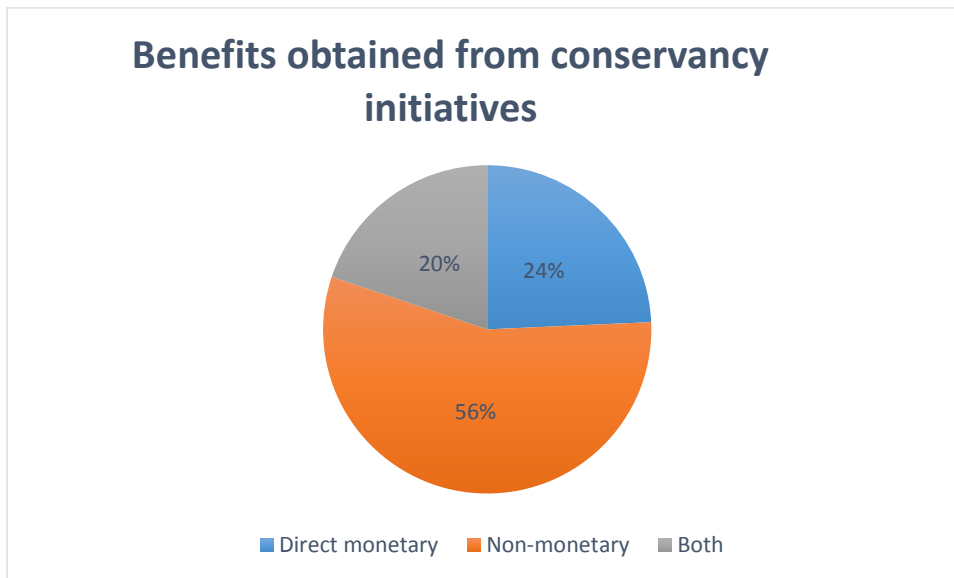


Figure 3: Summary of Benefits obtained from Conservancy initiatives

Those who indicated that they only get direct monetary benefits were particularly those who had a formal employment in the eco-lodge or camp within the conservancy. The non-monetary benefits included education, health support and capacity building through training that the members received which did not directly amount to receiving cash money.

Table 4.13: Benefits received from Conservancy initiatives.

Benefit Category	Ranking
Education support	1
Health / medical	2
Employment / jobs	3
Training / capacity building	4
Business opportunities	5

From the highest considered benefit to the lowest where 1 is the highest benefit.

Other than the direct monetary benefits that members receive from the conservancy, the above table indicates that they also acknowledge enjoyment of other benefits with education and

health support being considered the two top benefits respectively. However, this doesn't mean that these are the only benefits that members should consider to be accruing from the conservancy and they should only be valued in monetary or material terms. There more benefits going to the community from the natural resources such as utilizing the conservancy as a grass bank for livestock particularly during dry seasons.

4.2.14 Involvement and participation in governance/management

According to the interviewed respondents a minority 24.7% were involved in management and planning activities and out of which 21.7% were members of the management committee. Only eighteen percent of the interviewed respondents were involved in financial and investment decision making as summarised in table 4.14 below.

Table 4.14: Involvement in decision making.

Activity	Involvement		Level of involvement	
	Involved	No involved	Management	Member
Management and Planning	24.7%	75.3%	21.7%	3%
Financial and Investment decision	18%	82%	15.9%	2.1%

The study findings show that a majority of the members are not involved in decision making of the conservancy. This was found to concur with other studies done by Muthiani (2012) and Nthinga (2008) in Laikipia and Amboseli Ecosystem respectively indicated very low community participation in group ranch activities which was attributed to low sensitization. This therefore calls for mechanism of ensuring that more community members participate having in mind that meaningful participation is a key principle in natural resource management in community areas.

A majority of the of the interviewed respondents (71.3%) agreed to be participating in the general conservancy's meetings while 28.7% confirmed that they did not participate in conservancy meetings which are always called twice in every year.

Table 4.15: Community meetings

Activity	Involvement	
	Involved	Not Involved
Community meetings	71.3%	28.7%

With regard to general community meeting, it was impressive to find out a majority of the members do participate in the meetings. This can be attributed to the fact that it is during these meetings that the amount of revenue generated by the conservancy is announced to the members and dividends shared. It is also the forums through which the new management committees are elected.

4.3. Management Actions in the Satao Elerai conservancy.

The study established key management actions for sustainable management of the Conservancy resources. This results were derived from the review of the conservancy management plan coupled with focus group discussion and key informant interviews within the conservancy.

