A SYNTHESIS REPORT

MANAGEMENT OF RANGELANDS AND DIVERSIFIED LIVELIHOODS IN THE IGAD ASAL REGION

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October, 2020.

A study report on Rangelands Management and Diversified Livelihoods within IGAD region.

DISCLAIMER

This Study Report was prepared by a team from ICPAC, under the support for Effective Cooperation and Coordination of cross-borders initiatives (SECCCI) Project in the IGAD region, funded by EU and implemented by UNDP in partnership with IGAD and UNEP (2020). Views and opinions expressed in this Study report are solely those of the authors and do not in any way imply the expression of any opinion whatsoever on the part of official views of the UNDP, IGAD or Member States.

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Cover Photo: Prof Farah Dr Amdihun (2017)

ACKNOWLEDGEMENTS

This study was undertaken with funds from IGAD/SECCCI Project through ICPALD for ICPAC to undertake a study on Rangeland Resource Management Study and Diversified Livelihoods in the three (3) Clusters of the IGAD. Clusters of South OMO-Turkana; Marsabit-Moyale; and Mandera Cluster.

In this respect, ICPAC-IGAD wishes to express its deep gratitude to its sister specialized institution, ICPALD-IGAD under the leadership of Director Dr. Solomon Munyua, for the long term close and fruitful collaboration, of which this assignment is among the most recent ones.

Within ICPAC, I personally oversaw this study under ICPAC-ICPALD LoA signed in February 2020. Further, I would wish to express my sincere indebtedness to the technical team, led by Prof. Kassim O.Farah, Senior Rangeland Ecologist and Dryland Resilience Expert, who oversaw the literature review layout and original design of the Study Report. The tireless efforts of Mr Adan Abdi Mohamed, Senior Disaster Risk management Specialist assited by the technical teams, are greatly appreciated without which this report would be far from complete.

Much appreciation also goes to all the stakeholders at National and County Level, Implemeting Partners of EU funded projects in the clusters, and all who supported the study field work.

Finally, but not least, ICPAC Senior technical staff (especially, GIS and Climate Experts) are greatly acknowledged for their contribution and expert inputs into this study within their respective fields.

Thank You,

Dr. Guleid A. Artan, Ph.D.

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EXECUTIVE SUMMARY

The IGAD region,has a population of over 200 million and characterized by; a) high population growth rate, over 60% of the population classified as youth, most of whom are unemployed, and rapid urbanization b) high level of poverty, c) low human capital capacity, d) poor infrastructure, e) limited access to social services and low technical capability. All these, singly or in concert, have among other things, translated the region into being highly vulnerable to natural and man-made disasters, especially droughts. This has made the region to become one of the largest recipients of humanitarian assistance in the world.

Arid and Semi-arid rangelands account for about 60 -70% of the land area in the IGAD region. The ASALs are spatially extensive pastoralist systems that require livestock movements over large areas of relatively low productivity. Management of Rangelands in the Horn of Africa revolves around resource utilization, conservation and sustainable practices of Arid and Semi-arid Lands (ASAL) for the benefit of local communities and future generations. Rangeland resources support production of goods and services on a sustained basis for the pastoral and agro-pastoral communities.

Dynamic ecological and environmental change models suggest that climate vulnerability and land degradation induced drought events may push dryland systems to cross biophysical thresholds, causing a long-term drop in livestock and crop productivities. The combined effect of these adverse effects, have tended to threaten not only the security of the Rangelands in the region, but also the livelihoods of the local inhabitants. With the cyclical and more frequent droughts and floods, diseases(humans and livestock) outbreaks, conflict and other myriad problems, the current outbreak of desert locust and restriction of mobility due to COVID-19 Pandamic has compounded the problems that the region is faced with. As such, livelihood sustainability within ASALs of the IGAD region is threatened and severely constrained. All this present significant challenges to researchers, practitioners, policy makers, and, above all, rural land end users.

This study attempts to synthesis of the many existing studies and researches, past literature and limited field survey on rangelands management and diversified livelihoods within IGAD region. It looks into the key factors that define rangelands resource management, state of the rangelands in different areas across the IGAD region, alternative use of rangelands, effects of rangelands management, and provides recommendations on what IGAD Member States can do to enhance sustainable rangelands resource management and productivity with view to unlock many of the problems the region is faced with.

The study reviewed the existing studies on rangelands management and diversified livelihoods in the Horn of Africa in particular pastoralists in Kenya, Uganda, Ethiopia and Somalia,with emphasizes on the cross-border pastoral communities. The South-Omo Turkana, Marsabit-Moyale and Mandera Triangle Clusters are covered as areas of concern in this study. IGAD Climate Prediction and Application Centre (ICPAC) and IGAD Centre for Pastoral Areas and Livestock Development (ICPALD) past and recent specific studies are included, as well as other relevant studies by relevant organizations and individual authors.

The desk review shows that besides livestock, rangeland areas are endowed with natural resources such as wildlife, forests, minerals, medicinal plants, wild foods, rain-fed and irrigated crop agriculture, trade and harvesting of natural resources, solar energy, fish, plant, water, wind, gums,

resins, free seeds and aesthetics, tourism and commercial deposits of oil and natural gas, and sand and gravel among others upon which the people depend on. The problems facing the ASAL communities in the IGAD region cited in the existing rangelands studies include but not limited to:-

- Population pressure, which has contributed to a proliferation of unplanned mushrooming settlements, political marginalization, underutilized and dilapidated infrastructure.
- Food insecurity, unreliable crop productivity and inappropriate marketing systems, and high costs in irrigation schemes for crop farming.
- Undermined indigenous institutions- rangelands are not registered with their traditional routes, they face a lot of conflicts with farmers since most productive pasture land has been transformed into crop farming constraining regional and cross-border mobility of pastoralists.
- Landlessness attributed to historical land injustices and loss of land to ranching Compounded by the environmental pressures such as land degradation and recurring droughts and famines.
- Low levels of availability of water and forage for livestock compounded by the current Desert Locust outbreak further contributing to severe reductions in forage supply at a time when the seasonal rainfalls were favourable.
- Restriction of grazing lands due to lockdowns, border closure as a result of the Covid-19 Pandemic.

The report highlights short term and medium term key recommendations assummarised below:-

- Peace, dialogue, and supporting management of rangelands is done by indigenous institutions.
- The need to implement a close monitoring of vital of forage indicators both at regional and national levels is needed as the season progresses and iinstitutionalize accurate feed balance assessment and monitoring system.
- The private actors in the rangelands should be involved in the government discussions on investment opportunities and options for overcoming barriers.
- IGAD and member state agencies should develop a common knowledge-base on the scope of rangelands management for enhanced decision making.
- Resource Mobilization from IGAD member governments and support partners should be prioritized to scale up investment in technologies that support rangelands management.
- IGAD to provide practical guideline on formulation and implementation of rangeland policies and investment projects in rangelands.
- The study recommends special focus should be given on the development particularly of water and pasture, as rangelands management should be regional for peace and pastoral development.
- Collaborations and partnerships: - Given the porous nature of borders in the region, governments in the region should collaborate to find sustainable solutions including increasing investments in training courses on rangeland management and diversified livelihoods in the IGAD clusters as a possible long-term plan to increase rangelands management.

TABLE OF CONTENTS

LIST OF FIGURES

ABREVIATIONS AND ACRONYMS

ASALs:	Arid and Semi-Arid Lands
BLM	Bureau of Land Management
CBO	Community Based Projects
CEWARN	Conflict Early Warning and Response Mechanism
COMESA	Common Market for Eastern and Southern Africa
FAO	Food and Agriculture Organization
ICPAC	IGAD Climate Prediction and Applications Centre
ICPALD	IGAD Centre for Pastoral Areas and Livestock Development
IDDRSI	IGAD Drought Disaster Resilience and Sustainability Initiative
IGAD	Intergovernmental Authority on Development
ILRI	International Livestock Research Institute
KALRO	Kenya Agricultural Livestock Research Organization
LPJ-GUESS	Lund-Potsdam-Jena General Ecosystem Simulator
NGOs	Non-Governmental Organizations
NWFPs	Non-wood forest products
RMD	Range Management Directorate
RPLRP	Regional Pastoral Livelihoods Resilience Sustainable Development
SPSS	Statistical Package for Social Sciences
SSA	Sub-Saharan Africa
TLU	Tropical Livestock Unit

SECTION 1.0: INTRODUCTION

1.1.1 Background of the Study

Over the past 30 years, the rangelands upon which pastoralists depend have become less productive as human and livestock populations have increased, and climate has become more variable and unpredictable. Concurrently, traditional knowledge and systems are being lost as younger generations seek to modernize their way of life and pastoralist communities have become more sedentary in order to access water, education, healthcare, food aid and other development services. Policies and interventions by Governments and development agencies historically undermined these traditional systems with a dominant view that pastoralism was *'inefficient, backward and needed to be modernized'*. Nomadic and mobile pastoralism is also viewed by many people through a 'prism of myths and half-truths' which continue to dominate many donor perceptions and pastoralist development programmes.

However, there is growing recognition that mobile pastoralism remains the most efficient and viable livelihood strategy in dryland regions, is culturally irreplaceable, and that development should build on the traditional knowledge and strategies of pastoralist communities and their indigenous institutions.

1.1.2 IGAD Rangeland

TheIGAD region consists of eight countries namely Djibouti, Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan and Uganda and supports human population of about 300 million within a total area of 5,209,975 sq km (IGAD, 2017; IGAD, 2015). About 65% of the IGAD region landmass is Arid and Semi-arid Lands (ASALs) characterized by low erratic rainfall with vast rangelands.

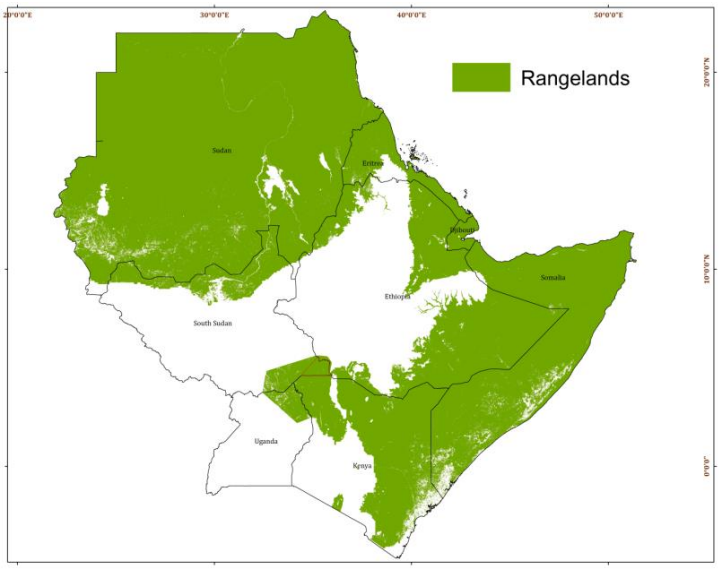

Figure 1: IGAD Rangelands Boundaries – Shaded in green. (Source: Farah and Amdihun, 2016)

1.1.3 Livelihoods and Demographic of the rangelands

The rangeland landscapes within IGAD member states have significant pastoral and agro-pastoral populations with around 17% of total population in pasture-based production systems. See the IGAD Livelihoods Map (Figure 2) showing the different livelihood zones here below.

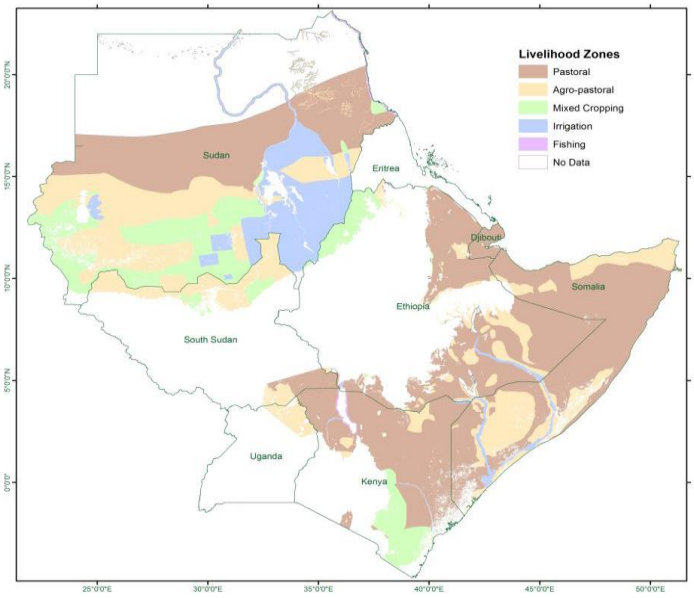

Figure 2: IGAD Livelihoods Map. (Source: Amdihun et al., 2017)

Pastoralists and agro-pastoralists which are the two dominant livelihoods bases, dependent on natural resources for their livelihoods which are highly sensitive to climate variability and change. Regarding livelihoods, climate is among the key factors in determining the availability of energy, water, food and other important resources.

1.1.4 Significance of Rangeland in the IGAD Region

Rangelands within the IGAD region are mainly covered by natural vegetation that provide forage and grazing for wildlife and livestock. Rangeland ecosystems are beneficial to agriculture and environment across the IGAD region including providing land for farming, forage and grazing for livestock and generally animals, watersheds for both urban and rural users, habitat for animals and plants, and water for sustainable sceneries.

Rangelands provide an array of ecosystem services and represent a key role when they have a direct market value. Rangelands enhance biodiversity with the natural ecosystems they support. The benefits for the society include the products derived from activities on rangelands including agriculture both crops and animals and the environmental sustainability posed by effective maintenance of rangelands.

Discussions have also opened up in terms of understanding the role of ecosystems in environmental sustainability. The sheer size and scope of rangelands makes them important contributors to carbon sequestration as well as storage. In addition, rangelands are essential in the scope of cultural elements. There are strong links between rangelands and ethnic identity of diverse agro-pastoral and pastoral groups. This is key especially in pastoral communities widespread across the IGAD region.

The introduction and domestication of livestock has increased the influence and dominance of pastoralists and their animals on ecological processes and economies of huge tracks of the regions rangelands. In areas with pastoralists, land management has had an impact on vegetation with varying impact from location to location.

1.1.5 Challenges in Rangeland Management in the IGAD Region

Changing climatic and environment patterns also continue to dictate rangeland management practices. Traditional governance and cultural institutions structures that managed natural resources in the past have been eroded in different areas. This has resulted to widespread interference to rangeland management. There are other factors that fuel disruptions to rangeland management which include continued increase in population which in return increases demand for land for settlement, security threats as a result of livestock rustling, and growing consciousness of climate change and related extreme events. Peace and security are key indicators of proper rangeland management practices based on the fact that degraded environment and rangelands results to depleted resources which makes communities vulnerable to infighting and conflicts.

1.1.6 Opportunities within Rangelands in the IGAD Region

There has been significant technical information, knowledge and expertise on current rangeland issues that affect IGAD region. Exchange of knowledge and experience between IGAD countries and institutions provide enhanced opportunities for effective rangeland management practices. The adaptations to changing natural and human environment and the growing knowledge on rangeland management has been synthesized. The focus now shifts the implementation of practices that contribute to improved management through innovative rangeland control practices. Clarifying the requirements and characteristics demands illustrating impacts of ecosystem activities and human wellbeing. The focus is on demonstrating through case by case analysis on the potential and value of investing in rangelands.

1.2 The Study

Based on this informative background, the SECCCI project initiated an activity to undertake a study and develop training manual on rangeland management and diversified livelihoods to build capacities of the cross-border communities and support livelihoods resilience. This study report outlines rangeland management practices and diversified livelihoods practices among pastoralist communities in the IGAD clusters I, II and III of South Omo-Turkana, Moyale-Marsabit and Mandera as presented in Figure 1. The figure below shows the IGAD/SECCI clusters.

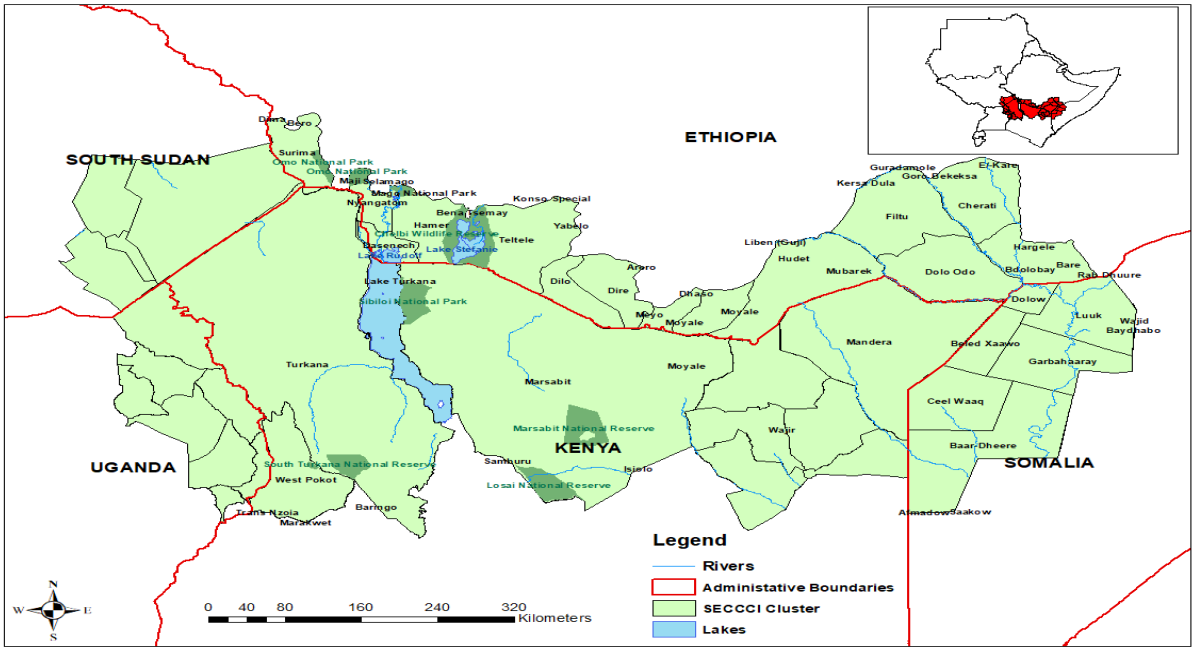

Figure 3: IGAD/SECCI clusters.[1]

1.2.1 Rationale of the Study

Effective rangeland management at scale remains one of the toughest challenges among pastoralist communities. Various rangeland management practices have been in place including bush management, fecal and forage sampling and mending or plan fencing. Despite these, rangeland management practices and diversified livelihoods practices that have been put in place, pastoralist communities are still struggling to improve their livelihoods and also efficiently manage ranges for their livestock.

Many studies have been carried out on rangeland management practices and diversified livelihoods practices. However, there is need to gain more coherent and up-to-date information for better understanding, how development of training courses on sustainable rangeland management and diversified livelihoods in the IGAD clusters enhances rangeland management practices and diversified livelihoods practices in the three IGAD clusters of South Omo-Turkana; Moyale-Marsabit; and Mandera. This will contribute to better resilience programs, integration strategies and repatriation processes.

1.2.2 Overall Objective

Undertake a study, develop training manual and, recommend appropriate training courses for sustainable rangeland management and diversified livelihoods in the three IGAD clusters of South Omo-Turkana; Moyale-Marsabit; and Mandera in close collaboration with IGAD/ICPAC/ICPALD.

[1] SECCI / IGAD Annual Progress Report (2019/2020).

1.2.3 Specific Objectives

i. Undertake Desk Review on existing IGAD/ICPAC/ICPALD and related studies on Rangeland Management and Diversified Livelihoods.
ii. Identify current systems of Rangeland Management and Diversified Livelihoods in the SECCCI three IGAD clusters.
iii. Identify key areas of concern and gaps in Rangeland Management and Diversified Livelihoods.
iv. Provide recommendations for action in the short term and medium-term.

1.3 Expected Output

i. A study report for current Rangeland Management practices and Diversified Livelihoods in the 3 Clusters, namely South Omo-Turkana; Moyale-Marsabit; and Mandera.

ii. Recommended appropriate course contents for sustainable Rangeland Management and Diversified Livelihoods.

SECTION 2.0: LITERATURE REVIEW

This section presents regional and local existing IGAD/ICPAC/ICPALD and relevant studies on rangeland management and diversified livelihoods within the IGAD region.

2.1 Regional and Local Studies on Rangeland Management Practices and Diversified Livelihoods Practices

Filipova[2] looked at the development from traditional to current pastoralist practices and the modern diversification of livelihoods of the Jie group in Karamoja in Uganda. Semi-structured individual interviews, observations and focus group discussions were used on community elders and experts. Traditional pastoral management mechanisms were practiced, which included allocating time to be spent on a grazing field depending on the amount of pasture and water available, and in the event that these are depleted, the herds are expected to move on instantaneously. Mobility is a major way of coping with the harsh environment of Karamoja.

Households are also dependent on income-generating activities other than pastoralism. These include making and sale of bricks and charcoal on a commercial basis to an increasing urban population requiring them for fuel and construction. There is also sale of firewood. Wood is also used to fire the bricks, as well as for charcoal, with effects on land cover.

The challenges faced include droughts, erratic rains, environmental degradation, food insecurity and ethnic marginalization by government. The current case of degradation of rangelands across IGAD countries impedes communities from using land productively. The vast rangelands are therefore seen as a problem lacking a solution. The focus has been on overgrazing, undernourished livestock, desertification and erosion, famine, and conflict. All these factors result to constrained resources resulting to conflicts as communities fight over the scares resources.

A lack of appropriate educational systems, health systems and poor infrastructure contribute to high poverty rankings for the region. Concerning pastoralism, there has been closure of the commons, which leaves them with no grazing space. There is also an issue of weapons, where guns (firearms) in the region are used to protect the herds, and also act as means of acquiring more livestock, through cattle rustling.

The gap in this study is that the study was not able to reveal the deeper causes of environmental degradation. Other important factors such as multiple sedentarization pressures and population growth were not discussed. There was also believe that traditional pastoralism was viewed as primitive, which requires further works to erase this view, or even critique it.

Wellard-Dyer covered pastoralism in the Horn of Africa, looking at the diverse livelihood pathways.[3] This was a policy brief, based on research by Future Agricultures Consortium. Rangeland management was found to be managed through fences, breeding and mobility. However, private fencing of rangeland has resulted in disruption of traditional common property-based range management in Borana, Ethiopia and elsewhere. However, importantly there has been modernization programmes to manage rangelands which entail dip tanks, boreholes, livestock markets, irrigation schemes, and rotational grazing. The report notes that vital drought-grazing land

[2] Filipova, Zuzana, and Nadia Johanisova. "Changes in pastoralist commons management and their implications in Karamoja (Uganda)." *Journal of Political Ecology* 24, no. 1 (2017): 881-900.
[3] Wellard-Dyer, K. "Pastoralism in the Horn of Africa: Diverse livelihood pathways." (2012).

for pastoralists have been identified, for instance, from across northern and eastern Kenya as well as Laikipia plateau for tourism.

Trade is forming a major way of diversifying in this region. Growth in commercial trade and markets has created a number of livelihood opportunities; pastoralists are taking advantage of greater incorporation into national and regional economies to move livestock and goods across land-use boundaries, leading to high value fodder and milk. Most households are adopting a mixed strategy by maintaining herds on the range and developing trade, services and business.

The main problems facing pastoralists as identified in the study were underutilized and dilapidated infrastructure, inappropriate marketing systems, intensive range management programmes are less productive than ranch systems, irrigation schemes involve high costs, compete with pastoralism for riverine grazing, and are likely to be targeted by largescale (non-pastoralist) investors.

Some of the concerns include a growing gap between those who are able to profit from the increasing market opportunities and those who cannot. Those who cannot benefit have to drop out of the traditional pastoral system and either move into other livelihoods as labourers, small-scale entrepreneurs or service providers. Ways of striking a balance need therefore to be explored and implemented.