4.3.1 The management plan.

The study found out that, Satao Elerai Community Wildlife Conservancy (SECWC) has developed a 5-year management plan as a tool to enhance sustainable management and utilization of their land resources. Generally, this plan aims at highlighting the main activities that takes place in the area and recommend suitable actions. These activities include but not limited to farming, pastoralism, wildlife conservation and management, ecotourism, firewood collection, medicinal extraction, among others. According to the conservancy chairman, the plan was developed through a participatory process that involved the community members and land owners under the leadership of the management committee. This management plan will be a vital tool for enhancing livelihood security and will provide a roadmap for sustainably managing various land uses to reduce competition and land use conflicts. It will also empower the SECWC members to effectively manage their own natural resources by improving the rangeland condition and consistent monitoring for improvement of both their livestock and their livelihoods. The study recommends that, the management plan should aim at not only highlighting the activities but also focus on the state of the landscape, its available resources, users and user rights and the neighbouring communities on a landscape perspective recommends suitable actions that guides its management for livelihoods security and environmental wellbeing. It is also worth noting that planning is a continuous a dynamic process that requires continuous adjustments as new experiences emerge. Key management areas have been discussed below:

4.3.2 Pasture and Grazing Management

According to the respondents during the FGD, livestock numbers have been increasing in SECWC as there is no control on cattle numbers but at the same time the grazing land is expected to decrease due to population pressure. The conservancy is home to both livestock and wildlife and therefore the pasture and other resources is shared by the two. While livestock and wildlife directly compete on same resources and hence their numbers can lead into the exclusion of one of them, it should be noted that if the pastures are well managed, they can comfortably coexist. The conservancy management has zoned two distinct land parcels within

the conservancy for both livestock and wildlife separately. The plan provides that livestock grazing shall be restricted in the livestock grazing designated areas marked with white paint for identification for most of the year. However, in the very dry season (August – October) the conservancy manager together with the community leadership will identify suitable areas within the wildlife conservation designated areas where permission will be granted for limited grazing. This allowed grazing should avoid direct conflict with tourist activities taking place in the conservancy eco-tourism zone. According to Senior management member, Satao Elerai Community wildlife conservancy, Key informant interview 06 *“Yes, we have a grazing system that was established through zonation. The conservancy also employs community members as security personnel’s to enforce the set rules and regulations. The area set aside as dry season grazing reserve is always out of access for all livestock until the 10th of August every year. The laws are very strict and they have even been registered with the sub-county commissioner and the OCS to make them more binding. For instance, if you are found within the Dry Season Grazing Reserves (DSGR) for the first time, one receives a fine of Ksh 10,000 and a warning letter. If the same herder repeats the fine goes to Ksh 20,000 with exclusion of the first one. If he/she repeats for the third time they receive a jail term of not less than 3 months”*..

The study also found out that, it is quite important that zonation has been done and parcel of land area set aside for livestock grazing. However, the missing gap in the planning is the failure to address the issue of carrying capacity. It is therefore important that the land owners and the conservancy management carry out an assessment on the carrying capacity so as to ensure pasture accessibility and availability so as to meet year round animal requirements for pasture and avoid overgrazing. This corroborates with Sangeda (2018), who argues that it is important to assess rangeland condition and livestock carrying capacity for semi-arid rangelands so as to generate new information with regard to status of livestock population, vegetation, soil and water resources that are necessary for grazing plans. He adds that such information is a key to developing strategies that would ensure sustainable rangeland productivity and improved pastoral livelihoods.

4.3.3 Wildlife conservation and coexistence

According to the Conservancy senior warden, although wildlife is a crucial resource for the people of Satao Elerai, its presence in the same locality possess a great threat to that community. These threats include but not limited to predation, injury and death of human, destruction of property and crop raiding among others. This therefore calls for mechanisms of enhancing the coexistence between people, livestock and wildlife within the study domain. To

address this several actions have been initiated by the community which aid in ensuring the issues of human-wildlife conflicts have been look into. The results showed that, the conservancy has employed local youth as wildlife rangers so as to provide protection and security for all within the conservancy. These rangers conduct routine patrols within the conservancy as an effort to mitigate human wildlife conflicts. They are required to report any incidence of human – wildlife conflicts for immediate and prompt response. It is a responsibility of the rangers to ensure that the zonation plan is followed including securing the area demarcated for wildlife from livestock incarnation. The study further found out that, the idea of having community rangers participate in the security patrols is a recommendable one and the fact that joint operations are organized with the other neighbouring communities strengthens their social fabrics and enhances coexistence and connectivity. However, the issue of criminalizing herders and excluding them from the grazing fields might create conflicts amongst the members which might lead to the dissolution of the conservancy and ultimate subdivision. It is also important to highlight that the Conservancy Chairman emphasised that wildlife conservation and management will be carried out with strict conformity with the Wildlife Conservation and Management Act 2013. This is a great observation that the community recognizes the existence of the Wildlife conservation and management Act 2013 amended 2018. According to Conservancy chairman, key informant interview KII-001 *“Yes, we are aware of the Wildlife conservation and management Act, 2013. Several leaders from this conservancy joint other rangelands practitioners in a workshop that was organized by the Kenya Wildlife Conservancies Association (KWCA) where we were taught on its provisions with regard to wildlife conservation. And we now know that law is superior than all of us and that is why we always remind our members to act within the confines of the law to avoid trouble. Particularly for wildlife matters where the government values its wildlife more than people.*