The Quarterly Bulletin[4] postulated that the management of the rangelands is based on increasing the knowledge and citizen participation in land management and tenure security. In Ethiopia, there is mapping of resources, which is carried out on a regular basis as part of community action planning. However, this tends to be carried out on a village by village basis, which does not fully reflect pastoral use of the rangelands, and reciprocal resource sharing arrangements. Mapping has also been done in Tanzania, Uganda and Kenya.

The main problems highlighted is landlessness attributed to historical land injustices, for example in Tanzania and Kenya. Access to and control over grazing lands was also highlighted, which point to the need for finding ways to address land and resource management and access issues from a livelihood and environment perspective to alleviate conflict and build peace. The gap in this study is that it has not underscored alternative livelihoods to pastoralism in the regions studied, and how alternative livelihoods can be used to solve land-related conflicts which was the main issue in this study.

Kassahun[5] studied the impact of rangeland degradation on the pastoral production systems, livelihoods and perceptions of the Somali pastoralists in Eastern Ethiopia. A survey was conducted in two pastoral districts of Aysha and Erer in the Shinile zone of the Somali region. Sixty years were studied with the aim of identifying trends of rangeland degradation and understanding the impact on livelihoods and perceptions of the pastoralists (1944–2004). Elders were interviewed using questionnaires and open discussions.

The main economic activity was livestock production, which was under threat. Rangeland management was through traditional mechanisms. However, the traditional mechanisms were not working as poor households had emerged, showing that poverty had increased over time. there were

[4] Quarterly Bulletin. Making rangelands secure in east and horn of Africa. News, views and experiences of policy-makers, practitioners and communities on making rangelands secure for local users (2012).

[5] Kassahun, Ameha, H. A. Snyman, and G. N. Smit. "Impact of rangeland degradation on the pastoral production systems, livelihoods and perceptions of the Somali pastoralists in Eastern Ethiopia." *Journal of Arid Environments* 72, no. 7 (2008): 1265-1281.

also changes in vegetation ecology, which had altered the livestock species composition in favour of small ruminants rather than cattle. The concerns here were that there is rangeland degradation and lack of national policies to minimize or solve the problems.

Carabine and others[6] looked into enhancing climate change development programmes in Uganda. The study identified various forms of rangeland management through traditional mechanisms such as early warning, increasing their mobility and migrating in search of pasture and water resources to sustain their herds. The study also identified the role of women in the management and sales of livestock. The study identified the economic opportunities for investment in climate change adaptation to enhance the resilience of Karamoja's livestock value chain, through upgrading the value chain and diversification into related sectors.

The main problems facing the region include droughts which have affected the wider Horn of Africa region and reduced the availability of water and forage for livestock in the Karamoja region. There is also pressure on resources compounded by the migration of Turkana pastoralists from Kenya, who have also been affected by the drought. The pastoralists experience vulnerabilities that expose them to climate risk and that also act as barriers to value addition. Poor infrastructure, inadequate service delivery and lack of appropriate regulations all reflect the relatively marginalized position of Karamojong in the national economy. The gap in this study is that all solutions highlighted were policy based. Specific solutions involving the local people in the management of rangelands are not highlighted, and the role of community leadership is ignored.

Gebru and others[7] focused on the dryland forests of Ethiopia, and identified various ways of rangeland management entailing traditional management and farming systems that are not effective and have contributed to land degradation. Farming forms a major alternative to pastoralism.

The main concern is that dryland ecosystems in Ethiopia are increasingly becoming vulnerable to global climate change. *Prosopis juliflora* has colonized vast areas of rangelands and crop fields. Frequent and extended drought and rain fall variability are hampering livelihood and ecological process. The gap from the problems is that the various development interventions are either not inclusive as there is marginalization of dry forests or insertion of new land use systems, which are incompatible to the fragile nature of dryland ecosystems.

Paul[8] covered the future of pastoralist conflict in Africa. The study was convened by the Future Agricultures Consortium and the Feinstein International Centre, Tufts University in Addis Ababa. Rangeland management was mainly done through the militarization of rangeland communities, which had been contributed by state conflicts in areas such as Sudan, Ethiopia, and Somalia. The civil community has also been involved in the management of rangelands, where their role is mainly geared towards capacity building in the local communities.

The main problems identified included high rates of demographic growth, technology change, rangeland conflicts, contested rights and popular support for legal-constitutional reforms and accumulation of indigenous capital. The study identified areas such as rangelands between Lamu and Juba where pastoralists inhabiting these areas feared the influx of foreign capital and

[6] Carabine, E., S. Lwasa, A. Buyinza, and B. Nabaasa. "Enhancing climate change development programmes in Uganda: Karamoja livestock value chain analysis for resilience in drylands." (2017).

[7] Gebru, Yonas, Getachew Animut, Wubalem Tadesse, Adefires Worku, Messay Sintayehu, and Habtemariam Kassa. "Research and Development in Dryland Forests of Ethiopia." Forum for Environment, 2011.

[8] Paul Goldsmith. An essay on the future of pastoralist conflict (2011).

infrastructural development, which would erode their ways of life.

The main concerns raised from this study include increased inequality, weakened collective management of the environment, distorted political power relations, aggravated social problems, and heightened conditions of economic insecurity. The study has not revealed the issues that can be solved, especially the issue of conflict management in the rangelands. The study has also not identified the diversified livelihoods, apart from pastoralism.

Gebru and others[9] looked at the dryland forests of Ethiopia and identified how rangelands were managed. The study was based on a reconnaissance survey where three areas Serkamo kebele, Buri and Halidebe kebele were selected based on the level of *Prosopis* invasion level. Rangelands were mainly managed through a network of research institutions in the country dedicated to addressing the problems of climate change and rain fed agriculture. There was also decentralization and devolution of forest management responsibilities to the local governments. However, this has not been effective, which had led people to diversify their livelihoods to other sources of income such as minerals, radiant energy, fish, plant, water, wildlife, wind, gums, resins, free seeds and aesthetics.

Figure 4. Rangeland covered by prosopis and opuntia

Increased and spread invasive plant species that have increasingly altered rangeland ecoysystems structure and function in areas where it exist. *Prosopis juliflora* has colonized vast areas of rangelands and crop fields

Apart from the identified livelihoods, drylands are a major area for practicing cultivated cropping. They are the main centers of sorghum, chickpea, cowpea, finger millet, field peas, perennial cotton, safflower, castor bean, and sesame and others. The dryland areas are also rich in natural vegetation. It continues to play an essential role in the country's ecology and economy. Natural vegetation provides food, fodder, fuel and building materials, and helps to protect the soil from erosion and restores its fertility.

The main problems in these areas are natural resource degradation, soil erosion, loss of biodiversity, land degradation, changes in rivers regimes, increased siltation of dams and lakes, recurrent drought,

[9] Gebru, Yonas, Habtemariam Kassa, Messay Sintayehu, Adefires Worku, Wubalem Tadesse, and Getachew Animut. "Proceedings of the National Workshop Organized by Forestry Research Center, Ethiopian Institute of Agricultural Research (EIAR) & Center for International Forestry Research (CIFOR)." (2011).

and acute shortage of basic forest products. The gap in this study is that it has not identified if developing technologies to adapt to the ongoing climate variability and change can improve production on sustainable bases and achieve food security and alleviate poverty in the country.

Mkutu[10] on pastoralism and conflict in the Horn of Africa, identifies that rangeland management is done through conflict management and longer-term peace-building and use of traditional institutions to manage land and herds. The main forms of livelihoods include pastoralism, which has been supported by other forms of livelihoods such as farming and wildlife management.

The main problems facing pastoral communities include intensified cattle rustling, inappropriate government development policies, inadequate land tenure policies, political and socio-economic marginalization of pastoralists, and small arms, including automatic and semiautomatic weapons which have become widely available and are increasingly used in areas such as Laikipia and similar districts. There is also national police and security services who lack the capacity to provide security to pastoralist and other communities, weakening and undermining of traditional governance systems, inadequate arrangements to cope with droughts and other emergencies, and inadequate engagement with traditional governance systems.

The gaps from this study include land tenure issues which lead to invasion of ranches by other communities. There are also conflicts involving pastoralists associated with resource competition, cattle rustling, and wide availability of small arms. As the study has not provided ways of dealing with these problems, cattle rustling and proliferation of small arms will continue to haunt the pastoralists in these regions.

Unruh[11] identified rangeland management practices such as control of grazing through indigenous management practices. The main livelihoods identified in the Horn of Africa were pastoral livelihoods and livestock production. The problems of overgrazing, drought recurrence, low rainfall and low natural carrying capacity are evident in this region.

The main concerns from this study is that of herd reconstitution, which was attributed to when drought, conflict, famine and subsequent food distribution programs undermine traditional indigenous restocking mechanisms. The study did not identify how traditional support mechanisms could work together with those from support groups such as NGOs and the government, leaving a gap in terms of management of rangelands.

Lind and others[12] focused on the five key areas; Karamoja in northern Uganda, the Northern Bahr el Ghazal region in South Sudan, Maasai system in Kenya's South Rift Valley, the Somali region of Ethiopia, and Borana Plateau in southern Ethiopia. The study identified rangeland management practices which were done through mobility, herd splitting, and opportunistic movements to exploit key resource patches. The study identified other rangeland management practices including modifying rangeland management practices; changing herd composition particularly to drought resistant animals such as goats and camels in Ethiopia and Kenya, and venturing into other livelihoods such as distress livestock sales, charcoal production, getting support from indigenous safety nets and in Kenya, promoting conservation and wildlife tourism.

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[10] Mkutu, Kennedy. *Pastoralism and conflict in the Horn of Africa*. Saferworld. Organisation, 2001.
[11] Unruh, Jon D. "Restocking refugee pastoralists in the Horn of Africa." *Disasters* 17, no. 4 (1993): 305-320.
[12] Lind, Jeremy, Rachel Sabates-Wheeler, Sarah Kohnstamm, Matteo Caravani, Abdurehman Eid, Deborah Manzolillo Nightingale, and Christopher Oringa. "Changes in the drylands of Eastern Africa: implications for resilience-strengthening efforts." (2016).

The main problems facing pastoralists in the identified areas included poverty, malnutrition and destitution of pastoralists and drought. The concern in this study was that the study did not compare data on indicators related to herd size and type, cash income, income sources, and assets over time which can be used to measure change and resilience.

The African Union and the United Nations Office for the Coordination of Humanitarian Affairs[13] study identified rangeland management practices through traditional leaders and governance systems in pastoralist communities and national and district state regulations. Apart from pastoralism, agricultural production, ranching and wildlife management.

The main problems include arms proliferation, access to scarce resources and of managing competition for the resources. There is also increased risks of violent conflict which has become particularly clear during the periods of drought, where lack of provision for pastoralist needs for pasture and water has led to ranch invasions and similar conflicts. Pastoralists are also coming into conflict with ranchers, farmers, horticulturalists and conservation area wardens, and with state authorities.

The concerns in this study were that pastoralist communities are inadequately represented in decision-making processes in many countries in the Horn of Africa, allowing their interests and concerns to be unduly neglected in development and other programmes. The issue of disarmament also leaves some groups vulnerable, as shown in the Turkana community. There is therefore a gap in terms of the decision-making process.

USAID[14] identified rangeland management practices to include support from organizations, who have put in a wide range of pastoral development activities that focus on animal health, livestock market information, natural resource management, alternative basic education, promotion of good governance, and an early warning system in Jijiga, Fik, and Shinile zones, as well as in Liben and Afder zones, along the border of Ethiopia with Kenya. The most diversified livelihood apart from pastoralism was agriculture, which was supported by long rains especially in the north-western districts of Turkana, Marsabit, West Pokot, Baringo, Kajiado, Narok, and Samburu who reported greater food security, improvements in livestock prices, increased milk availability, and decreasing rates of child malnutrition.

The main problems identified by this study included recurrent droughts and chronic needs of pastoralist communities in Ethiopia. There are also significant reductions in land and water available as a result of desertification, bush encroachment, soil erosion, population growth, and political and economic marginalization. Further, there are crises that threaten the survival of animals which include drought, food shortages, disease, severe cold, lack of access to grazing lands, looting, and conflict.

The main concern identified by this study was that both rural and urban populations face a significant decline in water availability. Pastoralists' access to water sources has worsened due to ongoing regional instability, which has limited human and animal movement. The various ways to fill the water gap was not addressed, leaving a gap in this study.

[13] African Union and the United Nations Office for the Coordination of Humanitarian Affairs. Pastoralist Voices. OCTOBER 2008 Volume 1, Issue 8. For a Policy Framework on Pastoralism in Africa

[14] USAID. Horn of Africa - Multi-Sectoral Interventions in Pastoralist Communities Fact Sheet, Fiscal Year (FY) 2005.

Stockton[15] identified the main rangeland management practices; which entailed mobility because the rainfall pattern in the Horn of Africa is erratic. The study has not identified various livelihoods of the pastoralists apart from pastoralism. The problems encountered include increasing population growth, water development and environmental degradation.

The main concern from this study is that with the population continuing to being large, an environment which is deteriorating, and too few economic opportunities for too many people who are underprepared to meet that future, the effect the conflicts like those in Somalia will have on pastoralism is not known.

Roxanna[16] on pastoralism in East Africa, challenges and solutions noted that rangelands are managed through traditional mechanisms. The main problems include pastoralists having the difficulty accessing natural resources such as land and water. This restricts their mobility, which is crucial for this type of work. In addition, various services such as education and healthcare, are difficult to reach, both for themselves and for their animals. This is mostly due to the fact that these services are not tailored to their nomadic lifestyle. Additionally, it is difficult for pastoralists to find access to the markets, while these are the only way to sell their products, such as meat and milk. Pastoralists also lack recognition and receive hardly any support, which is also partly at the root of the above-mentioned problems.

The main concern from this study is based on the general recognition of pastoralism. With recognition, African countries would pay more attention to the challenges that pastoralists are currently having to overcome on a daily basis. This can be done, for example, by civil society organizations representing the pastoralists and ensuring they have a say. They can, in turn, promote a pro-pastoralism agenda.

Rashid's report[17] was based on the United nations development programme for Ethiopian Somali. The study identified that rangeland management was controlled by a clan with local clan elders solving conflicts regarding use of resources such as water. Grazing land is controlled by clans. However, the limits of clan territories are not clearly defined and subject to change over time.

There are problems of declining pasture and declining livestock production, reduction in availability of grasses, reduction in browse species, water dilemma, drought and lack of support from the government. Based on the problems, the main gap from this study is that other sources of livelihoods of people of Somali in the five districts of Aware, Gashaamo, Warder, Boh and Geladi which were chosen for the study were not identified, and the effects of government control of the grazing was not explored.

Sandford[18] studied pastoralists and irrigation in the Horn of Africa. The study was based on a paper presented at the International Conference on the Future of Pastoralism. Rangeland management is done through spatial restrictions on animal mobility in the rangelands. Pastoralism is complemented by irrigating farming. The problems cited included increased grazing pressure, land tenure for the Ethiopian side, and flooding for the Kenyan side, and human and animal diseases. The main gap

[15] Stockton, Gilles. "Sugar for the tea: assistance and the state of pastoralism in the Horn of Africa." *Pastoralism: Research, Policy and Practice* 2, no. 1 (2012): 6.
[16]Roxanna Deleersnyder. *Pastoralism in East Africa: challenges and solutions*. March 2018.
[17] Rashid, M., and R. Shank. *United nations development programme. Emergencies Unit for Ethiopia*. Technical report: Rough guide to animal diseases in Ethiopia, 1994.
[18] Sandford, Stephen. "Pastoralists and irrigation in the Horn of Africa: Time for a rethink?." In *Pastoralism and Development in Africa*, pp. 72-81. Routledge, 2013.

from this study is that the measures to check the natural growth of the human population are not dealt with in this study.

Watakila[19] observed that the defining features of Borana range management institutions are indigenous knowledge, equitable access, and decentralization of governance, principles of subsidiarity, distributive and redistributive mechanisms and environmental sustainability. However, indigenous authorities are being undermined by state officials. There is also participatory rangeland management approach, which details a number of steps which should be followed in order to establish a legally binding agreement between government authorities and indigenous institutions.

The problems experienced include fluctuations in rainfall and drought recurring problems in the rangelands, socio-economic marginalization, frequent conflicts over natural resources, human conflicts and raids. The main gap from this study is that the study did not assess the deepened understanding of the conflicts involving pastoralists in order to be able to design strategies that shall address their route causes.

Global Water Partnership[20] argues that the efforts aimed at managing drought in the Horn of Africa region have mainly focused on emergency/crisis response rather than the integrated management, which involves preparedness, drought mitigation and early warning. Agriculture is the most dominant livelihood for the population of the region and is the major economic sector. However, agriculture is largely dominated by smallholder subsistence farming, and nomadic/semi-nomadic livestock production systems.

The study identifies that there is a huge challenge of sustaining economic development due to different human-induced and natural hazards, especially drought, in the region. There is also the growing human vulnerability against environmental hazards, especially droughts and man-made disturbances such as resource-based conflicts and economic crises.

The gaps identified by this study entail; Low level of educational and strong adherence to traditional ways of keeping large herds of livestock by pastoralist communities. At times this is exacerbated by issues related to land tenure arrangements, inadequate participatory platforms in drought management programs and inadequate policy and legislative frameworks for disaster risk management in general and drought risk management in particular. There are also weak early warning systems to inform vulnerable communities on weather trends and disasters and to alert them for effective preparedness and response.

The Northern Rangelands Trust[21] identified rangeland management in pastoralist areas in Kenya, Ethiopia and Zimbabwe. The main management strategy identified was respect for traditional livelihoods, traditional governance systems and the coexistence of livestock, people and wildlife. This approach builds on traditional institutions combined with modern practices, technologies and governance concepts. The approach used also does not promote firm boundaries, the limit of livestock movements or prohibiting of livestock. The strategy also identifies grazing plans based on each settlement, combined at conservancy level, and shared across the region. This will include development of learning sites and grass banks to show best practice methods in healing rangelands

[19] Watakila, Felix W. "Pastoralism and Conflict Management in the Horn of Africa: A Case Study of the Borana in North Eastern Kenya." PhD diss., University of Nairobi, 2015.
[20] Global Water Partnership, Eastern Africa. "Assessment of Drought Resilience Frameworks in the Horn of Africa." (2015).
[21] The Northern Rangelands Trust. Rangelands Strategy. 2019-2022.

through improved grazing management. Other strategies identified include awareness and capacity creation, conservancy rangelands governance, rangeland rehabilitation, settlement planning, and research and monitoring.

Apart from pastoralist livelihoods in areas such as Borana, Somali, Orma, Turkana, Rendille, Samburu, Gabbra, Pokot, Lchamus, Maasai, and Wardei, other forms of livelihoods have been used by people of these regions. This include mainly wildlife conservation in conservancies.

The main problems affecting tis regions include high levels of poverty, insecurity, severe degradation of rangelands (declining state of natural resources), human and livestock population growth and climate change, lack of water, loss of traditional knowledge and authority, encroachment from other communities, and illegal guns.

The main concern/gap from this strategy is that tough it has managed to address various ways of cross-boundary range management; it has not identified various ways in which other livelihoods could be used to avoid over-reliance on pastoralism. Could other strategies such as introducing them to farming help manage rangelands even better? The question has not been answered.

Hodbod and others[22] looked at the Omo-Turkana basin, and used expert elicitation and a scoping review to make deductions. The study found that the main response to food insecurity and changes in availability of natural resources is increased mobility by the populations living in this region.

The main diversified livelihood was large-scale commercial farming in the basin. More than ten ethno-linguistic groups depend on flood-retreat farming for sorghum cultivation along the Omo. In addition, technological developments in Kenya can be framed as potential solutions to livelihood challenges in Turkana, where ventures to exploit reserves of petroleum and establish large-scale wind farms are underway.

The main problems in this region include rapid environmental and social change and conflicts. Certain conflicts are being exacerbated by the ecological changes underway in the borderlands between the Ethiopian and Kenyan states. These conflicts have historically taken the form of raids and attacks in the delta and lake margins. There is also the expropriation of land without compensation, and increasing difficulty in accessing vital resources, including water, forage, and wild foods.

The study identified a gap that further research is required to assess social, spatial, and temporal trade-offs in order to identify more sustainable and equitable means of generating value in this block.

Mounir[23] identified various rangeland management practices which included herd mobility, early warning systems, grazing management, geo-spatial and temporal analysis, restoration techniques, management planning which entails balancing soil productivity, plant physiology, and climatic conditions. There is also monitoring and assessment are continual activities in rangeland management. The diversified livelihoods entailed venturing into aromatic and medicinal plants.

The contribution of range vegetation to livestock feeding has drastically reduced. Pastoralists, and

[22] Hodbod, Jennifer, Edward GJ Stevenson, Gregory Akall, Thomas Akuja, Ikal Angelei, Elias Alemu Bedasso, Lucie Buffavand et al. "Social-ecological change in the Omo-Turkana basin: A synthesis of current developments." *Ambio* (2019): 1-17.

[23] Mounir Louhaichi. *Rangelands: Rangelands for better livelihoods*. Consultative Group on International Agricultural Research. September 2015.

in particular female pastoralists, often face marginalization and low levels of education. Other problems include degraded rangelands, land tenure, drought and climate change. The main concern/gap from this study is that major livelihood diversifications have not been discussed, which leaves a gap whether these livelihoods can improve and be an answer to the problems facing these communities.

Nalubwama[24] used a cross-section exploratory study to understand the changes in livelihood strategies of rangeland communities in face of climate change and restricted mobility in Uganda. The main rangeland management strategies revolved around livestock mobility which allowed for exploitation of water and quality pasture, livestock species diversification, use of improved breed varieties and land tenure reforms.

Other major livelihoods included ranching, commercial agriculture, wildlife conservation, and mixed farming systems. There were problems facing them, including livelihood insecurity, collapse of pastoral adaptation, poverty, resource use conflicts and hindrance to permanent developments. There were also livestock-crop conflicts, limited financial capital, low productivity of tolerant local breeds and varieties and lack of land for expansion.

The gap in this study was the failure to identify strategies that threaten the environment, which can help in promotion of integration of community best practices initiatives in proven modern concepts of adaptation to climate change and livelihood vulnerability.

The IGAD Regional Pastoral Livelihoods Resilience Project (RPLRP)[25] was based on a review of a series of pastoral rangeland management policies, proclamations and strategies, in the three countries of Ethiopia, Kenya and Uganda to identify impediments to, and policy gaps in sustainable land management. The study identified the main rangeland management practices in the three countries as indigenous rangeland management practices, which were found neither to be working independently nor when combined with the national management practices.

The main diversification of livelihoods rotates around wildlife management, domestic trade, tourism and commercial deposits of oil and natural gas (like in the north and east of Kenya). Other natural resources include sand and gravel for construction, a wide range of precious minerals, soda ash, gum, resins, and medicinal plants. The rangeland management problems were cited as increased land degradation, conflicts, shrinking rangelands due to expansion of protected areas, large-scale irrigated crop farming, and encroachment by invasive plant species, are acute problems. The problem is also aggravated by limited support for technologies and limited investments in infrastructure.

There were four main concerns from this study. First, there is low agricultural productivity (yield), under-utilization of land for agriculture, inefficient markets and low value addition. The stud has not addressed how to solve these concerns, which leaves a gap in policy development.

Haydarov and others focused on evidence-based engagement of the Somali pastoralists of the Horn

[24] Nalubwama, S. "Department of Animal Health, Ministry of Agriculture, Animal Industry and Fisheries, PO Box 513, Entebbe, Uganda, 1 School of Veterinary Medicine and Animal Resources, Makerere University, P." (2018).
[25] The IGAD Regional Pastoral Livelihoods Resilience Project. *Policies and Proclamations Relevant to Pastoral Areas Land Management for Ethiopia, Kenya and Uganda.* IGAD Centre for Pastoral Areas and Livestock Development (ICPALD) (2016).

of Africa.[26] The main ways of pastoralism and rangeland management was through nomadic tracking, cross-border collaboration, use of clan elders, and mapping of water points and livestock markets. Pastoralism was the main form of livelihood identified in this study.