4.3.4 Water sources management

According to the findings from the focus group discussion, the community of Satao Elerai is cognizant that water is essential for life and a crucial factor for livestock production in drylands. This results agrees with (Ridoutt et al., 2014), who found out that there is raising recognition of the increasing competition between users, sectors and use, hence understanding the distribution and demands for water in livestock production is of great importance. The consumption of adequate amount of water is essential for productivity and welfare of livestock. The community has therefore taken critical measures to ensure availability of water within the conservancy. According to the a senior elder in the community who spoke during the focus

group discussion, the increase in livestock numbers as result of population growth and more members having livestock has resulted into reduced water volumes in water sources. The findings corroborate with the findings by (Blache et al., 2018), who found out that water consumption throughout the life cycle of livestock may lead to a reduced availability of water in an area and may create damage on the environment. Managing water for livestock production is a complex scenario and is influenced by several factors. For instance, the need for water repletion depends on the environmental conditions and the physiological status of the animals and the metabolic activity of the animal (Willmer et al., Revell 2016). According to (Ran et al., 2016), livestock will get about 10% of their water needs from drinking water points, 90% from the plants they consume. However, with the consumption of dry feeds or senesced forage in drylands systems, a greater proportion of the water must be met from drinking water points. Finally, the study found out that the people of Satao Elerai have never conduct a thorough water need assessment for their production. However, they have developed strategies to ensure availability of water for their livestock and wildlife. According to the Conservancy secretary, they have dug three (3) boreholes that provides water in the area demarcated for livestock rearing and settlements and one (1) borehole in the area demarcated for wildlife conservation. According to Conservancy chairman, Key informant interview KII – 002 who narrated that *“Using the money from the tourism in the conservancy, we have sunk for boreholes that supply water to the members for livestock, people and wildlife.*

The study also found out that managing a consistent supply of water could be costly for the community as the boreholes is operated using a petrol powered pump. This results agree with (Vercoe et al., 2018) who argues that, in rangeland situations, maintenance of water points can be costly and, with free-ranging animals, the monitoring of water points is essential to maintain productivity. The Senior Warden, Key informant interview KII – 005 also said that, *We maintain a constant and efficient water supply for domestic use and livestock from our community boreholes by providing fuel, repairs and servicing the pump and engine. This has been expensive*

4.3.5 Environmental protection and Ecological Management.

According to the focus group discussion, the following activities that takes place in the conservancy affects the environmental integrity of the study domain and needs to be managed. These activities include firewood collection, poles harvesting, abstraction of medicinal herbs and solid waste handling.

During the FDG, the respondents expressed their concerns on the impact of unsustainable cutting down of trees for wood fuel causes widespread deforestation and land degradation within the conservancy. They acknowledged that firewood harvesting might have less impact on forests and trees as initially most firewood comes from dead wood or from branches (prunings) from living trees. However, according to Njenga (2018), where the availability of dead wood is receding, people eventually turn to cutting down live trees to satisfy their energy needs. According to the conservancy warden, the conservancy has put in place control measures to ensure that this practice does not result to widespread ecological damage. For example, firewood collection for domestic use by the community has been restricted to take place in the community grazing area except under special circumstance the collection will be permitted to take place in other location of the conservancy. Similarly, controlled firewood collection for the eco-lodge will take place in the tourist designated areas. The controls are necessary to ensure sustainable resource use.

Pole harvesting will be permitted to take place in the community land areas selectively to ensure sustainability and avoid deforestation. The conservancy management in consultation with the community leadership will identify suitable areas for pole cutting. The team that will be responsible for identification of the areas for pole harvesting should also factor in the species to be harvested and the timeframe for which harvesting happens. Measures for replanting of trees to replace the harvested ones should be put in place and this should be in consultation with Kenya forestry services so as to avoid introduction of unfriendly or invasive tree species. It is also advisable that reseedling of grass and indigenous plant species to be applied in the degraded areas so as to mitigate further environmental degradation where it is evident.

Abstraction of herbal medicine needs strict control because of the increased demand thus affecting plant stem, bark, leaves and roots. Permission to abstract in the eco-tourism designated areas will not be considered to avoid extinction of targeted plant species.

In order to safe guard against the environmental pollution, all empty bottles, cans, tins, plastics will be transported back to source for recycling. Waste disposal must conform with Waste Management Regulations 2006.

The conservancy management should ensure that waste materials are managed responsibly by applying principle of reuse, recover and recycle. This waste must be segregated at source and maintain waste disposal records. NEMA licensed waste handler should be contracted to ensure that the waste is disposed in Kajiado county government designated dumpsites. Effluent

discharge analysis should be conducted regularly to ensure that the quality of waste water has no harm to the environment and human health.

4.3.6 Social Empowerment and Capacity building.

According to the respondents in the focus group discussion, the community through a unanimous decision during one of their annual general meeting held in 2010 agreed that part of the revenue they generate from the eco-tourism activities be used for empowering its members. The identified areas included education, health and women empowerment. A senior member of the community informed the FDG meeting that the conservancy management supports education by building classrooms and other learning facilities in the local schools for its people. They also provide school bursaries to the students at secondary school and college level. The eco-camp also employs teachers and cooks at local and provide monthly salaries to them. The management also provide lunch for the school going kids particularly at low primary together with establishing and supporting Adult education for the community to address the high illiteracy levels.

On health issues, the conservancy management assist in settling medical expenses to critically affected members of Elerai Community in incidences of serious illnesses. They also organize and invite public health workers to the villages and camp premises to ensure compliance with health standards regulations. In Supporting any health care initiative to the community and neighbourhood they have been arranging for periodic and routine medical check-ups and treatment for employees in the camp

In efforts to improve income for its members particularly women, the management markets and encourage tourists or camp visitors to visit the community Manyatta for cultural experience and also purchase of the Maasai artefacts from the women groups. They also provide casual labour for community members at the camp and conservancy when and where necessary which will expand their income bracket. The management has also been training and capability building of youth and women on business planning and market literacy

4.3.7 Actions to be addressed.

The study finds out two key areas that the conservancy management has not addressed and would recommend that they be addressed so as to improve on resource management enhancing resilience. They include but not limited to;

Hay Bailing.

At the time of the study, it was evident that the conservancy had enormous grass and through the interviews and discussion with the management it was clear that the regeneration ability of the vegetation was relatively good. A lot of these grass species when not consumed or grazed on gets really dry to appoint that the palatability gets highly reduced and much goes into waste. Although it is appreciated that the residues that gets back into the soil is converted into carbon hence enrich the soil nutrients and biodiversity.

However, the study found that if this grass is harvested and stored in properly designed storage facilities it could be an important source of fodder for livestock particularly during severe droughts. It could also be a source of income particularly for women if they are allowed to harvest and sell to the neighbouring communities as this has been seen as a lucrative business in Kimana and Loitokitok. For instance, in the year 2016/17 thousands of bales of grass and fodder were coming as far as from Mwea, Embu, Naivasha and Narok and these even included rice and wheat residues.

Ecologically, this would open up the grass fields and plain game species such as zebras and gazelles that are not quite comfortable inside thicker vegetation would increase in the conservation area. This would provide prey to the predators hence reduce livestock predation in the grazing area and homesteads as predators would have relatively enough food within the conservation area. So this is both a drought adaptation strategic, economic empowerment initiative and a human-wildlife conflict mitigation measure.

Livestock Stocking Rates Assessment.

There is need for the conservancy to carry out an assessment on the stocking rate and carrying capacity for the conservancy. This is important as it could help advise the members on stock numbers that do not exceed the carrying capacity so as to curb the pressure on the limited grass and pasture resources. The assessment should incorporate both spatial and temporal analysis which would give more insight on when and where the members should graze and also help them in understanding when it is advisable to allow in other pastoralists. This initiative should then be backed up with a grazing plan and by-laws that govern the community. Awareness education on the important of grazing planning must be given considerable priority so as to educate the herders on the relevance of the above mentioned issue.

4.4 The policy and legal instruments for building climate resilience

This study analyzed various policy and legal instruments at national level that focuses on climate change and integrates livestock production systems and wildlife conservation and coexistence practices. The analysis of these policy and legal instruments was done through review of official gazette government documents using a formula that focused on the identified problems, proposed solutions, implementation process and recommendations where necessary.

Generally, the various instruments appreciate the impacts of climate change on livestock dependent communities and acknowledges the vulnerability that pastoralists are exposed to and provides mechanisms for building their resilience to climate impacts.

According to the study findings, the climate change framework policy (CCFP), 2016 is seen as an overarching instrument that provides the mechanisms for sustainable utilization of natural resources that should be put in place to enhance climate resilience and adaptive capacity to protect Kenyan's natural capital. It also provides for the mainstreaming of climate resilience into national and county governments. Most importantly it recognizes that devolved governments provides new opportunity to reorganize climate change governance through diversifying and implementing appropriate climate change responses to building resilience. This policy is operationalized by the National Climate Change Act that provides a regulatory framework for enhanced response to climate change and for mechanism and measures to achieve low carbon climate development.