The problems affecting the Somali pastoralists included lack of basic health services, logistical challenges and lack of enough capacity to track nomadic groups. The main concern in this study is very few interventions to reach the pastoralists. Apart from the Food and Agriculture Organization's animal health program, very few targeted interventions in the Horn of Africa engage such hard-to reach populations systematically.

Resilience Focus[27] identified management of rangelands through cross-border peace meetings especially between the Turkana of Kenya, Tepeth, Matheniko, Karamojong and Pokot of Uganda. These meetings have led to the appeal to the governments of Kenya and Uganda to establish a technical institute along the border of Turkana and Karamoja to train the pastoralists' children. Traditional elders play an important role during these meetings.

Major problems in the border entail problems of overgrazing, transmission of transboundary animal diseases and conflicts. There is also persistent drought that has been closely associated with food insecurity, chronic poverty, protracted competition and conflicts over cattle and access to pasture and water resources and unwarranted loss of human life, as well as cross-border incursions. Other challenges include natural resource sharing, livestock movement, regional trade and trans-boundary human and animal diseases.

The issues identified from this study include improving donor coordination and increasing efforts to hold the drought resilience strategies in these areas. Since drought was identified as a key problem affecting the daily livelihoods of the people in this area, its management in both short-term and long-term will prove crucial.

The project on strengthening the livelihoods resilience of pastoral and agro-pastoral communities in South Sudan's cross-border areas with Sudan, Ethiopia, Kenya and Uganda,[28] was aimed at strengthening the livelihood resilience of pastoral and agro-pastoral communities in the border areas in South Sudan neighbouring Sudan (Abyei/NBEG and Upper Nile Clusters), and Ethiopia, Uganda and Kenya (Karamoja Cluster, including Akobo). Rangeland management was done through early warning and response systems, recognition and implementation of simultaneous cross-border interventions and peace agreement achieved by traditional leaders.

In South Sudan, there is a volatile political situation, increasing conflict and economic stresses. This needs people to diversify their livelihoods. After livestock production, crop farming is the second most important livelihood activity, in terms of household food and cash income. However, South Sudan has a huge but largely unrealized agricultural potential. Favourable soil, climatic conditions and water render more than 70 percent of its total land area suitable for crop production.

However, less than four percent of the total land area is currently cultivated, as the country continues

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[26] Haydarov, Rustam, Saumya Anand, Bram Frouws, Brigitte Toure, Sam Okiror, and Bal Ram Bhui. "Evidence-based engagement of the Somali pastoralists of the Horn of Africa in polio immunization: overview of tracking, cross-border, operations, and communication strategies." *Global Health Communication* 2, no. 1 (2016): 11-18.

[27] Resilience Focus. Cross-border Cooperation Framework to facilitate the development of the Karamoja ecological zone (2019).

[28] Project on South Sudan. Strengthening the Livelihoods Resilience of Pastoral and Agro-Pastoral Communities in South Sudan's cross-border areas with Sudan, Ethiopia, Kenya and Uganda (2020).

to experience recurrent episodes of acute food insecurity. Why are the fields underutilized yet the country faces acute food shortages? The study did not address such concern, which is an important area for the development of people in the country.

IGAD Centre for Pastoralist Areas and Livestock Development (ICPALD)[29] identifies rangeland management practices through capacity building of local resource user associations, resilience of the local people, political goodwill, international community goodwill and increased interest by development partners in the Greater Horn of Africa, enabling policy environment and legal frameworks. Pastoralism was identified as the main livelihood activity, but other alternative livelihoods included livestock production and marketing, fisheries, aquaculture and marine resources development.

The main problems facing pastoralists include insecurity and conflict problems, poor provision of services and remoteness, government policies, inadequate prediction, prevention and mitigation mechanisms, and poor road network. All these contribute to the low agricultural productivity, and inadequate investment in agriculture and related infrastructure, leading to dependency on relief food. Livestock productivity also faces pests, diseases, rangeland scarcity due to encroachment by high populations growth, poor rangeland husbandry, insecurity related problems and high cost of inputs.

The main concern was that the problem of land tenure has not been resolved till now. The provision of land tenure security for the dryland communities like pastoralists has been a major challenge to many governments in the IGAD region; most tenure provisions in the constitutions and laws have been inappropriate for pastoralists, who are the main custodian of these lands. Moreover, rangelands are not registered with traditional stock routes occasionally blocked by farmers in fear of livestock damage to their crops.

Fenetahun and others[30] covered rangeland management approaches in Yabello in the Borana rangeland of Ethiopia. The study used was a review to assess the rangeland management approaches, rehabilitation mechanisms and efforts in the Yabello rangeland. Therefore, in-depth literature review was done using various secondary sources from websites, journals and books. Interviews were also done with pastoralists and representatives from the NGOs including CARE, SCUS, Action for Development (AFD) and SOS Sahel.

The systems of rangeland management identified in this study were mainly technical approaches that aimed to ensure propagation of plants and encouraging grass growth through hand cutting woody, prescribed fire on some species, cutting trees and preserving enclosures, resting of pasture land (deferred grazing), reseeding, movement during dry seasons, use of development agents mainly NGOs and use of traditional institutions in management of rangelands.

The main issues affecting the area were issues of bush encroachment and land degradation. Bush encroachment was attributed to the spread of woody species and thus contributed to land degradation. In addition, changes in grazing patterns, due to vulnerabilities which constrict rangeland usage, appear to be exacerbating the effect and heavy grazing in areas seems to encourage further bush encroachment.

The concerns in this study are that the methods used in rangeland management do not introduce new

[29] IGAD Centre for Pastoralist Areas and Livestock Development (ICPALD). ICPALD Strategic Plan, 2016 – 2020.
[30] Fenetahun, Yeneayehu, and Wang Yong-dong XU-Xinwen. "Assessment of Rangeland Management Approaches in Yabello: Implication for Improved Rangeland and Pastoralist Livelihoods. Review Paper."

systems of management into their system, and do not improve grass production in the long-run. Furthermore, the methods only address the symptoms of land degradation, instead of focusing on bush encroachment, which is the core cause of land degradation.

Sandford and Ashley[31] examined livestock livelihoods and institutions in the IGAD region. According to the study, pastoralists have developed specific livelihood strategies to cope with the high risk nature (low rainfall, significant variation in rainfall) of the vast majority of pastoral areas. The following two strategies are amongst the most critical: Mobility. There is strong evidence that more mobile pastoralists are better able to withstand droughts than those who have become partially or completely sedentarized. Herd accumulation. Large herd sizes perform two critical functions for pastoralists. Firstly, they allow pastoralists to meet needs while maintaining productive assets (through a mixture of milk sale and consumption and animal sales). Sharing of Livestock. A range of livestock tenure arrangements exist in pastoral societies including outright ownership as well as a number of loaning and sharing arrangements.

There are three critical reasons why understanding how people use livestock to support their whole livelihood matters: Poor small-holder households often have very rational reasons for taking actions which are different from those a wealthy and commercial livestock producer may take. This is not to say that people's livelihood strategies cannot be improved upon. Rather, by understanding the rationale for existing actions, it is more possible for policies and interventions to support livestock-keepers in ways that will make a difference. Misunderstanding these actions leads to perceptions that poor and small-holder households behave in ways which are irrational, based on ignorance and which need to be combated. Policies and interventions then act at odds with people's strategies rather than supporting them.

Experience from livestock development to date is clear that this is ineffective. Furthermore, interventions built on misunderstandings tend to be simplistic and ineffective – both failing to target the poor and to address their constraints. For example, many programmes aiming to introduce improved livestock breeds are not taken up by the poor. The poor are more concerned with the higher expense and greater risk of keeping improved breeds (which are often more susceptible to disease and have higher feed requirements) than they are interested by the prospect of increased productivity.

The study by Skinner[32] was on rangeland management for improved pastoralist livelihoods the Borana of Southern Ethiopia. The study was based on interviews with the Borana pastoralists concerning rangeland management, their traditional practices and impressions of rangeland management techniques by NGOs who worked on pastoralism in the Horn of Africa. Interviews were also conducted with the NGO staff in Addis Ababa and participatory observation of work conducted with the community by holistic management experts. The areas of interviews were specifically at Guyo Jattani of the Dikale Pastoral Association, and Malise Boru of the Dambala Dhibayu Pastoral Association.

Because of the unpredictable northern African environment, pastoralism was the most sustainable option for survival. Established on flexibility, mobility and strategies of herd mobility, pastoralist systems are designed to respond to changing vegetative and climatic conditions. This is achieved

[31] Sandford, Judith, and Steven Ashley. "Livestock livelihoods and institutions in the IGAD region." *FAO IGAD LPI, Addis Ababa* (2008).

[32] Skinner, Djihan. "Rangeland management for improved pastoralist livelihoods: The Borana of Southern Ethiopia." *Unpublished MA Thesis, Oxford, Brookes University* (2010).

through existing indigenous rules governing access to resources and control of resource use. The systems include livestock diversity, livestock mobility, ecological threshold, herd and family splitting during drought, maximizing stocking densities, livestock diversification, stratified rangeland and livestock feed supplementation. They have also resorted to other livelihoods such as use of wild foods, social support systems and opportunistic cultivation.

The main problems affecting the Borana pastoralists include population pressure, which has contributed to a proliferation of unplanned settlements which block migration routes and encroach onto pastures. There is also food insecurity, which has severely decreased because of land alienation. Other problems cited included undermined indigenous institutions, unreliable crop productivity, loss of land to ranching, and environmental pressures such as land degradation and drought. Political marginalization was also cited, which has progressively weakened pastoralists' livelihoods strategies.

Various gaps/concerns were cited concerning the problems. First, there was inadequate drought preparation and response. There was also reduced mobility options and drought reserves, decline of Borana cattle breed, limited livelihoods strategies, and weakened indigenous institutions.

Morton and Kerven[33] covered the livelihoods and basic service support in the drylands of the Horn of Africa. The study was a technical consortium by the Consultative Group on International Agricultural Research (CGIAR) hosted at the International Livestock Research Institute (ILRI). Rangeland management has been lately diversified, ranging from livestock insurance which is an encouraging new way, to conserving indigenous breeds. This is supported by local institutional capacities especially in remote areas.

The main form of livelihood identified in the Horn of Africa was pastoralism, where pastoralists were highly dependent on livestock as the main source of livelihood. Rainfall is both low and highly variable, posing a challenge in this area. Other ways of livelihoods include rain-fed and irrigated crop agriculture, trade and harvesting of natural resources.

The main problems facing pastoralists in the Horn of Africa were recurrent droughts and famines, which have rendered many to be long-term dependents on food aid. With most people aspiring to regain their livestock after droughts and famines, this is not possible for most of them. This has made many pastoralists to engage in other activities that generate cash income, food resources and investment opportunities.

The key concerns from the study include zoonotic diseases on humans and how to counter them. The diseases are hard to control because of the remoteness, low population density, pastoral mobility and poor infrastructure which are constraints to delivering both curative and preventive health services in these areas.

FAO and IGAD[34] noted that the diversification outside of pastoralism will require flexibility and formulation of supportive policies in view of the possible future scenarios where pastoralism will support few people as the majority drop out. Land tenure and natural resource tenure (in communally shared resources) policies in context of changing environment in pastoral economies is a top priority

[33] Morton, John, and Carol, Kerven. "Livelihoods and basic service support in the drylands of the Horn of Africa." (2013).

[34] FAO & IGAD. *Promoting effective resilience investments – Delivering peace, agriculture-led growth and socio-economic transformation in the Horn of Africa*. Rome. 72 pp. Licence: CC BY-NC-SA 3.0 IGO. 2019.

if outside investors will be attracted to create opportunities for alternative livelihoods. There is already a strong trend for individual fencing of land for fodder and dryland agriculture in all the three case studies. Kenya for example has come up with a community land bill that is taking time to be approved by parliament due to several contentious issues. But these issues have to be resolved before especially local investors from within and outside pastoral areas can take risk.

The report indicated value-added diversification in the livestock sector: There is a lot of potential for adding value in pastoral livestock production. Opportunity for animal fattening for niche markets is already working in Borana in Ethiopia and it is possible in other countries as well. This is only possible if fodder production enterprise is done within defined resource access framework. Value added diversification in Garissa and most of northern Kenya should be taking place as well and be out-scaled especially for Camel milk value chain. Natural Product Extraction and Trade: Commercialization of natural products is possible and has been going for a long time but it has not been out-scaled among the pastoralists except in Ethiopian Borana where this enterprise has significant contribution to the household incomes. Urban and Peri-urban Planning and Infrastructure in Drylands: National investment in infrastructure in drylands has been avoided due to perceived low economic returns and low population. The investors also are hesitant to participate due to high risks. However, this is changing with several public mega projects currently being implemented by national governments.

IGAD Review Report[35] on regional pastoral livelihoods resilience project (RPLRP) reviewed a series of pastoral rangeland management policies, proclamations and strategies, in the three (3) countries of Ethiopia, Kenya and Uganda to identify impediments to, and policy gaps in sustainable land management, and then makes recommendations. The study entirely relied on a desk review of available documents from each country studied, and this was complemented with literature and the researcher's experiences. The general objective of the review was to assess the current land management policies, proclamations, regulations, directives and other similar documents in pastoral areas, and to identify impediments to sustainable land management, as well as provide gap analysis. More specifically, the review process aimed at the following key issues: Reviewing national and sub-national land management policies, proclamations, rules, regulations, Acts and directives related to different types of land management and the role of national and sub-national States; Assessing legal provisions in pastoral land management related policies regarding farm practices, and environmental protection; Examining problems and opportunities in pastoral land management, environmental maintenance, and the provision of goods and services; Undertaking a policy gap analysis; and Recommending policy and development interventions.

Solomon, Snyman and Smit[36] examined cattle-rangeland management practices and perceptions of pastoralists towards rangeland degradation in the Borana zone of southern Ethiopia. A survey was conducted in the Borana pastoral areas of southern Ethiopia to assess current livestock production systems, rangeland management practices and the perceptions of the pastoralists towards rangeland degradation. This information is considered vital to future pastoral development planning and interventions. Data were collected from a total of 20 villages that were identified from

[35] IGAD Review Report. Regional pastoral livelihoods resilience project (RPLRP) reviewed a series of pastoral rangeland management policies, proclamations and strategies, in the three (3) countries of Ethiopia, Kenya and Uganda. 2016.

[36] Solomon, T. B., H. A. Snyman, and G. N. Smit. "Cattle-rangeland management practices and perceptions of pastoralists towards rangeland degradation in the Borana zone of southern Ethiopia." *Journal of environmental management* 82, no. 4 (2007): 481-494.

5 peasant associations, namely Did Yabello, Moyatte, Did Harra, Dubuluk and Melbana. The condition of the rangelands had declined dramatically over time. In the past most development policies were based on equilibrium theories that opposed the communal use of the rangelands and traditional range management practices. The way in which the pastoral system affects the rangeland ecosystem functioning is contentious to this theory and the 'tragedy of the commons'.

Ngaido[37] noted the interactions between the three major components vegetation, livestock and people are complex and not easy to manage. Integrated rangeland management seeks to establish a framework for those with interests in the rangelands to develop strategies and actions to sustainably manage change and ensure a viable legacy for future generations. The challenge is to balance the diverse economic, cultural and social needs of rangeland residents, users, and other stakeholders with the need to maintain its natural resources and conserve the biological and cultural heritage. Since rangeland ecosystems are cross sectoral in nature, there is a need for effective management strategies so as to enhance their sustainability. A holistic approach is therefore needed to identify the values, needs and threats, and to suggest appropriate and effective management interventions.

Admasu, Abule and Tessema[38] did a study on livestock-rangeland management practices and community perceptions towards rangeland degradation in South Omo zone of Southern Ethiopia. A survey was conducted in Hamer and Benna-Tsemay districts of the South Omo zone of Ethiopia, with the objectives of assessing the range-livestock management practices and perceptions of the different pastoral groups (Hamer, Benna, and Tsemay) towards rangeland degradation. This information is considered to be vital to future pastoral development planning and interventions. The information was gathered through group discussions, personal observations, and using a structured questionnaire where each household was taken as a unit of analysis.

All pastoral groups derived their main income from the sale of animals, which was followed by the sale of honey as in the case of Hamer and Tsemay pastoralists. The average livestock per household was 25.7, 10 and 2.8 tropical livestock unit (TLU) cattle, goat and sheep, respectively. The major livestock production constraints were drought, feed and water shortage and animal health problems. The different pastoral groups have the opinion that the condition of their rangeland is poor, mainly due to overgrazing, drought and increase in human population. Furthermore, there was also a problem of bush encroachment which is an indicator of rangeland degradation. There are no range improvement practices undertaken to improve the condition of the rangelands. Mobility is the first measure taken to solve shortage of livestock feed and water but many of the pastoralists replied that they face many problems during migrations. In conclusion, the indigenous knowledge of the pastoralists about range-livestock management and their environment should be incorporated while planning range-livestock development projects for the study districts.

FAO and IGAD[39] examined natural resource management and other livelihood activity in arid and semi-arid lands (ASALs). With FAO support, IGAD has identified and documented (gender-sensitive) resilience-enhancing good practices along the seven PIAs of IDDRSI in all the IGAD region, to ensure that lessons learned and good practices are considered in investments, programmes and policies relevant to the regional resilience agenda. National workshops were organized to

[37] Ngaido, T.. Integrated rangeland management systems. *Range and Animal Sciences and Resources Management*, 2016. 327-342.

[38] Admasu, Terefe, Ebro Abule, and Z. K. Tessema. "Livestock-rangeland management practices and community perceptions towards rangeland degradation in South Omo zone of Southern Ethiopia." *Livestock Research for Rural Development* 22, no. 1 (2010).

[39] FAO & IGAD. Natural resource management and other livelihood activity in arid and semi-arid lands (ASALs). 2017.

validate country specific resilience good practices. A regional workshop was organized on the margin of the 8th IDDRSI platform meeting in Entebbe, Uganda to validate the regional resilience enhancing good practices that are documented in this booklet.

In scaling out challenge the report retaliates that security of land rights for communal rangelands – defining rightful users and management structure, recurrent drought – taking away community effort (reseeding & area closer), Lack of viable grass seed source and poor seedbank in the soil, Inadequate applied research and poor link to development and Rangelands management efforts - lacks bigger picture (Piecemeal): no overarching land use plan (wet/dry season grazing).

Al-bukhari, Hallett and Brewer[40] did a review of potential methods for monitoring rangeland degradation in Libya. Natural and human factors exert a profound impact on the degradation of rangelands, human effects being the most significant factor in increasing the severity of deterioration. This occurs through agricultural expansion at the expense of rangelands, and with the number of domestic and wildlife animals exceeding the natural carrying capacity. This raises concerns about the ongoing sustainability of these land resources, as well as the sustainability of traditional pastoral land practices.

Rangelands require effective management, which is dependent upon accurate and timely monitoring data to support the assessment of rangeland deterioration. Natural rangelands provide one of the significant pillars of support for the Libyan national economy. Despite the important role of rangeland in Libya from both economic and environmental perspectives, the vegetation cover of Libyan rangeland has changed adversely qualitatively and quantitatively over the past four decades. Field study costs are also significantly high in comparison with their accuracy and reliability, both in terms of the time and resources required. Remote-sensing approaches offer the advantage of spanning large geographical areas with multiple spatial, spectral and temporal resolutions.

Abdu and Robinson[41] examined community-based rangeland management practices in Dirre rangeland unit: Taking Successes in Land Restoration to scale project. In southern Ethiopia and developing countries generally, issues of food security, land degradation, and the connection between the two are of great concern for policy and for development programming. The Borana pastoral community, located in the extreme southern part of Ethiopia and northern Kenya, has been facing challenges in these areas due to recurrent drought, bush encroachment and erosion of indigenous resource management systems. The Gada system represents a form of traditional institutional capital for addressing land degradation, ensuring effective natural resource management, developing drought coping mechanisms, and resolving conflict.

Government and non-governmental organizations have undertaken various interventions. However, in the Borana pastoral community, the impacts of these interventions on management of, and conflict resolution for, natural resources including rangelands and water sources have not been thoroughly assessed. The project aims to deepen understanding the biophysical, social, land tenure and governance context, as well as the interventions aimed at strengthening local institutions for rangeland management.

ASAL areas across the IGAD region are undergoing rapid social and environmental change. The

[40] Al-Bukhari, Abdulsalam, Stephen Hallett, and Tim Brewer. "A review of potential methods for monitoring rangeland degradation in Libya." *Pastoralism* 8, no. 1 (2018): 13.
[41] Abdu, N. H., and Lance W. Robinson. "Community-based rangeland management in Dirre rangeland unit: Taking Successes in Land Restoration to scale project." (2017).

current developments in Omo-Turkana basin presents social-ecological change. This is based on research done on the impact of Gibe II dam and related commercial farming along the Omo-Turkana Basin. The research was based on active data-collection programs across the Basin. The Omo-Turkana region in northern Kenya and southern Ethiopia is home to South Oromo community and is undergoing change on high pace and scale. The construction of the Gibe II dam has transformed the area. The changes have been triggered by a series of hydro-power dams across the lower Omo, the Gilgel-Gibe II dam, and the development of irrigation schemes in sugar estates that cover about 100,000 hectares and large scale cotton schemes. The Gibe III dam is the tallest in Africa.

The development of the dam has changed the scope of rangeland in the areas as regulation of water flow has eliminated annual flood pulse triggered by the river. However, it is important to note that the filling of the dam reservoir has subsequently reduced water levels across Lake Turkana and intensified abstraction of water used in irrigation expected to trigger further decline in water levels in the lake. The transformations are geopolitical. Omo River and its whole course is contained in Ethiopia and the river terminates into Lake Turkana, in Kenya. This means that the current developments pose threat to the regions rangeland and indigenous livelihoods. Reduced water levels will subsequently result to degradation of rangelands resulting to poor grazing and agricultural practices. This will create a strain on the communities' resources resulting to inter-community wars as they fight over the limited resources available.

The development of the dam opens up conversation and study on change in land use in one country impacts on rangeland in another country within the IGAD region. This calls on the need for concerted regional efforts in addressing rangeland management and development of policies that integrate local, national and regional spheres. This is based on the fact that the research suggests majority of the population along the Basin will be negatively affected by the hydrological projects and changes in land use.

The research made use of political ecology frameworks and social-ecological systems to examine the impacts of such interventions on ecosystem and hydrology services across the Basin as well as the cascading impacts on livelihoods, conflict dynamics and patterns of migration. The outcome of the study reveals that increased development of the dam may have a negative impact on communities around Lake Turkana that benefit from the lake and subsequently degraded rangelands in the Turkana area. A large-scale change is imminent in the area where commodities as opposed to staple foods for consumption by local communities is becoming the core output in the area.

The mitigation initiatives effected by the Ethiopian government especially the resettlement schemes have not been able to adequately buffer the affected communities from food insecurity as a result of disrupted indigenous livelihood systems. The cost of development is borne mainly by agro-pastoralist indigenous communities in the region. There is need for a reflection and measures that maximize benefits from the transformation to mitigate negative outcomes which include controlled floods, food aid, irrigating fodder crops, and sharing the benefits.

SECCCI Report[42] looked at effective cooperration and coordination of cross-border initiatives in Southwest Ethiopia - North West Kenya, Marsabit Borana & Dawa, and Kenya-Somalia-Ethiopia. Rangeland management practices identified included early warning tool for monitoring of pasture condition, seasonal mobility and support of the cross-border integrated programmes for sustainable

[42] SECCI. Support for Effective Cooperration and Coordination of Cross-Border Initiatives in Southwest Ethiopia - North West Kenya, Marsabit Borana & Dawa, and Kenya-Somalia-Ethiopia. Annual Progress Report (2020).

peace and socio-economic transformation, which could be achieved through better coexistence and cooperation, that would allow for bridging isolation gaps and improve their livelihood and socio-economic conditions; improved infrastructure, create opportunity for trade, investment, facilitation of cross border movement, tourism, use and management of natural resource, reduced vulnerability and build sustainable resilience through capacity building programme.