The National Climate Change Action Plan (2018-2022) provides detailed action that Kenya will embark on to address Climate Change, during the medium term planning period. It seeks to increase food and nutrition security by enhancing productivity and resilience of the agricultural sector, particularly livestock, one of the proposed action is too improve productivity in the livestock sector through the implementation of climate smart agricultural (CSA) interventions. In particular, it stipulates that by the year 2023 the plan expects to achieve improved productivity of pastoralists where 10,000 hectares of rangelands will be re-seeded in 23 ASAL counties. To enhance water availability, the plan requires that annual ASALs water harvesting and storage increased by 25% from 16m³ to 20m³ via small dams and water pans and 700m³ through large multiple dams.

The National Livestock policy looks at key areas of livestock production including farm animal genetic resources, livestock feeds & nutrition, inputs, animal diseases and pests, livestock's marketing, research and extension and food security. Key on this policy is that it stipulates that

county government should institutionalize the involvement of communities in planning and development of range and pasture rehabilitation programmers, develop strategies for monitoring and control of the deterioration of rangeland and put in place mechanisms for sustainable land management.

The Sustainable Development Goal (SDG) 13 on climate action which calls for urgent and accelerated action by countries as they implement their commitments to the Paris agreement recognizes the importance to build the livestock sector's resilience to climate change. This goal provides that, climate smart interventions are required in agro-pastoralism and agro-forestry to secure animal feeds and livelihood diversification for the pastoral communities. It can also be achieved by improving water management, better grazing management, increased animal mobility, improved animal health, enhanced disease control and stocking of livestock breeds that are drought resistance among other actions.

Finally, the study found out that the livestock sector in Kenya is governed by over 17 legislations most of which are not updated to conform to current realities. This brings in weakness in the areas of regulation, facilitation, promotion and development of the sector.

CHAPTER 5 – Conclusion and Recommendations.

5.1 Conclusion

The study aimed at carrying out an analysis of climate resilience among livestock dependent communities at the household and landscape level in order to find out a way to improve adaptive capacities among livestock dependent communities. This study focused on Satao Elerai Conservancy as a case on how Community Wildlife Conservancies can be used as structural interventions to building climate resilience for livestock-dependent communities within Kajiado County, Kenya. The choice of Satao Elerai was based on the fact that it was once subdivided into individual parcels but amalgamated again and integrates livestock production and wildlife conservation in situ hence can provide an example of best practice that can be replicated in other parts of the ASALs of Kenya.

The study revealed that a majority of the residents relies on livestock production as a primary source of livelihood but also, significantly supplement it with agricultural crop farming and eco-tourism activities. Climate variability particularly incessant drought events resulting in environmental degradation and livelihood loss possess huge threat to the communities in the area. This has grown to be an area of growing concern for the community and as such mechanisms of addressing the menace have to be instituted. It was also evident to the community that sustaining pastoralism and conserving the wildlife populations in their land area was proving impossible in small individual parcels of land. This then prompted the individual land owners to amalgamate their parcel forming a group conservancy for communal use and management. This process allowed the community develop a land zonation plan where areas of land were demarcated and allocated to the three land uses namely: livestock rearing and settlements, wildlife conservation and crop farming which could not be possible on individual parcels. The integration of livestock production and wildlife has demonstrated to be win-win scenario where communities are able to benefit from both.

As far as the arrangement has shown great success as a livelihood security measure the community. The community members also held a believe that having land amalgamated and communally managed equally serves land tenure security measure. Despite the above successes, the model has some challenges such as human wildlife conflicts and transfer of diseases from wild animals to livestock which calls for proper interventions. Unequal benefit sharing complaints raised by some of the members may hamper the management of the conservancy resulting in community conflicts leading to its subdivision if not adequately addressed.

The community has developed a management plan that focuses on key areas of pasture and grazing, security and coexistence, environmental protection and social empowerment. The community recognizes the existence of the Wildlife Conservation and Management Act, 2013 and the plan provides that all the operations will be carried out with strict conformity to provisions of the Act.

The study assessed 9 policy and legal instruments that addressed issues of climate change, livestock production systems, wildlife conservation practices and community land. They included: climate change framework policy 2016, Climate Change Act 2016, National climate change action plan (2018-2022), National Livestock Policy, Kenya Agricultural and Livestock Research Act, 2013 Wildlife conservation and management Act 2013, National Wildlife Strategy (2030), Community Land Act, 2016 and Climate Action (SDG 13). The analysis of the said instruments was done through a review formula that focused on the identified problems, suggested solutions, actions for implementation and recommendations where necessary. Generally, these policies appreciate that livestock production systems are extremely climate sensitive making them vulnerable to the impact of climate change particularly drought in ASALs. The study also finds common recognition of the importance of building the resilience to climate change across the livestock sector. Climate Change Framework Policy, 2016, is seen as the overarching instruments as it provides for the mainstreaming of climate resilience into all levels of government aimed at enhancing adaptive capacity and resilience to climate change in all sectors including livestock. This is further strengthened by the National Climate Change Action Plan and the Climate Change Act where the former provides the detailed action that Kenya should embark on to address climate change and the latter provide for a regulatory framework for enhanced response to climate change and for mechanism and measures to achieve low carbon climate development.

5.2 Recommendations.

Recommendations for the study include:

1. The conservancy management plan should be revised to not only highlight the activities but also focus on the state of the landscape, its available resources, users and user rights and the neighbouring communities on a landscape perspective.
2. There is also need for an assessment of the stocking rate and carrying capacity for the conservancy and the ecosystem. This is important as it could help advise the members on stock numbers that do not exceed the carrying capacity so as to curb the pressure on the limited grass and pasture resources.
3. The conservancy management needs to develop and implement a benefit sharing strategy for equitable sharing of resources among all the members
4. With the increase of wildlife outside protected areas, there is need for increased support and capacity building from government to community conservancies for better coexistence.
5. Government policies targeted towards enhancing resilience of pastoralist communities to climate change and variability should be implemented. The National climate change policy 2016 should be implemented within a stronger implementation of the climate change Act as it provides a regulatory framework for enhancing climate resilience in all sectors including livestock.
6. Kajiado county government should develop policy to address land subdivision and privatization which is having severe impact on the livestock dependent communities in the County.

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8.0 Appendices.

SATAO ELERAI COMMUNITY WILDLIFE CONSERVANCY. Questionnaire

no.....

RESEARCH TITLE:

AN ASSESSMENT OF CLIMATE RESILIENCE FOR LIVESTOCK BASED LIVELIHOODS WITHIN COMMUNITY WILDLIFE CONSERVANCIES IN KENYA: A CASE STUDY OF SATAO ELERAI CONSERVANCY IN KAJIADO COUNTY.

CONSENT FORM

Hello Sir/ Madam,

My name is..... I am an interviewer doing research on behalf of the University of Nairobi. We are conducting a survey on Climate resilience for livestock based livelihoods within Community Wildlife Conservancies in Kenya: A case study of Satao Elerai Wildlife conservancy.

Your household has been randomly selected and we wish to have permission to interview eligible members of your household. May we proceed? ___Yes [] ___No []

Be assured that we want to learn from your experience and all the information we collect will be used to help us in assessing climate resilience for livestock based livelihoods within this community. It is possible that some of the questions asked, are of a sensitive nature, but please note that your name will not be recorded in the questionnaire, and any details related to your privacy will be kept confidential.

Your participation in this survey is very important and we rely on you to provide us with accurate information that will help us to develop a thesis.

The interview will take approximately 1:30 minutes, but with your cooperation it can be done quicker.

May I have your permission to undertake this interview? Yes No

If you do not want to participate, kindly explain why.....

1.0 General information.

1.1 Date of interview...../...../..... Name of Respondent.....

1.2 Location/Village..... County
.....

1.4 GPS coordinates: Latitude..... Longitudes

2.0 Household information.

2.1 Age of household head: 25-40{1}, 40-55{ 2 }, 55-70{ 3 }, >70{4}

2.2 Sex: Male (0) Female (1)

2.3 Education: 1) None (.....) 2) Primary (.....) 3) Secondary (.....) 4) Post-Secondary (.....)

2.4 Marital status: 1) Married (..)2) Single (..) 3) Divorced (..) 4) Widowed (..) 5) Separated (..)

2.5 General information on household members.

Member Of Household	Sex (F/M)	Highest Education level Primary (1) Secondary (2) Post-Sec (3) None (0)
Number of Children	Boys	
	Girls	
Other Dependants		

2.6 Main source of livelihood: 1. Livestock (...) 2. Crop production (...) 3. Tourism (...)

4. Formal Employment (...) 6. Others..... {Please Specify}

2.7 Are you aware that there is a conservancy? Yes (.1.), No (.0.)

2.8 When was is set up?

2.9 Why was is set up?

Reason for	Yes (1)	No (0)
Wildlife conservation		
Tourism		
Livestock production		
Avoid land subdivision		
Other {Specify}		

2.10 Is it achieving it set objectives? Yes (.1.) No (.0.)

2.11 If Yes, How has it achieved?

.....

2.12 If No, Why?

.....

3.0 Land use and Land Tenure.

3.1 Which land tenure system are you under currently? 1 Communal (...) 2. Private (...) Public (...)

3.2 What is the size of your land on acreage? Between 0 -10 (.1.), 10 – 25 (.2.) 25 – 50 (.3.), >50 - 100 (.4.), >100 (.5.).