The Government of Kenya Vision 2030 Development Strategy for Northern Kenya and Other Arid Lands[43] identifies major ways of rangeland management including livestock mobility and the communal management of natural resources. These are regulated by sophisticated governance systems within pastoral societies; control over most resources primarily in the hands of older men. The communities in the region have diversified livelihoods apart from livestock, which include wildlife, forests, pasture, minerals, and medicinal plants which are all critical resources upon which the people of the region depend.

The main problems rotate around infrastructure, land management and water. Water infrastructure is undeveloped and the condition of underground water has not been fully assessed. The region's large rivers could provide irrigation, but the lessons from the many failed irrigation schemes of the past are yet to be learned. Catchment management is poor, and the potential for water harvesting has been inadequately explored. The influx of non-pastoralist land management systems has also led to the loss of many dry-season grazing areas on which the locals depend.

Despite substantial drought management experience within both government and NGOs, drought response is still not timely or appropriate enough. Community-based eco-tourism enterprises and conservancies, implemented through public-private partnerships of various kinds, could incentivize sustainable management of wildlife and natural resources and increase the goodwill upon which conservation depends. However, the conservancy concept in Kenya lacks the kind of legislative framework which is common in other countries such as those in Southern Africa.

IGAD /ICPALD[44] examined on the rangeland management strategy for IGAD region Mombasa, Kenya. ICPALD/IGAD, with financial support from the World Bank through Regional Pastoral Livelihoods Resilience Project (RPLRP), developed the regional rangelands management strategy in consultation with the member states. This draft strategy was reviewed and validated by relevant public and private sectors; civil societies; universities and research centres involved in the areas and other partners. The report observed that the IGAD region suffers from the severe effects of climate variability and change. The recurring and severe droughts coupled by poor land management practices have caused widespread rangelands degradation leading to economic hardship for pastoralist and agro-pastoralists, the impacts of climate change have been more severe because of inadequate rangelands management practices, spread of invasive species and poor water management and that under these circumstances, livestock feed availability throughout the year in ASALs remains a major challenge and is most likely going to get worse. A policy brief was extracted, published and disssemenated to get buy-in of the key policy issues and advocate for increased resources to domesticate and operationalize the strategy.

Kimiti[45] examined the rangeland resource dynamics and their implications for pastoral livelihoods in Amboseli Ecosystem, Kenya. This study was therefore carried out in Amboseli ecosystem in

[43] GoK. "Vision 2030 Development Strategy for Northern Kenya and Other Arid Lands." (2012).
[44] IGAD /ICPALD. Rangeland Management Strategy for IGAD Region Mombasa, Kenya. ICPALD/IGAD. 2019.
[45] Kimiti, Kennedy S. "Rangeland resource dynamics and their implications for pastoral livelihoods in Amboseli ecosystem, Kenya." PhD diss., University of Nairobi, 2016.

Kajiado County in Kenya to assess communities' perceptions of spatio-temporal changes in range resources over the last four decades. Results also indicate that the average household herd size was bigger in nomadic site (40.8 Tropical Livestock Unit (TLU)) than in sedentary (22.9 TLU) land use site. There was a declining trend in household herd size. These declines were mostly attributed to recurrent droughts, loss of grazing lands through expansion of cultivation and human encroachment and the changes in land use. Improving the local livestock breeds (27%) for better returns and diversification of livelihoods (22%) were mentioned as key strategies by the community in addressing the changing rangeland conditions in Amboseli Ecosystem.

The study concluded that the Amboseli Ecosystem has experienced socio-demographic, economic and biophysical changes over the last four decades, which include decline in grazing areas, reduction in range condition, loss of woodlands, increase in human population, and encroachment of grazing land by settlements and crop cultivation, changes in land tenure, and collapse of indigenous institutions that regulated the use of range resources, that decline in grazing areas was the main change observed by the community over the last for decade, that grazing areas in the nomadic land use site declined by half.

Njoka[46] examined the livelihood diversification and transition in dryland pastoral areas of eastern Africa study reports. The IGAD region is exposed to multiple hazards and recurrent shocks such as droughts, floods, socio-economic shocks and conflicts. Most of the population in the IGAD region rely on agriculture for their livelihoods, have limited capacity to cope with the impact of these shocks that often result in disasters and protracted crises. As a result, millions of women, men and children are exposed to impending risks of food and nutrition insecurities. In this context, there have been several successful and shared efforts by governments and partners in building the resilience of vulnerable communities to threats and crises in the agricultural sector to address the food and nutrition insecurity and to attain the aspirations of the AU Malabo Declaration and the United Nations' Sustainable Development Goals (SDGs). Initial studies commissioned by IGAD provided an evidence base on the role that NWFPs could play in improving the livelihoods and consequently the resilience of pastoralists and agro pastoralists in the drylands of the IGAD region.

However, the lack of up-to-date statistics on the production of, and trade in, NWFPs limits evidence-based decision-making, and greater efforts should be made to ensure that high-quality national and regional statistics are available for the region. This output strengthens ICPAC's infrastructure, human, and structural capacity to deliver and support seamless forecasts (sub-seasonal, seasonal and longer term) and climate information products that benefit its member NMHSs, IGAD entities and other regional stakeholders. Key activities include: The development – with guidance from the ISPSC - of a consolidated and more objective seasonal forecast production system underpinning the GHACOF consensus outlook and other products; Training of NMHS focal points in use and interpretation of ICPAC's prediction outputs and increased access and training on outputs from modelling centres. Novel approaches are proposed, including Foundational Prediction Training to supplement training at pre-GHACOF workshops and in addition to seasonal forecasting, the Foundational Prediction Training will also focus on use and interpretation of sub-seasonal to seasonal forecast outputs as well as new products dealing with climate change timescales.

[46] Njoka, N. The livelihood diversification and transition in dryland pastoral areas of eastern Africa study reports. (2016).

Kariuki, Willcock and Marchant[47] study was on rangeland livelihood strategies under varying climate regimes: model insights from southern Kenya. The constructed agent-based model uses input biomass data simulated by the Lund-Potsdam-Jena General Ecosystem Simulator (LPJ-GUESS) dynamic vegetation model and parameterized with data from literature. Scenarios of land use change under different rainfall years, land tenure types and levels of wildlife conservation support were simulated. Reflecting reality, the results show livestock grazing as the predominant land use that changes with precipitation and land tenure leading to varying livelihood strategies. For example, agriculture is the most common livelihood in wet years and conservation levels increase with increasing support of wildlife conservation initiatives.

Waiganjo[48] examined the impact of enclosures on range management practices and productivity in Chepareria West Pokot County - Kenya. The aim of this study was to evaluate the effects of enclosures on range management practices and productivity in the semi-arid rangeland in West Pokot. Plant productivity, diversity and density were assessed in enclosures of different ages and in adjacent open land used for communal grazing. Questionnaires were also used to assess local community perception of the range restoration and improvement. Modified Whittaker plot was used for sampling in the selected enclosures and open areas. Herbaceous biomass and plant cover were greater in enclosures than in open areas. The average herbaceous cover in the enclosed area was 76% while that in the open it was 55% which was significantly different.

Achiba[49] examined managing livelihood risks: Income diversification and the livelihood strategies of households in pastoral settlements in Isiolo County, Kenya. Research in northern Kenya presents evidence that livestock herding remains the most important income activity for households in pastoral settlements, even though non-livestock income activities constitute a significant proportion of household income. This paper explores the socio-economic determinants of pastoral income diversification using rural household data collected from three pastoral settlements in Isiolo County, northern Kenya. This study is concerned with the patterns and determinants of participation in non-pastoral income-earning activities (NPIs), including emerging household strategies and their impact on pastoral livestock production with particular reference to household dependence on livestock income. The results show that the intensity and proportion of NPIs in household incomes are determined by household demographic factors and mobility status. This study concludes that the increase in NPIs that accompanies pastoral livestock production points to the growing importance of livelihood security derived from both managing pastoral livestock production risks and optimizing incentives for non-livestock livelihoods.

Rugadya[50] examined the land tenure and food security of pastoralist communities. According to the Africa Union (2010) and based on lessons from West Africa, land tenure that supports pastoral mobility is a priority, including cross-border movements, should focus on: recognition and protection of the rangelands as communal areas under controlled access management systems; protecting pastoral resources from alienation or encroachment, particularly strategic resources (dry season water, dry season grazing, livestock corridors, etc.) in the face of other developments and to the extent possible arrangements for co-existence of land uses should be facilitated; ensuring flexible

[47] Kariuki, Rebecca, Simon Willcock, and Rob Marchant. "Rangeland Livelihood Strategies under Varying Climate Regimes: Model Insights from Southern Kenya." *Land* 7, no. 2 (2018): 47.
[48] Waiganjo, Regina Wambui. "Impact of enclosures on range productivity in Chepareria west Pokot county Kenya." PhD diss., JKUAT COHES, 2017.
[49] Achiba, Gargule Andrew. "Managing livelihood risks: Income diversification and the livelihood strategies of households in pastoral settlements in Isiolo County, Kenya." *Pastoralism* 8, no. 1 (2018): 20.
[50] Rugadya, Margaret A. "Land tenure and food security of pastoralist communities." (2017).

tenure arrangements that focus on rights of access and control rather than ownership and which accommodate multiple use and over-lapping rights of access, because pastoralists utilize the range using differential approaches; secure mobility within and between different ecological zones and cross-border if necessary; Conflict management through mediation, negotiation and consensus by supporting traditional pastoral institutions and their involvement in natural resource planning and management.

Ministry of Agriculture, Livestock, Fisheries and Irrigation[51] examined range management and pastoralism strategy 2018/2028 in Kenya. Challenges facing sustainable management and development of the rangelands include: Inadequate and fluctuating availability of fodder and water: Most livestock development activities carried out in the Rangelands are faced with frequent droughts that affect the availability of feed and water resource. Inadequate conservation and lack of strategic feed reserve facilities constrain livestock production especially in the drought periods; Encroachment of crop production into pastoral land: Crop farming in the Rangelands has led to increased opening up of the fragile rangeland ecosystems. Rainfall scarcity results into crop failures that eventually make the productivity of land unviable; Alienation of pastoral lands: The rangelands are being subdivided into uneconomical units due to increased settlements and migration from high population areas.

The development activities undertaken do not take into consideration socio –cultural issues and hardly involve the relevant stakeholders. Privatization drive of land threatens the traditional management strategies that were sustainable in many rangelands of Kenya, the main driver of alienation and Inadequate markets and marketing infrastructure: The domestic market is small and fragmented and lacks effective marketing information system and infrastructure. The dependence on few external market outlets has also denied pastoralists full benefits from livestock production and inadequate extension service delivery in ASALs: Vastness and rough terrain of Rangelands coupled with staff shortage who are inadequately facilitated, impact negatively on the development of rangeland resources exploitation. Pastoralists are unable to access and adopt technology recommendations on improved animal husbandry practices, in particular the use of inputs as well as technologies for other important economic land use options.

Munene[52] examined factors influencing management of rangelands by pastoral communities in Gotu, Ngaremara Ward, Isiolo County, Kenya. The study was guided by the following research objectives: To establish the influence of size of livestock herd on management of rangelands in Gotu area; to examine the influence of community management structures on management of rangelands in Gotu area; to determine the influence of government support on management of rangelands in Gotu area; to establish the influence of socioeconomic status of community on management of rangelands in Gotu area. The study targeted all the male and female inhabitants of Gotu area in Ngare Mara Ward. The researcher also interviewed the former governor of Isiolo County, Hon. Godana Doyo. Questionnaires and interview schedule were used to collect the data.

The study found that size of livestock motivates conservation of the grazing land, that local communities frequently engage in any grazing land conservation activities, that government have put measures to support management of local grazing land and that local community's occupation

[51] Ministry of agriculture, livestock, fisheries and Irrigation. *Range management and pastoralism strategy 2018 – 2028 in Kenya*. Government of Kenya. 2018.

[52] Munene, Mary Wanjiku. "Factors influencing management of rangelands by pastoral communities in Gotu, Ngaremara ward, Isiolo County, Kenya." PhD diss., UoN, 2019.

prompts their management of grazing land. The study concluded that size of livestock herd had the greatest influence on management of rangelands in Gotu area followed by community management structures then socio economic status while had the government support then least effect on the management of rangelands in Gotu area. The study recommends that there is a need to strengthen the management capacity of rangelands through measures that enhance pastoralists' control over natural resources, that there is need to build capacity and skills of people to harvest and store rain water and surface run-off and to sensitize the communities on rangeland restoration techniques.

The IGAD/SECCI[53] clusters annual report summarized climatic characteristics of the three clusters that can provide local climate risk knowledge for climate change adaptation and mitigation. Figure 9 shows the analysis generated and mapped, for location-specific basic statistics including mean, trends, maximum and minimum rainfall patterns (mm) as well as projected climate characteristics that are required to provide local climate risk knowledge including those required for climate change adaptation and mitigation.

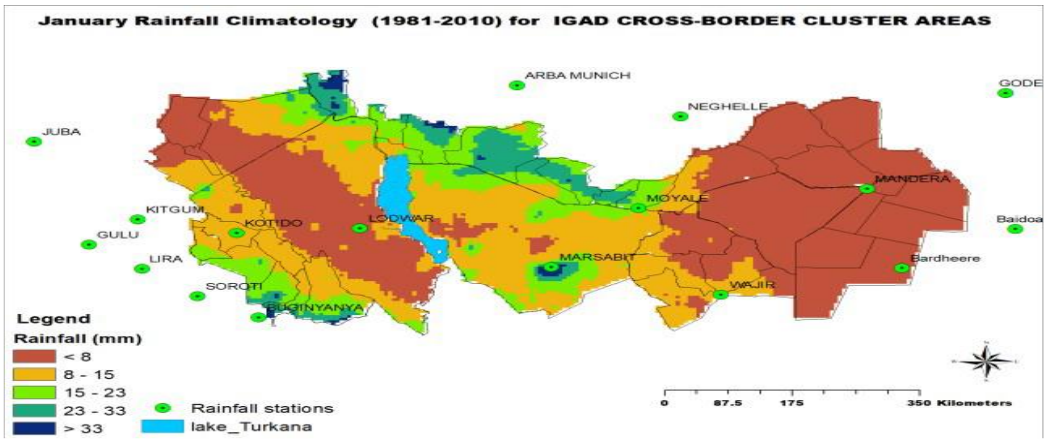

Figure 5: Rainfall Climatology Figures

The figure5 above shows rainfall in the clusters vary spatially from month to month. The driest months of the year in the cluster generally falls in January and February; however, South Western Ethiopia and Marsabit in Kenya experience some rainfall. The entire cluster generally seems to receive rainfall between March and May. June to September is generally dry in most part of the cluster with the exception of North Western parts of Kenya; however, some parts of South Western Ethiopia receives some rainfall in the month of September. October to December seems generally wet for the cluster.

Apart from rainfall parameters, the other climate parameter that of great significance in the ASALs areas is temperature. Temperature stress has physiological impacts on all ecosystems. Warmer temperatures have been linked to reduction in plant and vegetation productivity in ASALs areas. Figure 6 below shows the analysis generated and mapped, for location-specific basic statistics including mean, trends, maximum and minimum temperature as well as projected climate

[53] SECCI. Support for Effective Cooperation and Coordination of Cross-Border Initiatives in Southwest Ethiopia - North West Kenya, Marsabit Borana & Dawa, and Kenya-Somalia-Ethiopia. Annual Progress Report (2020).

characteristics that are required to provide local climate risk knowledge including those required for climate change adaptation and mitigation.

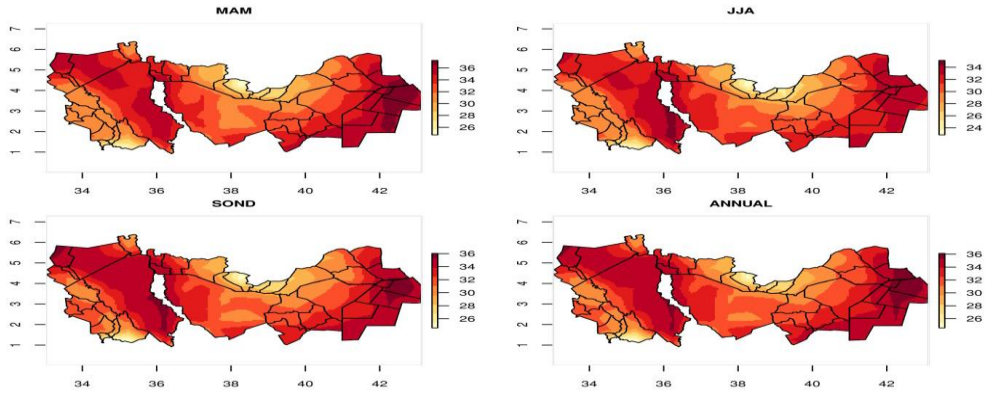

Figure 6: Seasonal and annual maximum temperature distribution within IGAD cross-border areas

The annual mean temperature was obtained from average monthly temperature for the twelve months, while the seasonal temperature obtained from averaging the months in the season within the period 1981-2010. The maximum temperature varies from spatially and seasonally as shown in Figure above. Southern Ethiopia seems to generally experience a maximum temperature of about 26ºC – 29ºC throughout the years. In Northern Kenya, the spatial variability is higher than that observed in the Ethiopia and generally ranges from 30ºC -33ºC during both the MAM and SOND season, but is slightly cooler during the JJAS season generally ranging from 28ºC -30ºC. In Somalia, the maximum temperature generally ranges from 34 C -35 C with the exception of the MAM season where some areas seem to experience temperatures as high as 37ºC.

A good climate information system within the IGAD clusters will help in minimizing/managing some of the climate related challenges that occur within cross-borders. This information will help in monitoring of current situations and early warning for effective planning purposes within the cluster areas. The findings obtained in the study from key informants supporting these views were as follows;

- ✓ Yes. NDMA maintains drought information systems and process drought early warning information for use by stakeholders through production of monthly drought bulletin. Also, metrological department collects climate information data and guide stakeholders accordingly by informing weather trends in the cluster area.

2.2 Summary of Literature Review

Rangeland management depicts proper use of land for sustainable economic activities and mitigating degradation. The region suffers from severe climate change, recurring droughts and poor land management practices all of which have resulted to degradation of rangelands. This has led to scarcity of resources especially for pastoral communities in the Mandera cluster and South Oromo communities, south of Ethiopia and north of Kenya. The Mandera cluster are forced to consider enclosures as better agricultural practices for livestock in drylands. The case of South Oromo

communities define how development projects have an effect on indigenous agricultural practices and strain on rangelands. The two cases presented define the role of IGAD in providing a framework for rangeland management at regional levels that are supported across the board at local, national and regional levels.

2.2.1 Livelihoods of Pastoralists

The literature has shown that besides livestock, the rangeland areas are endowed with natural resources such as wildlife, forests, minerals, medicinal plants, wild foods, honey, rain-fed and irrigated crop agriculture, trade and harvesting of natural resources, radiant energy, fish, medicinal plants, water, wind energy, gums, resins, free seeds and aesthetics, tourism and commercial deposits of oil and natural gas, and sand and gravel among others upon which the people depend on. The pastoral communities have huge opportunities to be exploited for their development and transformation. Pastoralism and mobile livestock herding was the most cited way of using resources in drylands and marginalized areas where crop farming cannot easily be sustained.

2.2.2 Concerns and Gaps

The various cited gaps and concerns in the study include inadequate drought preparation and response, the methods used in rangeland management are old and do not consider new and emerging challenges, over-reliance on traditional pastoral management systems, the balance between under-utilization and over-utilization of rangeland fields and land tenure problems.

As rangelands are not registered with traditional routes, they face a lot of conflicts with farmers, by blocking farmers in fear of livestock damage to their crops. There is also failure to identify the most successful approaches to manage rangelands by most studies. The local and national policies on rangeland management are also not unified, and this leads to conflict of interest. Most national management practices do not require indigenous and local laws, and there is confusion on the most appropriate strategies to manage rangelands.

In addition, in the case of nomadic pastoralists, most strategies have not addressed how to reach them. Decision making will therefore be difficult, as it requires to involve the participation of the affected parties. Further, getting accurate information about the pastoralists will be unachievable, if they cannot be reached.

2.2.3 Problems Facing Pastoralists on Rangelands

The problems facing pastoralists cited in literature include but not limited to; population pressure, which has contributed to a proliferation of unplanned settlements, food insecurity, undermined indigenous institutions, unreliable crop productivity, loss of land to ranching, and environmental pressures such as land degradation and recurring droughts and famines. There is also political marginalization, underutilized and dilapidated infrastructure, inappropriate marketing systems, irrigation schemes involving high costs, landlessness attributed to historical land injustices, low levels of availability of water and forage for livestock.

The study also cited overgrazing, transmission of transboundary animal diseases and conflicts, poor provision of services and remoteness, poor government policies, inadequate prediction, prevention and mitigation mechanisms, poor infrastructure, lack of basic health services, cattle rustling and arms proliferation.

SECTION 3.0 REGIONAL FIELD SURVEY

This section presents the responses and findings from a survey that was conducted on rangelands management and livelihoods to identify and understand the current systems of rangeland management and diversified livelihoods within the rangelands of IGAD-SECCCI cluster areas of South Omo-Turkana, Moyale-Marsabit and Mandera triangle.

3.1.1 Target experts

The target population (experts) for the study survey were senior government officials, Civil Society Organizations (CSOs), and community political leaders.

3.1.2 Data collection

Data was collected using key informant interviews (KIIs) and from secondary sources. The survey targeted to conduct 30 interviews, 10 from each cluster. During the data collection, interview questions were sent to the key informant through emails, and response sent back via emails. Because of the COVID-19 pandemic, lockdown and restriction of movement outside Nairobi, emails, skype and Zoom were used to collect data.

The survey was anchored on several ethical considerations to ensure no violation of the participants' rights occurred and to ensure high quality and integrity of the data collected. These ethical considerations included; individual consenting; voluntary and autonomous participation; privacy in storage of data and confidentiality.

3.1.3 Documentation and Collation of Data

After collection of qualitative data from the interviews and secondary sources, thematic and summaries were conducted to respond to the assessment objectives.

3.1.4 Data analysis and report development

The qualitative data from KIIs was analyzed using thematic analysis approach. This was achieved through developing a thematic area framework from the key issues, concepts and themes emanating from the open-ended questions.

Limitations of the baseline Study

Field missions to the cross-border areas and face to face interviews with key professional staffs, beneficiaries' and other stakeholders from the SECCCI project areas was not possible due to COVID 19 pandemic, lockdown and restriction of movement outside Nairobi. Instead, Emails, Skype and Zoom were used to collect the primary data.

3.2.0 SURVEY FINDINGS

3.2.1 General Information

The survey sought to establish the clusters to which the respondents belonged to. The findings are shown in Figure 8.

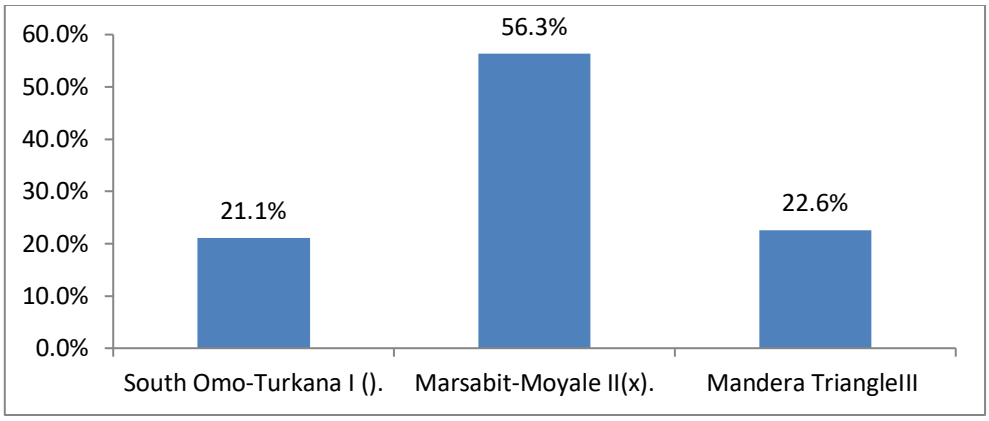

Figure 7: Responses from Clusters

From the findings, most of respondents were from Marsabit-Moyale cluster as shown by 56.3% while others were from Mandera (22.6%) and South Omo-Turkana (21.1%). Every region from the clusters were represented.