3.3 Are you a registered member of this conservancy? 1. Yes (.....) 2. No (.....)

3.4 If Yes, What size of your land have you given out to the conservancy? 0 -10 (.1.), 10 – 25 (.2.) 25 – 50 (.3.), >50 - 100 (.4.), >100 (.5.).

3.5 How will you rate the viability of the following land use option?

Land use Option	Less .0	Averagely .1	Highly .2	None .3
Wildlife Conservation				
Livestock production				
Crop production				
settlements and Infrastructural				
Forest				

3.6 In your opinion, does land subdivision and fragmentation affects Household herd size? Yes (1) No (0)

If yes, will it cause an increase (.1.) or a decrease (.0.)?

3.7 Would you prefer to have the land subdivided? Yes (1) No (0).

If yes, why?

.....

If No, why?

.....

3.8 Do you experience the following challenges within the conservancy?

Challenges	Less .0	Moderately .1	Highly .2	None .3
Water scarcity (1)				
Pasture insufficiency (2)				
Animal diseases (3)				
Population growth (4)				
Minimum movement (5)				
Others {specify}				

3.9 Do you live in: 1. Permanent boma (...) 2 Seasonal boma (...)

4.0 Livestock production.

4.1 Current Household herd size and composition in one year

Species/class	Born (B)	Inherited (i)	Bought (Bo)	Gift (G)	Total no
Cattle (1)					
Calves (2)					
Goats (3)					
Kids (4)					
Sheep (5)					
Lambs (6)					
Donkey (7)					
Chicken (0)					
Total					

4.2 Do you get the following products from the livestock in a Day? If yes what amount?

Wet season (January to March)

Product/Item	Quantity.	HH Consumed	Sold	Amount of Money	Total
Milk (1)					
Meat (2)					
Hides (3)					
Blood (0)					
Total					

Dry season (September to November)

Product/Item	Quantity.	HH Consumed	Sold	Amount of Money	Total
Milk (1)					
Meat (2)					
Hides (3)					
Blood (0)					
Total					

4.3 How do you make use of your livestock herd in 3 Months? Give the numbers of the below uses.

During Wet season (January to March)

Species	Sell	Slaughter	Give out	Total
Cattle (1)				
Goats (2)				
Sheep (3)				
Donkey (4)				
Total				

During Dry season (September to November)

Species	Sell	Slaughter	Give out	Total
Cattle (1)				
Goats (2)				
Sheep (3)				
Donkey (4)				
Total				

4.4 What is your estimated family income per month? (In ‘000) 0 -10 (.3.), 10 – 20 (.1.), 20 – 50 (.2.), 50 -100 (.3.), 100 – 200 (.4.), 200 – 500 (.5.), 500 – 1m (.6.), >1m (.0.)

5.0 Ecological conditions and Land Cover.

5.1 Have you experienced drought incidences for the last 10years? Yes (...) or No (...)

If Yes, what was the extent?

Year	Less (1)	Severe (2)	Very Severe (3)	No Drought (0)
2005-2006				
2007-2008				
2009-2010				
2011-2012				
2013-2014				

2015-2016				
-----------	--	--	--	--

5.2 In your view, what is the current range condition within the conservancy ecosystem?

Bad (.B.), Moderate (.M.), Good (.G.)

Has it Improved (.1.), Declined (.2.) or Not Changed (.3.). *{If not Changed, skip Q 5.3}*

5.3 What is the reason(s) behind your views on the current range condition?

If Declined is it due to?

Causes	Less (1)	Moderate (2)	High (3)	None (0)
Climate change				
Overstocking of livestock				
Increase wildlife population				
Change of land use				
Environmental degradation				
Others specify (

If Improved is it due to?

Causes	Less (1)	Moderate (2)	High (3)	None (0)
Increase in Rainfall				
Understocking of livestock				
Decreased wildlife population				
Change of land use				
Reduced degradation				
Others specify				

5.4 Where do you graze your livestock?

During the wet season	{Tick}	During the dry season	{Tick}
Within the conservancy area demarcated for livestock (1)		Within the conservancy area demarcated for livestock (1)	
Within the conservancy area demarcated for wildlife (2)		Within the conservancy area demarcated for wildlife (2)	
Outside the conservancy (3)		Outside the conservancy (3)	
Others specify (0)		Others specify (0)	

5.5 Where do you Water your livestock

During the wet season	{Tick}	During the dry season	{Tick}
Within the conservancy area demarcated for livestock (1)		Within the conservancy area demarcated for livestock (1)	
Within the conservancy area demarcated for wildlife (2)		Within the conservancy area demarcated for wildlife (2)	
Outside the conservancy (3)		Outside the conservancy (3)	
Others specify (0)		Others specify (0)	

5.6 Since 2009, has the following resources changed?

Resource	Increased (1)	Decreased (2)	Constant (3)	Not Know (0)
Livestock numbers				
Abundance of pastures				
Abundance of trees				
Dry season grazing reserve				
Migratory routes/sites				
Medicinal plants				
Wildlife species richness				
Watering points/sources				
Infrastructure				
Crop farming				
Salt licks				
Spiritual sites				

5.7 Do wildlife and livestock graze within the same grazing areas?

Yes (.1.) No (.2.).