3.2.2 Current Systems of Rangeland Management

The respondents indicated that the systems of rangeland management currently used in the clusters include pastoral production system which is managed and controlled by communities, Conservancies – MELAKO (Merille Laisamis and Korr) areas, SONGA, SHURR conservancies and JALDESA community conservancies and free land Management by pastoral communities.

In addition, the respondents indicated that nomadic pastoralism in another current rangeland system where livestock are migrated to areas with good forage, pasture and adequate water, herd management – division of herds (warra and fora), rotational grazing, conservation of grazing areas through standing hay (enclosures). The survey also revealed that semi nomadism they have settled village clusters with basic amenities like dispensaries.

3.2.3 Prior Management of Rangelands

The respondents indicated that communities have been managing the rangeland resources in the pastoral production areas, the wet and dry season grazing areas, protection of water bodies through communities designated leaders, protection of environment through protection of trees and other rangeland resources. The communities also practiced transhumance or nomadic life where resources are utilized and communities moved to other areas. The respondents also indicated that for the past forty or fifty years, during the colonial periods, the communities were having rangeland management that were enforced but since then no rangeland managements were put in place and that during that time, the rangelands were divided for use during dry season

Moreover, the respondents indicated the use of traditional Wet and dry season pastoral grazing systems, demarcate grazing areas for each season. This has been eroded because of establishing mushrooming settlements, urbanization and increase in population.

3.2.4 Uses of Rangelands apart from Pastoralism

The respondents indicated that apart from pastoralism, rangelands are used as community conservancies, development of community facilities and projects, Mining and exploration, for crop production and as ranches. The respondents also indicated that the rangelands were also changed to

settlements and urban centres and the issue of rangeland is dwindling and these was caused by climate change due to frequent drought that made pastoralist to loss their livelihoods thus forcing settlements and that they also use as farming in the Agro pastoral livelihood zone.

Other uses of rangelands apart from pastoralism included grazing livestock, opportunistic dryland farming, water harvesting facilities and other alternative sources of livelihoods (bee keeping)

3.2.5 Current Land Tenure Systems

In the urban areas the land is individually owned with title deeds given to owners, in the rangelands the land is owned communally by the communities. Communal land ownership in most common occurrence in most part of the county, however all the different forms of land ownership are found in the county. The four are: Public land, private land, communal land and forest land. Marsabit has a gazzeted forest which is protected by government and its source of livelihood for communities living in the area. The county also has a UNESCO recognized biodiversity centre in Gatab.

The respondents also indicated that Community land that is held, managed or used by specific communities as community grazing areas and lawfully land held as trust land by the county government.

3.2.6 Law(s) Protecting the Rangelands

The respondents indicated that the laws protecting the rangelands are County rangeland policies, New community land act, Land act 2012, Land registration act 2012, Land control act 1967, National lands commission act 2012, Lands adjudication act 2010, Land consolidation act 2012, Environment management and coordination act 2012 and All county land policies. Respondents also indicated Republic of Kenya (2012) 'Sessional Paper No. 8 of 2012 on the National Policy for the Sustainable Development of Northern Kenya and other Arid Lands: Releasing our Full Potential' (the ASALs Policy).

3.2.7 Whether there is Climate Information System Available

The respondents were asked to indicate whether there is climate information system available for monitoring the current situation and early warning for effective planning in their cluster. Findings are shown in Figure 8

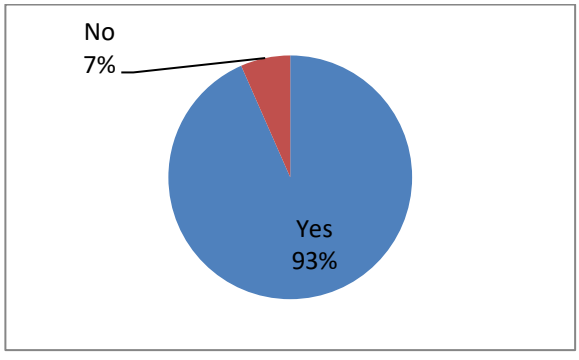

Figure 8: Availability of Climate Information

From the findings, majority of the respondents indicated that there is climate information system available for monitoring the current situation and early warning for effective planning in their cluster as shown by 93%. They indicated that the national drought monitoring authority provide climate

related information through weekly, monthly, bulletins. The information is shared through the county steering group meeting. The multidisciplinary teams occasionally conduct assessment of the areas and provide information and early warning for effective planning.

In addition, the respondents indicated that in their County, Climate information systems are there and there is Government institution that is mandated to drought risk management and issues of climate change (National Drought Management Authority) where they have the Monthly drought early warning systems produced for timely response on issues of climate change. The Monthly drought bulletin produced is shared with all stakeholders to mitigate any issues that arise.

The respondents also indicated the department of drought information under national drought management authority develops and maintain drought information systems and Process drought early warning information for use by stakeholders through production of Monthly drought bulletin and Metrological department collects climate information data and guide stakeholders accordingly.

3.2.8 Existence of Drought Mitigation/Management Strategies

The respondents whether there are drought mitigation/management strategies in the area. Findings are shown in Figure 9 below.

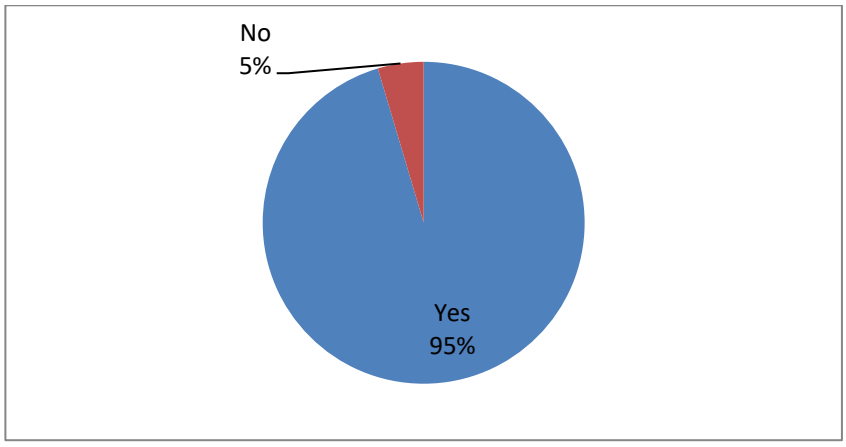

Figure 9: Existence of Drought Mitigation/Management Strategies

From the findings, the respondents indicated that there are drought mitigation/management strategies in the area as shown by 95%. In addition the respondents indicated that the most common drought mitigation/management strategies in their cluster area include provision of farm inputs – seeds, tools, equipments to the farming communities, provision of livestock feed supplements. social protection to the vulnerable members of the society through cash transfers to cushion them, food vouchers for the poor, provision of livestock insurance money, mass livestock vaccination, livestock off take programs, construction of dams, pans and water harvesting infrastructure, regular peace and security meeting to reduce resource based community conflicts, commercial destocking, transportation and distribution of livestock feed supplements, relief supplies, support pasture production and construction of hay stores.

The respondents also indicated that they have the each local governments Steering Group meeting which normally coordinate drought risk activities and technical/Sector group meeting that are mandated to specific sectors on issues of drought, that the county has also its contingency plans for effective management of drought risks where each sector will develop the three case scenarios that

mitigate the effects of drought risk and climate mitigations and that response plans by sectors shared with County Steering group meeting for County government and non-state actors to respond and mitigate the crisis.

3.2.9 Most Common conflicts Experienced

The respondents indicated that the most common conflicts experienced in their cluster area were resource based conflicts, conflict over the rangeland resources like water, pasture, competition for livestock resource in the hot spot areas is the primary source of the community conflict, cattle raids, Banditry, Moran or young community warriors who uses culture and traditions to invade and steal livestock from neighboring communities and claim to ownership of communal land by warring communities. The respondents indicated administrative boundary related conflicts and proliferation of arms and ease of availability in acquisition of arms amongst pastoralist is a big issue.

3.2.10 Mitigation of the Conflicts

The county has established peace and security committee members who represent elders, religious leaders, county government officers, national government officers and political representatives i.e. Governor, senator, members of parliament, members of county assembly, the members meet to discuss issues that led to conflict hence ensuring communication between the warring communities to restore calm. The communities can be told how to live together harmoniously and use the resources together without harming one another. The county has a department dealing with peace and peaceful coexistence between communities.

The respondents also indicated that conflicts can be mitigated through sharing of resources as the resources as is scarce and creation of awareness on spiritual importance of togetherness, Construction of water storage and conservation facilities e.g. construction of earths pans and underground water tanks, drilling of boreholes, Farming practices: dryland farming and conservation agriculture practices (soil and water conservation), developing drought preparedness and response plans for immediate actions (restocking programs; livestock feeds distribution, construction of water pans), conducting drought and flood risk assessments for responses and capacity enhancement that build community's resilience to droughts effects.

3.2.11 Key areas of Concerns and gaps in Rangeland Management and Diversified Livelihoods

The respondents indicated that the key areas of concerns and gaps in rangeland management and livelihoods diversification in the area included poor available rangeland resource, low quality forages, overgrazing and degraded soil condition due to heavy grazing, the communities lack good decision making powers and fair sharing of community resources and lack of community participation in management processes, lack of rangeland management policies to address sustainable rangeland management and promotion of sustainable livestock production in the county maintaining good relationship between pastoral communities, farmers and conservational authorities.

The respondents indicated that the key areas of concerns and gaps in rangeland management and livelihoods diversification in the area included rangeland management requires legislation: there is no law governing the pastoral communities and communities graze their livestock haphazardly without taking into future thus depleting the little resource available, large herd size by the communities properly one farmer has over a thousand cattle thus need to sensitize them on reduction of herd size, settlements: Many settlements were formed either on clan or pastoral drop outs thus

minimizing the settlements and frequent drought; these has also affected the situation of rangelands. Other concerns identified by the respondents included negative human effects (overstocking, deforestation, urbanization and increase in population), increased pressure from local people to open protected rangelands for other community use, cultivation of crops, loss of vegetation/ loss of biodiversity, range land degradation, recurrent and prolonged drought, invasion by alien invasive species (Introduction of exotic species), global warming (climate change), Human wild life conflict (Malkamari game reserve communities sees wild life conservation in their rangelands as infringements to their rights), Emergence of new economic opportunities and competing development needs (quarry mining is a potential activity that cause severe rangelands environmental destruction) and resource based conflict (increase in demand for rangelands resources).

3.2.12 Recommendations for Action

The respondents also recommended that there is need for protection of degraded land, reseeding and pasture production, introduction of lost species within the rangeland areas, addressing challenges of invasive species, training, capacity enhancement and exposure visit to Botswana where livestock production is flourishing to learn from the best, enhancing community participation on rangeland utilization, helping the county enact its rangeland policies with the necessary tools and instruments, promoting commercial livestock production and promoting good relationship between farmers, pastoralist and conservancies. The respondents also recommended that the County Assembly need to put in place legislations that govern rangeland management and enforce it at location level, stop or reduce the formation of new settlements, sensitize communities on herd size reduction and train communities on early warning information and drought mitigation measures.

Other recommendations for action as indicated by the respondents included:

i. Practicing conservation agriculture and dryland farming and need for policy document on management of rangelands and its biodiversity
ii. Involvement and full participation and engagement in decision-making, planning and development of activities like Malkamari game reserve.
iii. Civic education in conservation of rangeland management and empowering locally communities economically through enhanced livelihood diversification,
iv. Good governance through direct support to pro-poor polices and zero tolerance to corruption and accountability and the transparent use of public funds
v. Proactive population policy, education on family planning and implementation of poverty reduction strategies.
vi. Support strategies for the conflict prevention and peace building for resource based conflict at local communities level
vii. The problem of climate change and its potential impacts on rangeland biodiversity should be addressed through adoption of a various drought and climate mitigation and adaptation measures including activities such as deforestation, adoption of proper land management practices (including agroforestry), changing energy technologies (e.g. the use of efficient wood stoves and biogas), adoption of integrated land and water management practices.
viii. Civic education on invasive species and raise awareness of their usage and control.
ix. Adhere to rules of environmental impact assessments – quarry mining.
x. TOT training on rangeland managements and livelihood diversification.

xi. Conduct studies and recommend ways of providing alternative livelihoods with a view to having radical change in pastoralist livelihood as the range resources will continue to deteriorate

3.2.13 Proposed Appropriate Training Course Contents

The respondents recommended that the appropriate training courses and contents on Rangeland management practices and Diversified Livelihoods include rangeland ecology and management, ecology, rangeland plant identification, renewable natural resources, principle of vegetation management, global environment impact, integrated rangeland management, remote sensing of environment and GIS application. Other areas for training include training communities on drought cycle management and early warning information, Training communities on Community Managed disaster risk reduction (CMDRR) and linkage of Communities and EWS.

Other appropriate training courses indicated by respondents were introducing alternatives to free range grazing, introducing semi nomadism livelihood, Tapping gums and resins, identification of Conflict drivers and finding lasting solution.

SECTION 4.0 STUDY OUTCOMES

The section presents outcomes of the study supported by the survey responses and data collected from secondary sources.

4.1 Current Systems of Rangeland Management and Diversified Livelihoods

Current systems of rangeland management and diversified livelihoods are meant to improve the management practices of ranges and enhance productivity among the pastoralists. Approximately 70% of the human population inhabiting the rangeland areas are nomadic or semi-nomadic pastoralists. The primary use of rangelands is for livestock production and farming. Previously rangelands were protected, conserved, managed, maintained through traditionally practiced wet and dry season grazing management system through enforcement of chief Acts. This is because rangelands are essential to the subsistence of pastoralists' economy as it acts as main sources of forage and pasture for their livestock. There used to be a functional traditional rangelands management systems which have since been eroded. Communities used to respect traditional wet and dry period management systems, where a 15km stretch near centres are left for grazing during dry seasons. This is attributed to changes in lifestyle, poor rangelands governance and lack of skills to utilize the opportunities for alternative livelihoods in the current business oriented markets

Currently rangelands are experiencing land use change resulting into many different socioeconomic activities with adverse implications on pastoralist livelihood as the end users. The range lands management face threats resulting from many challenges, community land tenure systems, poor land policy, population growth, introduction of mushrooming settlements (urbanization), recurrent drought, high poverty rates, environmental degradation, climate change and declining wildlife due to human interferences and poor rangelands managements systems.

Clan based politics and resource based conflicts have made the rangelands management systems to erode due to competition for land resource negatively affecting marginal groups, the hunter-gatherers and pastoralists, which are being increasingly displaced by farmers and urban population.

Traditional grazing rangeland management system is slowly losing their importance in natural resource governance as the traditional communities embrace modern lifestyle. The erosion of traditional herding practices is accelerated leading to loss of rangeland use governance and other adaptive husbandry practices. Changing pastoral lifestyle as a result of interactions with neighboring communities has led to supplementation of their diet of milk, meat and blood with agricultural products. This change has resulted in transformation from pure pastoralism to other forms of land use such as agro pastoralism with adverse implications on the rangelands.

Transfers of responsibilities to lower units of local governments have contributed to poor rangelands management through increased development of projects in the rangelands such as water provisioning, increased medical services and social services coupled with sedentary lifestyle and population growth. The systems identified by this study were:

4.1.1 Enclosures

The enclosure of rangelands and registration of exclusive rights in the grazing by individuals or groups of prastoralists has been increasing over the past few decades. Rehabilitation of degraded rangelands through the establishment of enclosures is believed to improve soil quality and livelihoods, and enhance the sustainability of rangelands. Grazing Dominated Enclosure (GDE) and Contractual Grazing Enclosure (CGE) are the common enclosure management systems in Kenya.

Under CGE, a farmer owning few animals leases the enclosure to households with relatively more livestock, while GDE is where the livestock utilizing the enclosure are purely owned by the farmer. Livestock management in both systems is via the free-range system.

In restoring degraded rangelands, enclosures have been used where grazing is excluded for a specified period of time. Enclosures have proved to be viable systems for restoration of degraded land in different parts of Ethiopia, when they have clearly defined resource boundaries, users and realistic rules established. Incorporating scientific and indigenous knowledge in the management of rangeland enclosure to prevent unwanted results is essential in the management of rangelands.[54] The findings obtained in the study from key informants supporting these views were as follows;

- ✓ Currently, rangeland management is done through nomadic pastoralism where there is conservation of grazing areas through standing hay (enclosures).[55]

In areas such as the Lake Baringo Basin, the severity of rangeland degradation has made the life of the pastoralists very harsh. Overstocking in the open range has undermined the economic welfare of local livestock keepers who face high levels of stock loss amidst other problems at the end of the dry season, especially if it is protracted. Their response has been to enclose a portion of their rangelands for their exclusiv euse, while emulating the communal rehabilitation enclosures set up by the community. These enclosures help in conservation of grazing and fodder lands by encouraging vegetation regeneration and tree planting.

Enclosures provide opportunities for productive livestock production as it supports diversified income streams. Enclosures also contribute to enhanced soil organic carbon and vegetation cover. The results of the research affirm that observed transformation into the use of enclosures provides opportunities towards sustainable livestock agro-pastoral system that is valid in different drylands across East Africa. It is also important to note that emergent risk of inequalities and conflicts related to land is triggered by weakened communal property rights and this poses a threat to sustainability.

The change from pastoralism to agro-pastoral system in livestock production where enclosures are incorporated as part of rangeland management therefore represents productive and sustainable transformation and development that proves to be valid in many dryland areas. In this case, the use of enclosures will substantially reduce strain on rangelands and depletion of resources and create diversification in agriculture resulting to enhanced use of rangelands. This will subsequently reduce conflicts brought about by strained rangeland resources where each community wants a share of the limited resources.

Damage to the environment is reduced and allows tree species to grow for longer, while stock taking (counting the animals) and examining a herd is easier and quicker, as livestock can be separated and re-grouped easily. Milking is made simpler, as lactating animals are partitioned separately. Time is saved, as one does not have to search for animals within a larger herd.

4.1.2 Fodder Production

A big challenge for settled pastoralists whose herds have limited mobility is the lack of animal feed

[54] Mohammed, Hakim Hashim, and Mukeram Teha. "Rangeland degradation: Extent, impacts, and alternative restoration techniques in the rangelands of Ethiopia." *Tropical and Subtropical Agroecosystems* 19, no. 3 (2016): 305-318.

[55] Mohamed, Issac., (NDMA, Mandera) Interview with Adan Mohamed, IGAD, May 2020.

during the dry seasons, especially in times of drought. Forage bulking and conservation storage of hay and/or silage and also erecting enclosures for standing forage provides opportunities to ensure livestock have access to high quality forage all year-round. At the times of surplus forage, rangelands normally realize increased livestock productivity and off take as such it is recommend to facilitate sales and slaughter to regulate the stocking density. Likewise, fencing off of areas and rotation of the grazing livestock on several pieces of land is a suitable option to regulate the intensity and timing of grazing. Additionally, it is important to rehabilitate pasture land with improved grass varieties and legumes for higher yield, higher nutritive value and palatability of forage. The findings obtained in the study from key informants supporting these views were as follows;

- ✓ Rangeland Management is done through rotational grazing, which allows for conservation of grazing areas.[56]

In the riverine basins such as Daua and Ganane rivers in the Mandera Triangle, the Agro pastoralists grow irrigated fodder production for their livestock. It is also an alternative source of livelihoods for the Agro-pastoralists. It is an income generating activities and the surplus fodders are being sold to other livestock owners living outside the Rivers basins during the dry spell.

4.1.3 Wet and Dry Season Grazing Management

Grazing management is a major way to conserve rangelands.[57] Dry rangelands can become degraded by overgrazing; degradation occurence depends on the local systems and rules for organizing who grazes which animals where, at what time of year, and for how long. Soils, plant species and location can also be significant. Both under- and over-estimating the role of grazing in degradation will likely confound effective rangeland management. In response, collaborators in the conservation sector are building networks to monitor how rangelands are changing, where they are improving versus degrading, and assessing the mechanisms driving these changes.

Challenges include but not limited to herders facing difficult challenges from frequent droughts, conflict over land, livestock disease, population pressure, and restricted pasture access. In some areas, overgrazing results in land degradation, which when severe compromises pasture productivity and can cause massive soil erosion. The findings obtained in the study from key informants supporting these views were as follows;

- ✓ Free range grazing is practiced by pastoralists who migrate depending on availability of range resources of water and pasture; semi nomadism, agro-pastoralism, and satellite pastoralism.

- ✓ Traditionally, there were defined wet and dry season grazing patterns, this is currently nonexistent. The use of traditional wet and dry season pastoral grazing systems, demarcate grazing areas for each season. This has been eroded because of establishing mushrooming settlements, urbanization and increase in population. They also used to keep off livestock 15 miles away

[56] Mohamed, Issac., (NDMA, Mandera) Interview with Adan Mohamed, IGAD, May 2020.
[57] Jason Sircely. Managing degradation in East African rangelands. *International Livestock Research Institute and Natural Resource Ecology Laboratory*. 2015.

from permanent sources of water during so that be used during the dry season[58]

However, there is a difference between the wetter and drier savannas in terms of their system dynamics. In wetter rangelands, grazing can strongly affect the condition of the vegetation, and therefore also the soil. In contrast, since rainfall is the primary control over the condition of drier rangelands, grazing does not often cause degradation in drier, less productive systems.

As shown in Figure 10 below, wetter, savanna in Borana Zone, southern Ethiopia is in good condition due to protection from wet-season grazing as a dry-season forage reserve, and as in Figure 11, it is in poor condition due to open access grazing, shrub encroachment, and major soil erosion. In both photos, most shrubs had been selectively cut in recent years.[59]

Figure 10: Wetter, savanna in Borana Zone, southern Ethiopia in good condiion

Figure 11: Wetter, savanna in Borana Zone, southern Ethiopia in poor condition

There are mechanisms in use that aid pastoralist communities in controlling grazing during wet and dry seasons. During the wet season, livestock does not require water from the boreholes since the livestock water pans have empounded enough run-off water that can last for a while. Livestocks are sent to the areas where there are no permanent water sources but where they can access water from water pans during the wet seasons. When these temporary water pans dried up they are sent back to

[58] Mohamed, Issac., (NDMA, Mandera) Interview with Adan Mohamed, IGAD, May 2020.
[59] Jason Sircely. Managing degradation in East African rangelands. *International Livestock Research Institute and Natural Resource Ecology Laboratory*. 2015.

those areas with permanent source of water, such as the boreholes and the river basins with conserved enough pastures. Further, with new technologies such as controlling herds through satellite herding, unidentified herds are restricted from entering the areas they are not documented. This reserves the pasture for the milk herds kept at home, thus providing milk for home consumption and sale. During the dry season the pastoralists access to the permanent livestock boreholes and wells in the entire grazing area that belongs to them. This systm of rangeland management is one of the most common practices and allow the rejuvanation of vegetation cover.

Contingency Livestock Boreholes: in some counties or districts the governments or INGOs have drilled and equiped contingency livestock boreholes in a conserved wet season grazing areas and to be used only during the dry season. No settlement is allowed in near by (certain radius) these contingency livestock b/holes. This allows the surrounding rangelands of the contingency b/holes to rejuvanate and pasture available for the livestock during the dry season/peak of the dry spell.

4.1.4 Building of Middle-Level Dams

To address the climate change effects, pastoralist areas are being identified for building middle-level dams on the river basins to harvest the excess, the over-flow and the floods during the rains with out affecting the down-streams and the normal flow of the rivers. This helps to store necessary water that is needed for irrigation schemes through out the year. Irrigated farming is one of the major alternatives livehoods to pastoralism. Through this practices, the pastoralists will be able to enjoy irrigation farming and be able to sustain themselves in the rangelands. This is an alternative to rain-fed farming where crop failure due to inadequate rains is common.

4.1.5 Water Trucking

This is a practice used during a severe drought, when the livestocks are weak and they can not trek to water points and the distance between the available dry pasture and the water points are quite distance. In such scenario, the pastoral communities, with help from the governments and other concerned stakeholders, have been able to ensure water trucking for the livestock. This practice helps the weak animals animals especially the lactating and pregnant animals to access water and pasture in short distance.

4.1.6 Climate Change Control

Climate change has led to the problem of conflict and migration in drought prone areas. Climate is among the crucial factors in having essential resources such as water, food, energy and other important resources in these areas. Sensitivity to climate variability and change cannot therefore be ignored. Therefore, communities and stakeholders including decision makers and resource managers are working towards timely, trusted, usable and tailored information for decision-making in rangeland management.

Good climate information system on rainfall and temperature, helps in reducing climate related challenges that occur, especially within cross-borders[60]. This information helps in monitoring of current situations and early warning for effective planning purposes. However, availability and use of climate information for decision making is not sufficient. Other challenges of the existing climate services include inadequacy of number of climate observation stations, and limited coordination, management and sharing of available information among stakeholders. In addition the climate

[60] SECCI. Support for Effective Cooperration and Coordination of Cross-Border Initiatives in Southwest Ethiopia - North West Kenya, Marsabit Borana & Dawa, and Kenya-Somalia-Ethiopia. Annual Progress Report (2020).

information provided is not often translated into a usable form that meets planning and policy-making needs.

It is important to note that the communities within the clusters need to ttake advantage of the Grassland Project Protocol developed by the Climate Action Reserve where landowners can now generate carbon credits by preserving grasslands and avoiding the climate impacts of land conversion, including the release of soil carbon, application of nitrogen-based fertilizers and use of carbon-emitting machinery.

4.1.7 Mechanisms on Land Management

Rangelands are being registered with traditional stock routes and avoid commotion with farmers and their crops. In addition, the provision of land tenure security for the dryland communities like pastoralists by the government is a major boast in management of these areas. Most tenure provisions in the constitutions and laws are being revised to suit pastoralists, who are the main custodian of these lands. For instance, 77.2% of land in Karamoja is under government control with 11.6% under National Forest reserves, 24.8% under exclusive mineral exploration licences and 40.8% for wildlife conservation.

4.1.8 Increased Mobility

Cross border transhumance corridor development is seen as a means of promoting and enhancing resilience of the cross border agro-pastoralists and pastoralists. Mobility is the first measure taken to solve shortage of livestock feed and water. There is strong evidence that more mobile pastoralists are better able to withstand droughts than those who have become partially or completely sedentarized. Nalubwama[61] revealed that a limited number of households still practice mobility in which they take different directions to search for forage and water. About 32% of pastoralists, 20.4 % of agro-pastoralists and 22.6% of crop farmers used mobility as a coping strategy. The predominantly crop farmers too used mobility in search of employment in the nearby trading centres/towns. The findings obtained in the study from key informants supporting these views were as follows;

- ✓ Rangeland management is done through nomadic pastoralism where livestock are migrated to areas with good forage, pasture and adequate water.[62]

Forage from natural pasture and crop residue constitutes as high as 90% of livestock feed and mobility is an important part of livestock production in both pastoral and agro-pastoral areas for feed access. In such environments, remote-sensing data combined with modeling and ground data (as shown in Figure 12 below by ICPALD, GIS remote sensing) are essential to assess and monitor forage production over large, heterogeneous and often remote areas where sustainable livestock production is usually hampered by seasonal variations of forage quality and quantity mainly due to the effects of climate change.

[61] Nalubwama (2018).
[62] Mohamed, Issac., (NDMA, Mandera) Interview with Adan Mohamed, IGAD, May 2020.

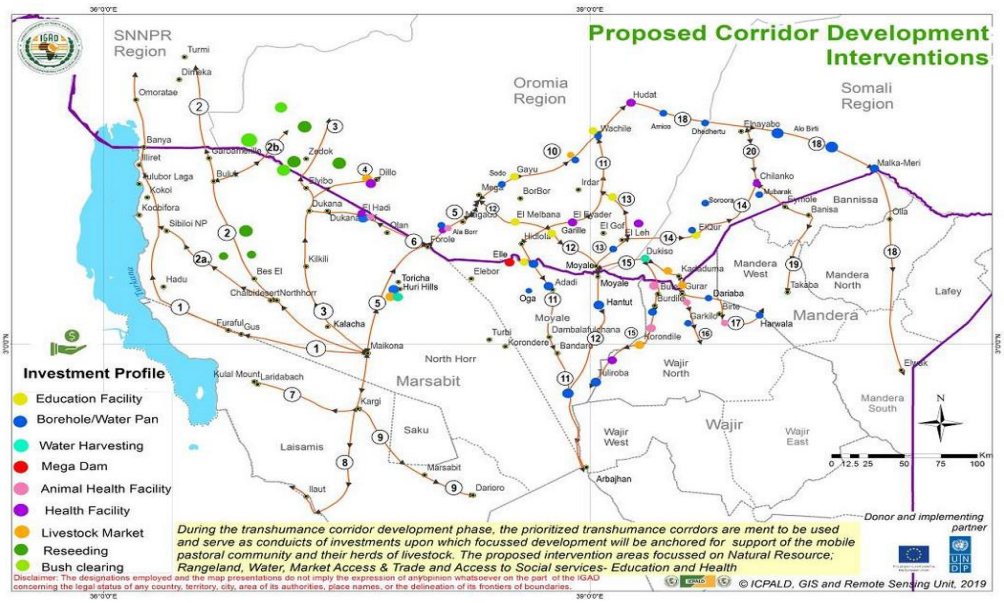

Figure 12: ICPALD, GIS remote sensing, 2019

4.1.9 Early Warning Systems

Early warning systems inform pastoralist communities on weather trends and disasters and alert them for effective preparedness and response. This is done through weather prediction mechanisms, which allow pastoralists to plan for the future about their animals. Producers need weather information, particularly early warning information, to determine the decisions regarding grazing and migration if necessary. Only 31% of people acknowledge access to an early warning system and information regarding weather conditions. Only 23% recieve early warning information on a timely basis. Information is delayed. Of those who access early warning information, 20% are satisfied with the information and 5% are not satisfied at all.[63] The information is received largely through public media, and as a result, no payments are made in exchange for the early warning information.

Climate is one of the key factors in determining the availability of water, food, energy and other resources. Pastoralists and agro-pastoralists in the cluster areas are dependent on natural resources for their livelihoods which are highly sensitive to climate variability and change. In this regard communities and stakeholders including decision makers and resource managers need to have ready access to information that is timely, trusted, usable and tailored to their specific decision-making needs.

4.1.10 Rangeland Rehabilitation

Rangeland rehabilitation has been done through propagation of plants and encouraging grass growth through hand cutting woody, prescribed fire on some species, cutting trees and preserving enclosures, resting of pasture land (deferred grazing), reseeding and movement during dry seasons. Feed, both quantity and quality, is one of the determinants of Livestock production in the IGAD region. Forage from natural pasture and crop residue constitutes as high as 90% of livestock feed in the IGAD member States. In these environments, remote-sensing data combined with modeling and ground data are essential to assess and monitor forage production over large, heterogeneous and

[63] Nalubwama (2018).

often remote areas where sustainable livestock production is usually hampered by seasonal variations of forage quality and quantity mainly due to the effects of climate change.

4.1.11 Controlling the Herd Size

Because of recurring droughts, loss of grazing lands through expansion of cultivation and human encroachment and the changes in land use, pastoralists are now learning more and more on how to control their herds. This is done by having large herds during the wet season, and downsizing their animal numbers during the dry season. The development of an evidence-based decision-making Rangeland Dought Lvestock Early Warning System (RDLEWS) by ICPAC together with partners tremendously helps to bridge this gap. The system integrates climatic information and rangeland forage biomass production assessment, monitoring and forecasting at various spatial and temporal scales. The system uses best-fit predictor models across different land use-land cover types and rainfall seasons to predict available forage for better livestock stocking rates and forage management to enhance resilient livestock sector development in the IGAD region. The RDLEWS model uses the balance-imbalance feed scenario analyses between livestock numbers and the available rangeland forage in arid and semi-arid lands in conjunction with rainfall patterns, to capture livestock populations and stocking rates within the IGAD region. This will greatly improve rangeland management, livestock production and monitoring and early drought warning within the rangelands of IGAD region.

4.1.12 Drought Mitigation Strategies

4.1.12.1 Herd Management and Herd Splitting

The goals of this practice is to match seasonally high feed needs with seasonally high levels of feed resources, and to add flexibility and alternative revenue streams during the drought. During the scarcity of forage, it is economically valid to keep less animals by destocking to reduce grazing intensity and also provide supplementary feeding i.e. feeding on concentrates or supplements to bridge the gap of sufficient feed.

Assessment of forage through biomass mapping and monitoring provides necessary tools to assist in decision making according to the productive potential of the land resource, such as, carrying capacity, utilization levels, grazing systems and range improvements. The rangeland carrying or grazing capacity dictates the maximum possible stocking of herbivores that rangeland can support on sustainable basis. The findings obtained in the study from key informants supporting these views were as follows;

- ✓ Rangeland management is done through herd management, where there is division of herds (called warra and fora).[64]

Other than biomass estimates, ther factors that can influence the availability of forage include terrain, distance to water and penetrability of shrubs and trees. The kind of grazing animal is also an important consideration because different kinds and classes of grazing animals differ in their ability to navigate these factors.

4.1.12.2 Contingency Planning

This involves established policies and specified plans and activities taken before drought to prepare

[64] Mohamed, Issac., (NDMA, Mandera) Interview with Adan Mohamed, IGAD, May 2020.

people and enhance institutional and coping capacities, to forecast or warn of approaching dangers, and to ensure coordinated and effective response in a drought situation. In Kenya, a contingency planning system is in place but still lacks set-aside contingency finance. Contingency plans are submitted through the County Steering Groups but often without the evidence-based scenarios that are likely to convince partners to fund them. Another concern is the weak link between emergency operations and interventions designed to support recovery and development. Thus Contingency Planning promotes and uses different approaches/tools that address the underlying structural causes of vulnerability and reduce the impacts of shocks in IGAD region particularly the three clusters of south Omo-Turkana, Moyale-Marsabit and Mandera. In this regard, the use of drought risk reduction, climate change adaptation and social protection such as Hunger Safety Net Programme (HSNP) all have an important role to play at different times and in different ways in reducing vulnerability and building resilience.

4.1.12.3 Monitoring and Early Warning

By being proactive rather than reactive, investing in early warning systems and assessing vulnerability, emphasizing protection rather than recovery is the way to go. IGAD Member States must understand not only where the most drought-stricken areas are, but also who and what is vulnerable and why. Integrated drought early-warning and monitoring systems that capture information on the incidence and severity of droughts can better identify vulnerable population groups and geographic regions. This facilitates early action and can lead to the development and implementation of a wide variety of mitigation actions including better land management to reduce impacts from future drought events.

Early warning systems can reduce hunger and distressed migration as a result of drought. Early warning provides timely and effective information to facilitate action to avoid or reduce the risk of droughts and prepare for effective response. Numerous natural drought indicators must be monitored routinely to determine the on-set and end of drought and its spatial characteristics. Although all types of droughts originate from a precipitation deficiency, it is insufficient to rely solely on this climate element to assess severity of drought. Effective drought early warning systems integrate precipitation and other climatic parameters with water information, such as stream flow, groundwater levels, reservoir and lake levels, and soil moisture, as well as a comprehensive assessment of current and future drought and water supply conditions. Local knowledge systems, including traditional knowledge of farmers and pastoralists should also be incorporated into the information system

The use of data and geographic information systems (GIS) to anticipate floods and droughts before they happen is an advanced science that has been able to predict extreme events with increasing accuracy. Delivering a policy response to these predictions can sometimes be more problematic and greater dialogue between scientists, policymakers and communities may help resolve this. Full understanding of the impacts of land cover changes and rainfall dynamics will contribute to early warning approaches in managing drought risks in the Rangelands of the Horn of Africa. Consequently, NDVI dictated by vegetation condition can be used to monitor the dynamic impacts of rainfall on vegetation cover, density and net primary productivity (estimated forage biomass amounts) for early warning and drought risk management within the Rangelands of Horn of Africa.

Equation 1: $NDVI = f(\text{Rainfall})$

Several studies have indicated that Normalized Difference Vegetation Index (NDVI) showed a

strong linear relationship with the fraction of photosynthetically active radiation absorbed by the plant (Asrar *et al.,* 1984; Sellers, *et al.,* 1996; Sellers *et al.,* 1997). Several studies have also shown the strong correlation between NDVI and vegetation cover and above-ground net primary productivity (Rafique *et. al.,* 2016; Running *et al.,* 1999).

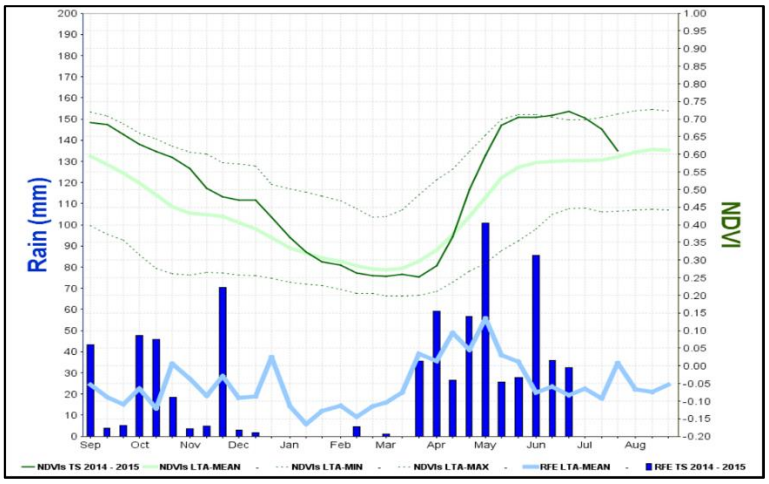

Figure 13: Relationship between NDVI and Rainfall: An Illustrative and schematic depiction
Source: Farah and Amdihun(2017).

This helps to detect accurately any deviations from the normal trends and delineate any strong correlations for early warning that can be used in future scenario modeling.

Equation 2: $NPP=_f(NDVI)$

Appropriate resilience analysis will help communities and policy makers to better understand and manage rangeland resources, mitigate climate risks and improve livelihoods that will result in improved resilience. It will further enhance understanding of rangeland production dynamics at sub-national levels within the IGAD SECCCI clusters.

4.1.12.4 New Technologies for Farming

Provision of need-based science and technology applications with a focus on fusion of local knowledge and organized knowledge for development of agriculture system and the livestock sector is crucial to drought management. Use of new technology on water harvesting techniques, livestock breed improvement and smart agriculture, coupled with use of agro-chemicals to maximize yields.

4.1.12.5 Water Harvesting, Dams and Reservoirs

Improved water storage in drought-prone regions represents a vital insurance policy for communities and farmers. Options for storage vary and careful consideration needs to be given to a community's water needs before adopting storage strategies. Dams are the most preferred forms of water storage.

Water harvesting, protecting water sources against contamination, de-forestation, developing water sources – such as micro dams, such as strategic livestock bore holes and water rationing/allocation can also be used to provide water during droughts. The goals of these practices are to support grazing systems that meet pasture, health and livestock production goals, and to improve reliability of water sources during drought.

Promotion of water harvesting and storage, training water user associations, planning for new water sources, deepening wells, and planning future interventions. With enough pasture and water, building up the herd, capacity building, strengthening social networks, development of livestock markets, conservation and protection of pasture using traditional rules and range management approaches, drought can be effectively managed. The findings obtained in the study from key informants supporting these views were as follows;

- ✓ Communities have been managing the rangeland resources in the pastoral production areas, protection of water catchment and bodies and free land grazing.

4.1.12.6 Capacity Building

In many Eastern Africa countries, drought awareness is limited and institutional capacities need to be strengthened by promoting public awareness and strengthening capacities of both the citizens and institutions especially at the local level: farmers, pastoralists and all those relevant actors and stakeholders involved in decision making. Local citizens and institutions, in particular, need help to identify and disseminate good practices that work in local conditions. The findings obtained in the study from key informants supporting these views were as follows;

- ✓ Yes, there drought mitigation/management strategies in this area include construction of water storage and conservation facilities e.g. construction of earths pans and underground water tanks, drilling of boreholes, dryland farming, soil and water conservation, animal feeds bulking, capacity enhancement of communities in resilience to drought.

4.1.12.7 Coordination

Drought management is a cross-cutting issue that requires collaborative action by a range of public and private sector agencies at national, county and community levels. There are many actors implementing and coordinating drought management initiatives, resulting in duplication, confusion, lack of synergy, and poor accountability. This degree of complexity calls for policy, institutional and legal frameworks capable of aligning initiatives to the government's development plans and harmonising approaches and strategies in different areas. For example, in Kenya, the existing government coordination structures include the Kenya Food Security Meeting (KFSM) and the Kenya Food Security Steering Group (KFSSG) at the national level, and the Counties steering groups at the counties level (CSG).

4.1.12.8 Reinforcement of Pastoralism

Livelihoods are clearly evolving, but pastoralism remains the dominant production system in the ASALs and underpins its regional economy. In some counties it provides employment and food security to more than 70% of households. It also makes an important contribution to natural resource management and sound stewardship of the natural environment. There have always been strong social and economic ties between mobile and settled populations; these are being cemented still further as the diversification of urban livelihoods is tending to focus on value addition within the livestock sector. However, pastoralism has never been afforded the policy and institutional support which will allow it to flourish to the full, despite evidence of pastoralists' adaptability both to climate variability and emerging economic opportunities. The African Union's Policy Framework for Pastoralism in Africa requires domesticating in the Kenyan context and measures taken to support

mobility, a key drought management strategy. Further, the harmonization of policies that facilitate cross border mobility in the Horn of Africa region will enhance climate resilience, peace and stability, and intra-regional trade. This process should be guided by a mapping of cross-border migration patterns.

4.1.12.9 Protection of the Livelihoods of Vulnerable Households during Drought

The major lesson of drought risk management is that early warning systems are of little benefit unless there is also the capability and will for early reaction. Specific activities can be carried out at different stages of the drought cycle which, in combination with the preparations made by communities, can significantly reduce the impact of drought. The systems of drought contingency planning and financing in response to drought risk are required, as well as investment in strategic activities that strengthen preparedness and response. Drought mitigation activities will take a livelihoods perspective and be well-linked with long-term development strategies. Regular impact assessments will evaluate the extent to which the loss of assets by households during drought crises is being reduced.

4.1.12.10 Emergency Relief and Ending Drought Emergency

The main types of emergency interventions provided include; food relief for affected people with special food formulas for most affected (children, elderly and mothers), human disease control and treatment, animal feed and supplements, water for human and livestock, cash transfer, food/cash for work/assets, livestock disease control (vaccinations against common diseases and mass treatment), shelter, debt relief, destocking, restocking, distribution of seed, supplementary feeding for livestock especially the breeding stock, rehabilitation of water points and agricultural credit.

4.1.12.11 Ending Drought Emergency

The ultimate objective of the drought response system in IGAD region is to promote early mitigation efforts that reduce the time that elapses from the point when warning of drought stress is given and the point when response starts. Drought mitigation activities will take a livelihood perspective and be specifically designed to support local economies and promote linkages with long-term development strategies. This is expected to reduce considerably the losses of assets by households during drought crises and contribute to enhance resilience among the IGAD clusters. The rationale of this approach is based on the fact that the benefits of investing in early response by subsidizing the livelihoods/ local economies exposed to drought risks are much higher than if intervening in a late stage to provide emergency humanitarian aids.

4.2 ALTERNATIVE USES OF RANGELANDS

4.2.1 Rain Fed and Irrigated Crop Farming

Pastoralists usually cultivate out of necessity, but better-off herders farm to invest the cash from crop sales or accumulate animals by not having to sell them to buy food. For example, better-off pastoralists of the Afar region of Ethiopia have the more favourable irrigation plots that allow them to earn incomes, which they can reinvest in livestock and can reduce dependence on food purchases. A similar rationale for cultivation is documented in the Borana and Karamoja case studies, where both poor and better-off pastoralists farm areas that also are used for grazing. Land use conflicts in these cases are difficult to adjudicate because of the conflicting reasons for farming and the different

parties involved.

The dry land areas of Ethiopia cover a wide range of agro ecologists and farming systems and are becoming increasingly important for agricultural production. For instance, the lowlands of the Omo Valley and the area surrounding Lake Turkana are home to people whose livelihood systems are based on a combination of mobile pastoralism, flood-retreat and rain-fed farming, a portfolio of economic strategies that allow them to exploit seasonally fluctuating resources. In Ethiopia, the average grain yield increase was very high up to 145 % for sorghum and about 125 % for maize compared to the traditional practice depending on soil type, slope, rainfall and the crop grown in some of the dryland areas, Kobbo and Melkassa. Similar grain and biomass increase of sorghum was also obtained in both Alemaya and Meiso areas.

The availability of irrigation as in the case of Garissa, or adequate rainfall for arable farming as in parts of Karamoja, diminishes the risks of rain fed agriculture, although as the Garissa case study shows irrigation pumps can break and, in the long term, fields can be made unproductive due to salinization. In the case of Mandera Triangle, the agro pastoralists practice both rain fed dry-land farming and irrigated farming along the Daua and Ganana Rivers. The most important crops grown under irrigation are maize and sorghum, which comprise 80% of irrigated crops in the district. In the past, cotton and okra were grown but there is currently no market for these commodities. The findings obtained in the study from key informants supporting these views were as follows;

- ✓ Rangelands are used for opportunistic rain fed farming, mining and firewood as wood products sources.

Areas such as South Sudan has a huge but largely unrealized agricultural potential. Favourable soil, water, and climatic conditions render more than 70 percent of its total land area suitable for crop production. However, less than four percent of the total land area is currently cultivated and the country continues to experience recurrent episodes of acute food insecurity. For most agro-pastoralists, after livestock production, crop farming remains the second most important livelihood activity, in terms of household food and cash income. Households cultivate only small parcels of land using improper hand tools with short handles which require farmers to crouch or kneel when cultivating.

4.2.2 Business and Trade

Growth in commercial trade and markets is creating numerous livelihood opportunities especially cross border trade. Pastoralists are taking advantage of greater incorporation into national and regional economies to move livestock and goods across geopolitical and land-use boundaries. This expanding trade is having multiplier effects; promoting diversification pathways in the dry-lands, with knock-on demand for transporting livestock, high value fodder and milk. Households are adopting a mixed strategy; maintaining herds on the range and developing trade, business or services.

Pastoralists investment in businesses including small, medium and large scale, points to a paradigm shift in livelihood strategies probably as response to climate change associated with frequent farming failures compounded by restricted mobility. The growth in domestic, regional/cross-border, and international livestock trade represents another significant recent change that affects pastoralist diversification strategies. These different trades have been dependent on pastoralist suppliers for decades, but as urban centres grew and international demand for livestock and animal products increased, their scale and complexity changed. For instance, only 54% of Borana households in

southern Ethiopia sold livestock in 2003–2004. As of 2019, the figure is around 78%. The trade increased in value by 14% and 24% for the periods 2001-2003 and 2004-2005, respectively. Such increment was probably due to the dramatic increase in the involvement of the private sector and the existing fair market for the products.

Due to collateral demand by financial institutions some pastoralists have formed saving groups among themselves to help themselves with their own savings at low interest rates. Money borrowed from such co-operatives or money lenders is used for either buying large quantities of food, renting/hiring land or invest in petty trade activities before it can be paid back after the crisis. In addition, the economies of the lowlands and highlands are complementary and increasingly integrated. There is already significant movement of capital between highland and lowland pastoralists, which is set to grow. With increase in income and urbanization, the highlanders will create more demand for meat and livestock products that increase economic opportunity for the pastoralists.