5.8 Have you encountered incidences of Human-Wildlife conflict for the last 6years?

Yes (.1.) No (.2.)

If yes, what is the extent?

If NO the below table should not appear..... Please

Conflict	Low (1)	Moderate (2)	High (3)	None (0)
Death & Injuries of People				

Loss of livestock				
Loss of Crops				
Destruction of homesteads				
Poaching				

If NO the below table should not appear..... Please

5.9 Where do this conflicts occur and which species are highly involved?

Conflict	Where	Species
Death & Injuries of People		
Loss of Livestock		
Loss of crops		
Poaching		

Code: 1) Within conservancy. 2) Outside conservancy 3) Shambas 4. Homesteads

5.10 In your view, has the population of wildlife changed in the area? Either:

1) Increased (...) 2) Decreased (....) 3) Same (....)

If increased, do you attribute the increase to the following reasons?

Reason(S)	Less (1)	Moderate (2)	High (3)	None (0)
Availability of pasture				
Availability of water				
Disease control measures				
Reduced poaching				
Increased in conservation area				
Others specify				

If Yes, The below information on Decreased should not Appear

If decreased, do you attribute the decrease to the following reasons?

Reason(S)	Less (1)	Moderate (2)	High (3)	None (0)
Pasture reduction				
Water scarcity				
Spread of Disease				
Rampant Poaching				
Decrease in conservation area				
Others specify				

6.0 Dynamics in Household Herd size, Mobility Pattern.

6.1 Has your household herd size changed in number since 2010 1) Yes () 2) No () or same ()

a. If yes, has it *increased* (.1.) or *decreased* (.0.)

b. If increased, through which means?

.....

Cause of Increase	Less (1)	Moderate (2)	High (3)	None (0)
Breeding /Birth				
Buying/ Purchase				
Reduced Deaths caused by Drought				
Compensation				
Other specify				

If decreased, to what extent do the following causes the reduction?

Cause of reduction	Less (1)	Moderate (2)	High (3)	None (0)
Drought				
Diseases				
Theft				
Predation				
Selling				

6.2 If Yes, Has your livestock herd size recovered? Yes (1) No (0)

If yes, through which means?

.....

If No, Why?

.....

.....

6.3 Do you still move your livestock in search of:

a. Pasture? Yes (1) No (0)

b. Water? Yes (1) No (0)

If yes, is it within the conservancy land demarcated for wildlife? or Outside the conservancy area..... Or other areas

..... {Specify}

6.4 What do you consider the greatest benefit of moving livestock from place to place

.....

.....

6.5 Has the migration patterns changed over time? Yes (1) No (0)

If yes what has caused the changes?

.....

7.0 Governance and Benefits sharing.

7.1 What benefits do you obtain from conservancy arrangement? Monetary (), Non-monetary (), Both () Or No benefits ()

If monetary How much in 3 months, 0-20 (.....), 20-50 (....), 50-100 (....), >100 (....)?

{In 1000}

The non-monetary benefits should appear independent of Monetary

Non-Monetary/Other Benefits: Do you get the following benefits.

Benefit	Yes (1)	No (0)	Specify Details of Benefit
Employment			
Education			
Health			
Training			
Business			
Others			

If Yes, The below information should not appear

If No, What reason is the highest contributor?

Reason	Low (1)	Moderate (2)	High (3)	None (0)
Human wildlife conflicts				
Not money paid at all				
Poor conservancy management				
Low income from conservancy				
No arrangement for benefits				
Interruption of normal operations				
Other Specify				

7.2 How have you been involved in the governance / management of the conservancy arrangements?

Activity	Involved Yes (1) No (0) <i>If No proceed to 7.3</i>	Level of involvement <i>Management (1) Member (2) Other (0)</i>	How often per month Weekly (1) Monthly (2) Quarterly (3) Yearly (4) Other Specify (0)
Management and Planning			

Financial and Investment decision			
Others specify			

7.3 Have you ever participated in a community meetings/forums regarding the conservancy?

Yes (.1.), No (.0.)

7.4 How often are the meetings conducted? Every week (1), Twice a month (.2.), Once a month (.3.), Quarterly (.4.) Twice a year (.5.), Once a year (.6.) or Never (.0.)