4.2.3 Wildlife and Forestry

There is increased gazetting of land for wildlife and forest reserves, and increased population in agrarian settlements. This can be seen in former grazing areas such as the Teso and Lango regions, Narok, Kajiado, Taita Tevata, Laikipia, Meru Counties and the district of Abim in Uganda. Rangelands also provide natural beauty, diversity of wildlife, and recreational opportunities, such as hunting, hiking, and camping; as well as economic opportunities like ranching. Wildlife conservation areas have however, restricted the land available to pastoralists. The excision of land for wildlife limits pastoral access to water and dry season resources, for instance in Laikipia. Wildlife excision has also created a rigid system which cannot adapt to changing environmental conditions such as drought, or seasonal events such as the migration of wildlife or pastoralists. The findings obtained in the study from key informants supporting these views were as follows;

> Conservancies such as JALDESA community conservancies in Marsabit-Moyale and MelkaMari conservancy in Mandera Triangle.

4.2.4 Natural Resources

Most rangelands in Uganda, Kenya and Ethiopia have commercial deposits of oil and natural gas such as in the north and east of Kenya. Other natural resources include sand and gravel for construction, a wide range of precious minerals, soda ash, gum, resins, wild foods, aesthetics and medicinal plants. Dry-lands' soils and vegetation store carbon, suggesting that the pastoral rangelands have the potential to generate payments for environmental services such as carbon sequestration. Rangelands in which pastoralists live are also rich in cultural and traditional heritage, flora and fauna diversity, valuable minerals, water, energy resources (solar and wind), and untapped tourist attractions.

In exploring natural resources, land tenure plays a key role. The Karamoja and Borana cases are most explicit in the recognition that strengthening indigenous land rights and institutions is critical for building resilience in pastoral areas. They also have important implications for pastoralist diversification strategies. In the Karamoja case, local rights to minerals and their lands often are allocated to outside investors without consultation with or benefits to local communities. Ambiguities over land rights in these areas allow mining companies and natural product merchants to extract valuable commodities with minimal economic benefits to communities.

4.2.5 Tourism

Rangelands are normally used for grazing by domestic animals and wildlife. Wildlife mainly supports the tourism industry and is found in the game reserves and national parks. In the Kenya, Uganda and Ethiopia, pastoralism and wildlife go hand in hand. Most protected areas such as game reserves and national parks are found in the arid and semi-arid lands (ASALs). This gives the region a comparative advantage in tourism.

Tourism is Kenya's highest foreign exchange earner and contributes approximately 12% to Kenya's GDP. Pastoralism, conservation and bio-diversity are closely interlinked with more than 70% of Kenya's wildlife is found outside protected areas on land occupied by pastoralists. With right incentives, research shows that wildlife numbers and diversity can be higher in areas adjacent to national parks than within the parks themselves. The findings obtained in the study from key informants supporting these views were as follows;

- ✓ There are community conservancies, development of community facilities and projects, mining and exploration, crop production and ranches.

4.2.6 Fuel Wood and Charcoal Burning

Fuel wood and charcoal sales are becoming the top alternative income sources for the pastoral communities. For example, in the Karamoja and Garissa, the areas have been culminated in an inability to maintain traditional ways of life. In recent decades, this has led to adoption of new income-generating activities such as the sale of firewood and the making and sale of bricks and charcoal on a commercial basis to an increasing urban population requiring them for construction and fuel. Wood is used to fire the bricks, as well as for charcoal, with effects on land cover.

Several former pastoralists are engaged in charcoal burning and cutting and selling firewood in mandera and Garissa Towns. There is cutting and selling firewood after pastoralists dropped out of pastoralism and moved to Mandera and Garissa towns. Wood resources are used for firewood in homes and restaurants, while building materials are supplied to the booming construction sector in the town. As the population of Mandera and Garissa has rapidly expanded in recent years, the demand for wood-based energy and construction materials has also risen. Tapping into range resources, such as trees, is not an alien occupation for former pastoralists like farming is. Although cutting trees and burning charcoal is not unfamiliar to them, it has risks as will be demonstrated in the case histories of former pastoralists.

In Karamoja, there is loss of woody cover which range from 7% in Kotido district to 16% and 36% in Moroto and Nakapiripirit districts respectively in the past decade. Loss of woody cover leads to a decreased ability of the land to retain water, more runoff and more soil degradation. Brickmaking itself necessitates mining of the topsoil, further jeopardizing agricultural production in this agriculturally marginal region.

4.2.7 Fishing

Fishing is evident in pastoralist areas such as Turkana. Fishing in Lake Turkana is a long standing, form of diversification. Fishermen along Lake Turkana migrate to follow the patterns of fish movement. The pastoralists also supplement their livelihoods by selling the fish. Namukuse and Longetch are currently the principal places where fish are caught in Lake Turkana. From north to south, other key bases for fishing include Lowarenyak, Nachukui, Kataboi, Namadak, Kalokol, Eleye Spring, and Kerio. While there are said to be plenty of fish around Central Island and off

Todonyang, fishing is not undertaken in these areas due to National Park restrictions and insecurity, respectively. Pastoralists are diversifying their incomes through fishing, increasing their resilience to drought, and fishing communities have launched village savings and loan associations that have boosted their incomes, helping members to meet their daily livelihoods.

4.2.8 Honey Production

There is growing interest in dry land bio-enterprise, with innovative projects in areas across the Rift Valley of Kenya. Bee-keeping is the fastest-growing SME activity in the pastoralism region. On average 70,000kg of honey are produced annually in Marakwet, West Pokot, Samburu and Baringo. In the Ewaso ecosystem, a partnership of institutions including the Laikipia Wildlife Forum, the African Wildlife Foundation and the Northern Rangeland Trust is promoting environmentally sustainable bio-enterprise production and marketing. The findings obtained in the study from key informants supporting these views were as follows;

> Opportunistic dryland farming and other sources of livelihoods such as bee keeping are extensively used. [65]

Honey production is a commercially viable enterprise, especially along the riverine ecosystems, for instance Turkwel and Kerio Rivers of Kenya. It is practiced in higher altitude locations close to the Ugandan border. The principal areas of honey production include Turkwel, Kalemunyang, Lokapel, Kanaodon, Kainuk, Loyapat, Lokwar, Ekwar, Kaptir, Nakwamuru, Kapelibok and Oropio.

Diversifying into honey production does not always result in improved livelihoods but that successful beekeepers were able to sustain their families. The manufacture of beehives only requires simple tools. An axe and panga (a machete-like tool) is required to chop and shape the hive. If you have these basic tools, anyone can enter beekeeping, particularly as communal lands have open access. Other areas such as Banissa sub-county of Mandera and Ijara sub-county of Garissa are also known for their honey production which supplements the livelihoods of pastoralists of those areas.

4.2.9 Basket-Making and Handicrafts

Commercial basket-making (and associated activities) supports a network of producers, traders and transporters in most areas such as Kenyan Turkana region and is especially important in the livelihoods of households located along dry-river valleys and close to Lake Turkana. The most important sites for these types of activities include Lodwar, Kalokol and Eleye Springs (for basket-making), and Kataboi, Kerio and Turkwel (for mat-making). In Turkana, women are the main producers of baskets, other woven goods and handicrafts, while men dominate the production of carved wooden products and actively trade both woven and wooden products. The principal products produced include mats, baskets and brooms, and an assortment of wooden goods.

4.2.10 Processing and Selling Hides and Skins

The processing and sale of hides and skins has been traditionally undertaken by groups scattered across many of the urban centres. However, as the market for hides and skins has tended to dry up, this activity has ceased in most areas, but there are still several groups actively processing and trading hides and skins in Turkana Kenya, for instance in areas such as Lodwar, Lorugum, Kerio Nakurio, Loturere, Kalokol and Lorengippi.

[65] Mohamed, Issac., (NDMA, Mandera) Interview with Adan Mohamed, IGAD, May 2020.

Lack of capital is the major constraint to making a good livelihood from selling skins and hides, as it restricted the amount of skins that could be purchased and sold on to the tanneries. Lack of alternative, possibly more profitable, outlets constrain the profitability of the trading activities. Transportation flags up as a significant proportion of member's costs; something that oblige them to utilize even greater economies of scale in order to make a profit.

4.2.11 Wild Products

Diversification through gums and resins marketing is not competitive with pastoralism; rather, it is supportive as it encourages mobility. The harvesting of gum and resin involves extensive movements across the landscape because trees bearing these products are spatially distributed. If herding and harvesting gums and resins are combined, this could facilitate mobility and enhance both pastoralism and the collecting of wild products, such as gums and resins. In addition to their economic and ecological contributions, gum and resin products also provide several other benefits. These include their uses as medicines for human and animal illnesses, for hygienic and perfuming (fumigation) of cloth and the body by women, for animal feed, and for food and chewing gums, particularly during dry seasons and droughts.

4.2.12 Camel Production

Camel production is an important source of food security and livelihood diversification for pastoralists. In Somali state of Ethiopia for instance, camel production serves to sustain people at present and near future. The main systems of camel production include majority of pastoralists (77.2%)[66] areas such as Korahay zone of Somali region use extensive camel management system, and they cover long distance of around 12 to 18 km every day for grazing and browsing activities. Herd management and feeding systems are done majorly through use of grazing and browsing feeding system (over 75%), supported by use of hay and crop residues feeding system.

Challenges of camel producers are very complex and complicated with policies and institutions related with the sector, and are not technical. Environmental conditions, family needs, household size, milk requirements and labour availability for herding are the major determinants of camel production for pastoralists. The main concern was that camel is among least domestic animals, research on camel is a recent initiative and there are major gaps of knowledge and technology to improve overall productivity and pastoralist livelihood.

4.3 RESILIENCE BUILDING IN IGAD RANGELANDS

4.3.1 Increased Adoption of Agricultural Technologies

Although local livestock breeds are considered to be more tolerant to climatic extremes, keeping improved livestock breeds and growing improved varieties of crops coupled with use of agro-chemicals to maximize yields increases productivity which increases resilience. The livelihoods of most of the people in the rangeland region strongly depends on rain-fed agriculture and pastoralism. Agriculture employs about 60-80% of the population which is in stark contrast with the limitations imposed by conditions in the Arid and Semi-arid lands, which receive less than 600mm of annual

[66] Abduselam Abdulahi, Kibebew Babege, Abreham Zuma. Determinants of Pastoralists' Choice of Camel Production and Production Systems in Eastern Ethiopia. *Review of Agricultural and Applied Economics*. 2020.

rainfall and comprise about 70% of the area of the region.

Investment in pasture production technologies ensures pasture feed availability and continuous livestock production which ensures household food and nutrition security and increased income. The adoption of such technologies has potential for increased productivity of livestock and crops in the pastoralist areas, leading to optimum domestic consumption and in some cases, sale of excess farm products to provide cash for other household needs.

Both Pastoral and Agro pastoral households use of agrochemicals and drugs due to the high prevalence of vector borne diseases associated with tropical climate. To guard against food insecurity, households purchase and store grain in anticipation of drought for fear of increasing grain prices that come with prolonged droughts.

4.3.2 Trading Occupation

Most trade comes through selling livestock or livestock products such as milk, butter, ghee and hides and skins at the major market centres for pastoral communities. However, other, non-livestock-based trade can include crops, charcoal, firewood, wooden poles (for building), chicken, resin, gum arabic, incense, alcohol and khat (a leafy stimulant). Poorer pastoralists often resort to selling charcoal and other products which they can collect from the rangelands but a government ban on selling charcoal can make this a risky business and incur fines. In addition, gum arabic production in areas such as Turkana faces stiff competition from Sudan, where 80% of the world's gum arabic originates.

More than 95% of the regional trade in eastern Africa is carried out via unofficial channels. Approximately 26% of Kenya's meat consumption comes from cross-border trade. A recent study conducted by the PCI estimates that informal cross-border exports from the Northern Somali Region alone exceed by a factor of 4.2 to 6.5 the Ethiopian Customs Authority's statistics for the number of live animals exported from the whole of Ethiopia.Cross-border trade with Somalia alone encompasses an estimated 16% of beef consumed in Nairobi.

4.3.3 Support for Women-Owned Enterprises

Gender is a principle of social differentiation that shapes pastoralist diversification strategies for resilience. Milk trade, petty trade in consumer items and foods, and other non-pastoral activities are dominated by women. In large towns, women can work as domestic workers, although these come with high risks of possible abuse and non-payment, as it has been observed in most parts of Uganda, Kenya and Ethiopia. Often with support from government and NGOs, women have been successful in organizing groups of pastoralists and ex-pastoralists into local savings and finance groups or group-based business ventures, which have played important roles in livelihood diversification.

4.3.4 Employment Programs for Youth

Cash income from unskilled wage labour is reported in pastoralist households. The hired work includes cash-for-work programmes to create communities' assets, supported by INGOs/NGOs and public socio-economic infrastructure development activities carried out within the territory, such as schools, health centres, veterinary clinics, government administration offices and roads. The number of small urban centres have increased considerably during the last few years, linked with increased creation of new local developments of public administrative, social, and economic infrastructures, under the government's decentralization programs. These programs have created job opportunities for the youths.

Opportunities for skilled labour have also been created, largely for local elites in public service occupations such as administration, police, schools, and health services. The process of public infrastructure development has created employment opportunity for unskilled labour as well. This implies that sedentarization and urbanization are an important set of drivers for pastoralist livelihood diversification.

4.3.5 Value-Added Activities around Livestock Production and Trade

In the Eastern African rangelands, employment and enterprises still revolve mainly around livestock production and marketing activities. Keeping more value in the pastoralist areas from livestock production and trade not only promotes beneficial diversification for households and communities, but also enhances regional development and productive linkages between towns and the pastoral sector.

Important value-added activities include fattening operations, meat processing, fodder production, milk processing and trade, and livestock transportation enterprises. Presently, much of the fattening of livestock for markets and other value-added operations, as well as the incomes and employment that they generate, take place outside the dry-lands, denying herders and local traders a large proportion of the benefits from their livestock and livestock products. In some areas, herders and small-scale traders have created small enclosures in the rangelands for value-added finishing of livestock for markets, and this is done both individually and collectively by the community.

4.3.6 Cross-Border Cooperation

Cross-border cooperation is a collaborative partnership between neighbouring states for the mutual benefit of communities residing on both sides of a shared international border to address common challenges. Such challenges may relate to building peace and security, promoting regional integration and economic cooperation, achieving food security, attaining social and environmental security and reducing the number of displaced people. This has been seen in communities such as the Karamoja of Uganda and Turkana of Kenya. The number of people displaced in cross-border areas reduced by 20% (March 2020).

Peace and security make cross-border movement and interaction possible and allow pastoral communities to access vital natural resources and engage in trading activities. The promotion of peace-building initiatives in conflict-affected communities in the Horn of Africa should therefore be prioritized in interventions aimed at strengthening pastoralists' resilience.

4.4.0 KEY AREAS OF CONCERN AND GAPS

There are various areas of concern and gaps in the rangelands management and diversified livelihoods identified in this study. These include:

4.4.1 Inadequate and Fluctuating Availability of Fodder and Water

Most livestock development activities carried out in the Rangelands are faced with frequent droughts that affect the availability of feed and water resource. Inadequate conservation and lack of strategic feed reserve facilities constrain livestock production especially in the drought periods.

4.4.2 Encroachment of Crop Production into Pastoral Land

Crop farming in the Rangelands has led to increased opening up of the fragile rangeland ecosystems especially the river basins creating conflicts over scarce resources. Rainfall scarcity results into crop

failures that eventually make the productivity of land unviable.

4.4.3 Alienation of Pastoral Lands

The rangelands are being subdivided into uneconomical units due to increased settlements and migration from high population areas. The development activities undertaken do not take into consideration socio–cultural issues and hardly involve the relevant stakeholders. Privatization drive of land threatens the traditional management strategies that were sustainable in many rangelands of Kenya.

4.4.4 Inadequate Extension Service Delivery in ASALs

Vastness and rough terrain of Rangelands coupled with staff shortage who are inadequately facilitated, impact negatively on the development of rangeland resources exploitation. Pastoralists are unable to access and adopt technology recommendations on improved animal husbandry practices, in particular the use of inputs as well as technologies for other important economic land use options.

4.4.5 Inadequate Research in Rangeland Resources

Research is important for enhancing increased productivity and competitiveness in rangelands, including research in livestock resources and other important economic activities like apiculture, plant products, and medicinal products among others. Rangeland resource industry is growing at a slower pace compared to the world average mainly due to inadequate research among other factors. It is envisaged that Kenya Agricultural Livestock Research Organization (KALRO) and ILRI, together with other national research organization will address rangelands research needs and spearhead development of appropriate technologies suited to the rangeland areas.

4.4.6 Uncoordinated Drought and Floods Response

There is an absence of a coordinated restocking initiative within the offtake process especially after drought periods. This contributes to food insecurity and impacts negatively on the livelihoods of the ASAL communities.

4.4.7 Inappropriate Legal and Regulatory Framework

The rangeland resource management sector has been operating with an outdated legal and regulatory framework that has constrained productivity, trade and effective competition. There is no comprehensive land policy covering use and administration, tenure and security, and delivery systems of land in the rangelands. This has resulted in over-exploitation of resource leading to environment degradation. However, the findings obtained in the study from key informants show existence of laws as follows;

- ✓ Article 10(2), Constitution of Kenya 2010, Sessional Paper No. 8 of 2012 on the National Policy for the Sustainable Development of Northern Kenya and other Arid Lands: Releasing our Full Potential' (the ASALs Policy); Kenya Vision 2030 Second Medium Term Plan (2013-2017) which transforming Kenya: Pathway to devolution, socio-economic development, equity and national unity are used.

- ✓ The law(s) protect the rangelands include county rangeland policies, new community land act, land act 2012, land registration act 2012, land control

act 1967, national lands commission act 2012, lands adjudication act 2010, land consolidation act 2012 and environment management and coordination act 2012.

4.4.8 Loss of Important Biodiversity

The rangelands of Kenya have been experiencing loss of important biodiversity, especially of important trees and grass species that has been of great value to communities. Poor management lead to land degradation, unsustainable harvesting of resources and climate change are also responsible for biodiversity loss.

4.4.9 Land Issues – Tenure Systems

A land tenure system structures the distribution of property rights within a society. Conflicts over land that result from such a system are best conceived as being nested within larger disputes and tensions. Four types of land tenure system suffice with 48.6% households settled on leased land, 34.3% under indigenous land tenure system, 14.3% households under freehold system and only 2.9% households on the land system.[67] Land-related grievances, many of them documented historically, do often have a basis in fact, but they are easily manipulated for political purposes. Recent violence in the Rift Valley, for example, targeted small-scale settlements, rather than large-scale farms. The findings obtained in the study from key informants supporting these views were as follows;

- ✓ In the urban areas the land is individually owned with title deeds given to owners. In the rangelands the land is owned communally by the communities. There four are: Public land, private land, communal land and forest land which all exist in the cluster.

- ✓ Community land that is held and managed as trust land by the county government on behalf of the community; by specific communities as community grazing areas and lawfully land held as trust land by the county government.

- ✓ There is no defined land tenure system but administrative boundaries that partially guide movement of pastoralists.

4.4.10 Cross-Border Issues

To promote peace and reconciliation initiatives to enable cross-border movement, access to vital natural resources and trade: Support peace meetings where local decision makers (e.g. elders, clan and religious leaders) can meet without the interference of government officials, but ensure that initiatives are linked with local systems of governance to ensure that the outcome of negotiations is taken into account by local authorities. Where possible, support and strengthen County/District Peace Committees with regular funding and capacity-building activities. Engage in advocacy activities at the local, national and regional level to foster understanding and acknowledgement of the positive dimensions of cross-border trade and to stimulate support of pastoralist livelihoods, facilitate conflict resolution, lift livestock bans and enable internal and cross-border movement. Engage with initiatives with a regional focus, such as CEWARN and COMESA. Support pastoralist-

[67] Nalubwama, (2018).

led cooperatives to improve livestock marketing efficiency in the region and to address poor market access of pastoralists.

4.4.11 Disease and Parasite Control

Transboundary diseases very critical in the cross border areas and affecting regional and international trade. It is a challenging task to control internal parasites in grazing livestock even by applying multi label and multi directional approach. It is impossible to draw general recommendations to control parasitic diseases due to varied geo-climatic conditions and methods adopted for rearing the livestock in the country like India. In view of increasing incidence of anti-parasitic drug resistance in animals, there is an urgent need to design sustainable parasite control strategy which must include on the host as well as off the host control measures to harvest the maximum productivity from the animal for an indefinite period. The findings obtained in the study from key informants supporting these views were as follows;

- ✓ Yes. Social protection safety programmes and mass treatment of livestock against diseases.

4.4.12 Migration Issues

The study reveals there are no harmonized migration policies. Evidence shows that many irregular migrants from the East and the Horn of Africa continue to use the 'Southern Route', hoping to reach Kenya. Ethiopia migrants tend to migrate without the requisite documents and pose threat to range lands in South Omo-Turkana.

4.4.13 Poor Water Management

Water is the major determining factor in stock management in most extensive grazing lands; in areas dependent on seasonal surface water, stock must move out once sources have dried. Improvement of water supply by creating water points or improving existing ones, and clearing of undesirable vegetation to allow free access for stock and better grass growth, is common to both systems, and provision of minerals or traditional salt licks is frequent. Shortage of surface waters, especially in arid and semi-arid regions forces man to find alternative management strategies. Population growth and development have increased the need for water resources. These needs have caused over utilization of groundwater and decreased the quality of the resource.

4.4.14 Other Areas of Concern

Other key areas of concern and gaps in the rangeland management and diversified livelihoods rustling (small arms and light weapons, raids from other communities), spread of invasive species, and climate change, high levels of poverty, lack of knowledge as to why the pastoral system continues to exist in the history of modern economic development, cross-border conflict, lack of political goodwill, resource use conflicts, limited financial resources, limited technical skill, unreliable weather conditions/patterns; unavailability of certified pasture seed, and skepticism among community members that grass can also be grown; scarcity of labour, farm machinery and other inputs (e.g. fencing material, quality seeds); non-field school members possibly obstructing field school activities (e.g. allowing animals to graze on restricted pasturelands); cultural barriers in addressing problems through collective and joint effort across gender and social divides; deep rooted perceptions restricting uptake of new practices (e.g. some communities not prone to cut and carry grass but favouring animals to graze on the pastures); and stored pasture destroyed by the vagaries of nature. The findings obtained in the study from key informants supporting these views were as

follows;

- ✓ The key areas of concerns in rangeland management and livelihoods diversification in this area include negative human effects, recurrent and prolonged drought, alien invasive species, climate change, human wild life conflict, emergence of new economic opportunities and competing development needs resource based conflict and poverty.

- ✓ Climate change and variability, population pressure and diminishing of land carrying capacity, encroaching on the remaining viable rangelands, deforestation and charcoal burning.

- ✓ Key areas of concerns include poor available rangeland resource, low quality forages, overgrazing and degraded soil condition due to heavy grazing, lack of good will in sharing of common resources and lack of rangeland management policies to address sustainable rangeland management

4.5 CONFLICTS IN RANGELANDS

Resource based conflicts in rangelands in the IGAD SECCCI clusters have been the cause of violence and insecurity with inter clan clashes, cattle raiding being among the main results of the conflicts.

Land scarcity due to increase in human and livestock population and inappropriate official land use policies have created serious land use conflicts among pastoralists, crop producers and conservationists. Marginalization of pastoralism and eviction of pastoral communities to poor range condition has resulted in massive loss of livestock and magnified land use conflicts.

4.5.1 Drivers

4.5.1.1 Competition for Scarce Resources

Competition for scarce resources, accounts for greater part of pastoral conflict. The scarce resources in question include water and grazing land. According to pastoralists themselves, development agencies, government officials and people who frequent the area, competition for scarce resources is the single most important factor. The root cause of many conflicts between various groups within Northern Kenya, Uganda, Somalia, Ethiopia, are based on access and use of dry and wet season grazing areas. Pastoralist way of life requires effective management of dry and wet season grazing areas for the pastoral system to function effectively. Pastoralists often cite that the most recent impact that adversely affected their way of life relates to loss of access to key grazing areas because most open land has been alienated for other uses such as ranching, irrigation and personal use.

4.5.1.2 Traditional Pastoral and Cultural Values

Traditional cultural practices of the pastoralists can be said to be another cause of conflict. Traditionalists have competed for pasturelands and water sources for centuries. This practice has manifested itself in cattle raiding although not originally considered a crime. Up to recent times cattle raiding was an acceptable cultural practice and even the raiders were respected. It was meant to portray the stronger community or groups or individuals who conducted successful raids. The raids were also a method of restocking herds after drought or other calamities. They often elicit-defence, revenge and counter actions that make conflict among the district protracted.

Marriage institutions also had a hand in the conflict in pastoral life. Mature youths often go to conduct raids ostensibly to raise a certain number of cattle to present as dowry or bride price. Where bride prices are high among the communities like the Matheliko in Uganda, Samburu, Pokot, Borana and Turkana in Kenya, more skilful and dreaded raiders often, emerge. Among certain clans in Kenya a bride price can be 20 – 30 heads of cattle, plus or including a number of assorted camels, goats and donkeys. In the past, it used to be very difficult and required frequent or brutal large scale raids to raise the number of cattle required.

However, with acquisition of modern weapons, it has become relatively easier to invade and raid one clan for the livestock. Interestingly other clans have also built their capacities to defend themselves and also raid others making conflict deeply rooted in the Northern Kenya. The demands of bride price clearly encourage young men to steal or to raid other communities. The youths are often encouraged by girls and women who sing and dance war songs thereby encouraging young men to prove their bravery and gain wealth by raiding for livestock. The findings obtained in the study from key informants supporting these views were as follows;

- ✓ The most common conflicts experienced in this cluster area include resource based conflicts conflict over the rangeland resources i.e. water, pasture, competition for livestock resource in the hot spot areas is the primary source of the community conflict, cattle raids, banditry, Moran or young community warriors who uses culture and traditions to invade and steal livestock from neighbouring communities, claim to ownership of communal land by warring communities and administrative land disputes.

4.5.1.3 Unreliable Climate

Decreasing rainfall and rainfall variability that often defines the climatic pattern of arid and semi-arid areas. The erratic rainfall makes the pastoral areas vulnerable to drought. The Northern Kenya, for instance, has had a pattern of drought in every 5 – 10 years per decade since 1960s. Longer term, desiccation has an impact not only on rangeland production but also on species diversity and nutritive quality of forage plants, affecting ultimately the size of the herds that can be sustained. Food stress in most parts of the pastoralist areas result into perennial famine. Generally, food insecurity, famine and drought result into conflict as people struggle to cope up with it.

4.5.1.4 Poverty

Widespread absolute poverty is highly visible in pastoralist areas. The residents have extremely limited access to education, health services and safe water supplies compared to the majority of other districts in non-pastoralist areas. In Kenya, primary schooling enrolment in the Central province is up to 91.2%, while in the Northern Eastern province, where the majority of pastoralists' communities live, the enrolment is only 20.5%. In Ethiopia, while the national average gross enrolment for the primary level is 64.4%, in the Afar and Somali pastoral regions the enrolment drops to 13.8% and 15.1% respectively. A similar disparity can be observed also in relation to health statistics. Lack of education among pastoralists' communities is a key determinant of pastoralists' political marginalization as it significantly reduces their ability to engage in advocacy activities and 'to understand and speak out for their rights.

Frequent inter-clan wars have reduced the already very limited access to these basic services in the Northern Kenya district and the neighbouring cross-border region. Besides, there has also been poorly developed physical and administrative infrastructures, which would be necessary for

resource development. Livestock farming has been the major viable economic activity in the Northern Kenya, yet livestock marketing opportunities are meagre. More so, transporting the same to viable markets is restricted by poor roads and hostile banditry along the highways within and outside the pastoral areas.

4.5.1.5 Politicization of Conflict and Regional Instability

The absence of effective government control gives a boom to other groups keen on exploiting such a vacuum to make fortune and create a territory. Besides, there are people in authority like Members of Parliament, Members of County Assembly and chiefs who twist conflict situations in their favour inciting their electorate against other clans. A sitting member of Parliament from a certain clan, will use his position to defend his clan and brand others as either rebellious or bad. The leaders also intervene to protect their kinsmen to restore law and order. In effect other clans view the ones with elected leaders as subjugating them or as friends of authority at the expense of others. The result here is that tension and animosity exists between clans.

4.5.1.6 Modern Weapons

Proliferation of small arms and light weapons heightened shift banditry which in the recent past has been experiencing transformation. Trade arm barons are recruited from retired army personnel and school leavers to create a new class of professionals and sophisticated highway men. Commercial and political raids are also conducted by mercenaries using sophisticated weapons. Hired fighters with experience in armed conflict in neighbouring countries, or youngsters, urban unemployed school leavers or occasional wage labourers form this band of mercenaries or hired warriors used by different groups and individuals to attain their goals. Modern weapons account for high number of deaths in conflicts involving pastoral groups. They are also responsible for changing conflict patterns and systems depending on where resources and territories are contested.

4.5.1.7 Weakening of Traditional Authority Structures

In pastoral life, raids for more livestock or revenge used to be authorized by the elders and got blessings from the seers (diviners or prophets). At times raids were even instigated by such individuals. Raiding nowadays occurs even without the formal sanction of elders. Often young men decide in secret and take action quickly without informing the elders of their intentions.

4.5.1.8 Role of the Media

Media has recently flourished with more liberation of the air waves and prints for example in Kenya. This means that no part of the country is far away from media scrutiny and coverage. Inaccurate and brazed reporting by the media can create a situation of animosity or serve to escalate conflict. However, of great importance here is the image the media is painting on certain clans, groups or leaders where such entities are presented as war-like. Inflammatory, rebellious or bandits' actions by the authorities that follow are tailored to cope with problems as presented. Media can also influence revenge, tongue lashing or the authorities for either being an accomplice, inept or insensitive. In 1998 the media presented the Kenya Government as weak and lethargic in the face of Oromo invasion from Ethiopia. People often advocate for revenge or self-defence because authorities cannot defend them. However, where pastoralists involve in clashes with agriculturalists, pastoralists are portrayed as war-like and perennial criminals. Media often campaign for disarming pastoralists not withstanding eminent dangers larking in the neighbouring territories.

4.5.1.9 Commercial Raiding

Commercial raiding is a recent phenomenon that has greatly altered conflict nature in pastoral districts. The organizers of this deadly business are; powerful wealthy individuals that include livestock traders, arms dealers who often sponsor livestock raids. Young men organized as raiders, mercenaries and bandits are often supplied with weapons even on credit in order to go and conduct raids. Some refugees and former soldiers especially from rebel groups and collapsed Somalia government are involved in commercial raiding of livestock. Stolen livestock are herded to predetermined destinations. These livestock are transported without government movement permits or quarantine procedures.

4.5.1.10 Raid of One Group on Another

As often happens between different clans, raid by one group upon another result into another conflict. The groups can be perennial enemies previously friendly groups or on commercial raids and their action can lead to violent conflict. Cases often are cited by respondents where certain clan block access to resources or passage as a way of punishing the other clan for a previous act. Unfortunately, the blocked group may use equal force to gain access or passage thereby triggering immediate violent conflict.

4.5.1.11 Government Military Operations

When a raid of adverse impact takes place, Government often sends security forces to punish the offenders by arresting, flushing them out or disarming them. The operations in most cases turn brutal and affect a large number of people. Northern Kenya Counties has seen a number of such incidences from colonial times to modern government responses. The punished group often gets bitter and the same to the other groups who get hard pressed to produce criminals or stolen animals or simply compensate the offended clans. Security forces are often blamed for deaths, defilements, rapes, destructions and alienations. Where such blames have been apportioned by the leaders, conflict between the Government and the people emerge; at the same time clans themselves engage in further conflict as a way of exposing their anger to one another.

4.5.2 Impacts of Conflicts in Rangelands

4.5.2.1 Effect on Education Services

Conflicts affect physical access to schools and to other learning institutions. Students and teachers are unable to go to school due to insecurity resulting from inter-clan conflicts. In most cases, schools get closed. Teachers who come from outside the affected districts prefer to return to their home areas whenever there are conflicts. Older students, through requests from parents, or based on social cultural and family obligations, abandon school so as to join others in fighting the enemy.

Children are forced to drop out of schools when families decide to migrate to other areas in search of physical security. Once again, disruption of learning leads to low levels of education, confining more and more people to pastoralism as the only source of a livelihood. Large number of people relying on pastoralism implies large herds of livestock kept. The herds require water, especially during dry seasons. Lack of access to water leads to competition and conflicts.

4.5.2.2 Effect on Health Care

Pasture and water-based conflicts interfere with peoples' access to health care services and facilities. Would-be providers like non-governmental organizations, religious institutions and the private

sector are kept away by insecurity. At the same time, people lack income to pay for services due to lack of access to income-generating activities.

4.5.2.3 Effect on Casualties

Death and injuries as result of fighting for water and pasture are a cost to households, for they interfere with the flow and allocation of resources for subsistence, and have high chances of initiating new conflicts in the form of revenge. Casualties arise as result from conflicts. When conflicts arise many people are usually left dead and some seriously injured affecting the household labour force and a decline in household income.

4.5.2.4 Effect on Food Basket/Crop Production

Insecurity and fear affect levels of food production at the household level due to a reduction in the quality and quantity of livestock and farming activities and as well the disruption of the market system. This leads to hunger, abject poverty and destitution. Physical insecurity restricts people going to market places to buy and sell foodstuff and participate in other income generating activities. Insecurity sparks a whole new cycle of poverty, limited access to water and pasture for the livestock. Among other factors such as rainfall that affect crop production, conflict is one of the other critical factors that affects factors of production. When conflicts arise, displacements and other incidents of casualties occur limiting the farmer from undertaking meaningful production of crops. Loss of life as a result of conflicts impede negatively on pastoralist communities. Cattle rustling is the most visible impact of conflict on livestock.

4.5.2.5 Effects on Rangelands Rejuvenation

Lack of vegetation cover, and pastures/hayfields on the one hand, and an increase in the number of livestock, on the other, cause a shortage in the livestock feed supply. In severe pasture deficit situations livestock owners are forced to buy fodder and grains at a high price, which is expensive for their budget, especially for the budget of private small livestock owners. Over stocking/high livestock population and frequent recurring drought leads to desertification and make the rangelands susceptible to soil erosion and degradation. Mushrooming of unsustainable and political settlements in the rangelands and closure of communal land has reduced the rangelands available for pastoralism.

4.5.3 Mitigations and Possible Solutions

4.5.3.1 Formulate Policy on Peace Building

The IGAD MSs should formulate and implement policies on conflict management and peace building. Such policies could provide frameworks for understanding some of these conflicts, how to manage them, institutionalize and legalize the role of alternative dispute resolution mechanisms, check the proliferation of illicit arms, address the issue of displaced persons as well as strengthen the community policing. With this policy in place, it will provide guidelines for conflict management in the respective communities as well as entrench conflict management into existing and future national plans.

4.5.3.2 Harmonize Migration Policies

The IGAD Member States should harmonize their individual existing migration policy to allow free movement of people, goods and services. This will spur trade and development in the cross-border regions. It will also allow pastoralists to move freely to practice their traditional copping mechanism

on drought.

4.5.3.3 Strengthen Service Delivery to ASAL Areas

The poor state of service delivery to ASAL areas is central to the conflicts that destroy them. Raising the education level, delivering other services such as health facilities and infrastructure, provision of security services through increase deployments of security forces, and improving communication services such as road network, GPS in addition to radio calls are important in their indirect role of reducing conflicts.

4.5.3.4 Promote Inter Community Peace Building Activities

Peace building activities include sports and dance festivals which form the basis of inter community friendship that brings together communities in a non-hostile setting. Eventually, these activities should conclude in inter community negotiations over contentious issues. These negotiations and traditional authority structures should be incorporated into peace committees, where other stakeholders such as government and civil society actors can moderate and facilitate proceedings and ensure they comply with the law. Empower indigenous institutions to mitigate conflicts between pastoralists and farmers, and inter-clan conflicts. Educate the inhabitants of ASAL areas about land rights and the relationship between government institutions and local indigenous institutions to improve recognition and security of tenure to communal land owners. The findings obtained in the study from key informants supporting these views were as follows;

- ✓ Most common conflicts experienced in this cluster are resource based conflict, geographical/administrative boundary related conflicts, proliferation and availability of Small Arms and Light Weapons (SALW) among pastoralists and recurrent prolonged droughts. The conflicts be mitigated through community peace dialogue.

- ✓ The cluster has established all-inclusive committee members who facilitate community peace and peaceful coexistence between communities living in the cluster.

4.5.3.5 Advocate for Smarter Policies For Pastoralists

Various stakeholders including the rural and pastoral communities, their indigenous organization, and other non-State actors should lobby and demand the governments provide and guarantee these people security as enshrined in the respective national constitution of the Member States.

Use the commercial potential of the livestock sector as leverage to enable pastoralists to understand the contributions of pastoralism and agro-pastoralism to national economic growth and also to regional livelihoods

Promote efforts within IGAD clusters to better support regional policies and reduce discrimination toward pastoralists. This could include greater support for the existing African Union policy framework on pastoralism, which could then also be used as vertical support for pro-pastoral policies at the national level.

4.5.3.6 Enhance Existing Natural Resource Management Systems in the ASAL Areas

Support and facilitate existing natural resource management systems including those that involve

young men and women, particularly in the sustainable but realistic use of forests, water sources, and rangelands in in IGAD clusters. Monitor levels of intra-community tensions that may arise as a result of potential encroachment of Rangelands and shortage of natural resources in regions with overlapping populations of farmers and pastoralists in in IGAD clusters. Promote local dispute resolution mechanisms for conflicts that may arise over scarce use of natural resources. The findings obtained in the study from key informants supporting these views were as follows;

- ✓ There are drought mitigation/management strategies in this area include provision of farm inputs – seeds, tools, equipment to the farming communities, provision of livestock feed supplements, social protection to the vulnerable members of the society through cash transfers to cushion them, food vouchers for the poor, provision of livestock insurance money, mass livestock vaccination, livestock offtake programs, construction of dams, pans and water harvesting infrastructure, regular peace and security meeting to reduce resource based community conflicts, commercial destocking, transportation and distribution of livestock feed supplements, relief supplies and support pasture production and construction of hay stores.

4.5.3.7 Mop out Illegal Weapons

The governments should secure all illegal arms as a way of reducing hostilities and take up their legal duty of providing security for pastoral communities. The governments need to be committed to this duty and gain trust and confidence from the pastoralists for them to surrender arms as one of the government programs to disarm the neighbourhoods.

The governments should consider implications for livelihoods of any transition from military protection to a community policing model, including training needs for incoming police forces to maintain and uphold existing systems in the IGAD SECCCI clusters. It should also create and provide alternative livelihoods for young men to counter cattle raiding/rustling activities. These includes educational support, vocational skills training, income generating activities, smart agricultural farming, poultry, beekeeping etc. Also support community centred efforts at peace and reconciliation to support local authority and conflict resolution mechanisms.

4.5.3.8 Address Migration, Urbanization, and Access to Markets

Strengthen livelihoods programming that specifically targets urban and peri-urban poor populations, including both those who have recently abandoned pastoralism and those who are keeping one foot in the rural areas. These programmes should aim to mitigate risk and to make these livelihoods safer and more sustainable for households, in particular female-headed households and single mothers and should supporting the social networks between rural and urban areas in the IGAD SECCCI clusters. This might include strengthening support for trade between rural and urban areas, such as in milk, meat, fodder, and other livestock inputs, as well as improving transit and transportation links.

Promote greater access to markets specifically for female-headed households and single women This could potentially be done by providing livelihood support for opportunities that typically attract women, and other activities to reduce liquidity constraints, perhaps through mobile technology.

Strengthen and support legal systems to enhance migrant workers' rights, especially in the artisanal mining sector.

Reduce transaction costs associated with access to markets by supporting road, storage, transit options, and communications infrastructure between rural and urban areas; support investments in mobile phone technology and access to remittances.

4.5.3.9 Mainstreaming Conflict in the development process

There is need for mainstreaming conflict and conflict mitigation into the planning, development and implementation process of all actors in ASAL areas. Subsequently, there should be established local structures at county/regional levels, preferably under the county/regional Development Committees, to review the plans of each actor and suggest ways of ensuring the maximum conflict mitigation impact is derived.The findings obtained in the study from key informants supporting these views were as follows;

- ✓ Addressing the drivers of conflicts, community peace dialogue, and disarmament and mopping of illegal weapons, demarcation of administrative boundaries.

4.6 CURRENT STATUS OF IGAD RANGELANDS

4.6.1 Current Livestock and range management under forage hotspots

In general, the rainfall distribution pattern within the IGAD region since mid-last year 2019 has been above normal in many areas of the region that improved availability of water and pasture in the region. On the other hand, there were pocket areas that received below normal rainfall which contributed to prolonged drought conditions mainly in arid and Semi-arid parts of Ethiopia and Kenya affecting livelihoods of the predominantly pastoral and agro-pastoral communities.

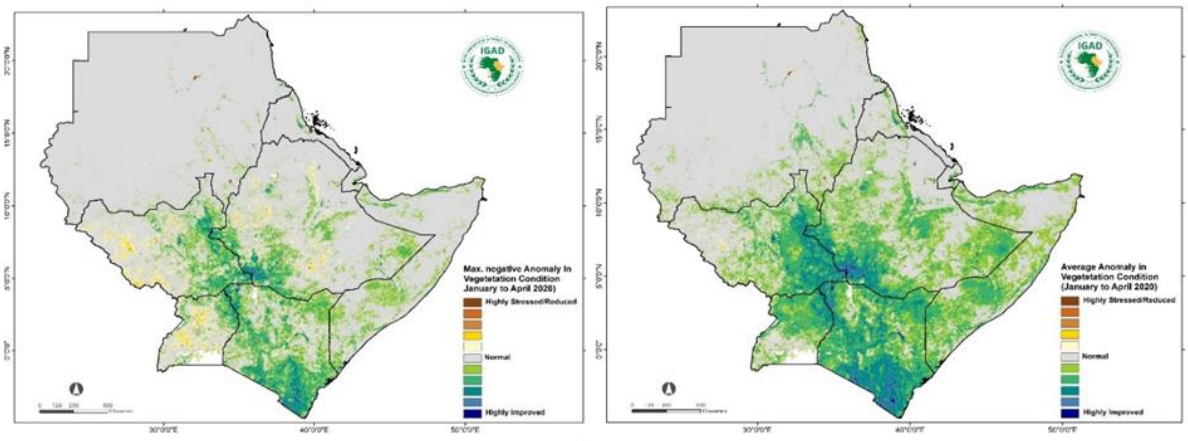

Figure 5: Maximum and average anomaly on biomass Condition from January to April 2020(Source: Ahmed Hamdihun, 2020)

The spatial analysis of monthly biomass condition through vegetation condition anomaly since January 2020 reveals that the region remain predominantly wet and there is surplus growth and regeneration of biomass. Whereas some pocket areas in northern and north-eastern Kenya, parts of south-eastern and north-eastern Ethiopia and the state of Kurdofan in Sudan experienced slightly below normal biomass and thus reduced forage production condition as seen on Figure 5 above.

Livestock are essential to the livelihoods of smallholder farmers as well as pastoral and agro - pastoral communities in many IGAD Member States. Livestock production in these countries is characterized by low milk production, low live weight gains and poor reproductive performances because of low quantity and quality feeds. Access to high quality forage has been identified as the key to improving livestock health and productivity. Therefore, in cases of surplus forage as highlighted above, forage bulking and conservation storage of hay and/or silage and also erecting enclosures for standing forage provides opportunities to ensure livestock have access to high quality forage all year-round. At the times of surplus forage, rangelands normally realize increased livestock productivity and offtake as such it is recommend to facilitate sales and slaughter to regulate the stocking density.

In the cases of forage scarcity, it is economically valid to keep less animals by destocking to reduce grazing intensity and also provide supplementary feeding i.e. feeding on concentrates or supplements to bridge the gap of sufficient feed. It is also recommended to venture into integrated fodder cultivation; feed and forage management considering to enclose the grazing sites and sowing grass varieties that are more appropriate to livestock needs and avoid overgrazing, using appropriate intensity of grazing on a particular piece of land to allow sufficient time for pasture to recover after intensive grazing. Likewise, fencing off of areas and rotation of the grazing livestock on several pieces of land is a suitable option to regulate the intensity and timing of grazing. Additionally, it is important to rehabilitate pasture land with improved grass varieties and legumes for higher yield, higher nutritive value and palatability of forage.

4.6.2 Animal Feed Outlook for Pastoral and Agro-Pastoral Areas of the IGAD Region: May – September 2020

The preceding season of October, November and December (OND) and current rain seasons March, April and May (MAM) onset, distribution and intensity have been favorable for rangeland feed in most part of the IGAD region. Any event that negatively affect rangeland forage availability and access usually jeopardize livelihood of the people and the regional economy. Furthermore, mobility is an important part of livestock production in both pastoral and agro-pastoral areas for feed access. Two important events coincided in the region which both having negative impact on feed availability and access: desert locust and restriction of mobility due to COVID-19. This forage outlook description is prepared for the period between May and September 2020 focusing on pastoral and agro-pastoral areas (ASALs), and situations will be bleak.

Sudan and part of South Sudan have been in dry season and will start receiving seasonal rain in June, thus so far desert locust invasion is not significant due to effective control in late 2019 and early 2020. Thus, desert locust impact on the rangeland forage is little or minimal, if any, in the two countries. However, the two countries deserve close monitoring for desert locust during the coming rain/growing season due to their current favourable climatic and ecological conditions for locust invasion, development and reproduction since desert locust recession areas are in western Sudan near Darfur areas.

In Uganda, Kenya, Somalia and Ethiopia, the preceding (OND) and current rain seasons (MAM) (onset, distribution and intensity) were favorable for forage production. However, the four countries were affected by desert locust invasion at varying degrees. Currently, the following areas are under locust invasion: South Omo, Borana, Bale lowland, Guji Zones and part of Somali regional State in Ethiopia; Turkana, Samburu, Marsabit, Isiolo and Wajir counties in Kenya; Karamoja region in Uganda; areas bordering Ethiopia, northwest as breeding happening in the coast, northeast, central

and south in Somalia. Following the onset of MAM rain, the rangeland forage quickly recovered and improved forage availability. The impacts of locust invasion in the agro-pastoral areas has been reduced by above normal rainfall and off-season rainfall which has led to both rangeland forage regeneration and consumption by desert locust are happening in parallel, and thus impact on the rangeland feed is not amplified so far. An example is seen in the graph below comparing long term vegetation values and rainfall values in Ethiopia, Somali region-Fafan Figure 6 and Kenya-Samburu Figure 7 below. This situation will continue until the end of the rainny season (end of May).

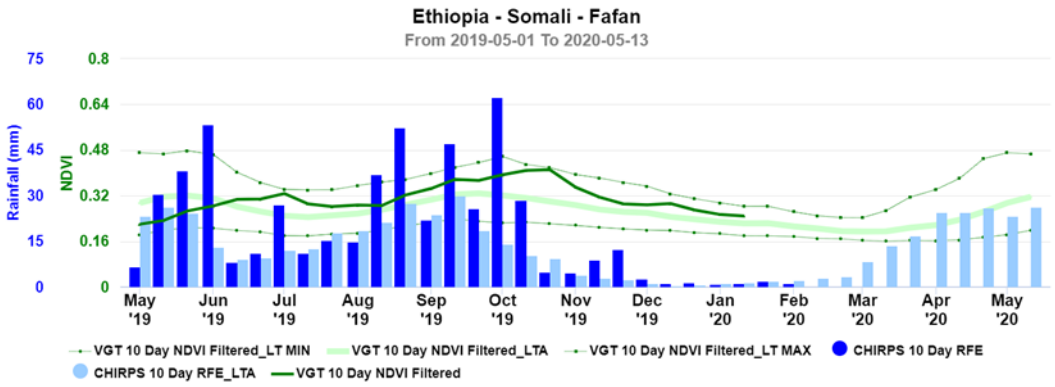

Figure 6: Graph of Vegetation conditions (observed, long term maximum, long term minimum and long-term average) values and rainfall estimate for Ethiopia Somali Region, Fafan -(Source: Mwangi,K.2020)

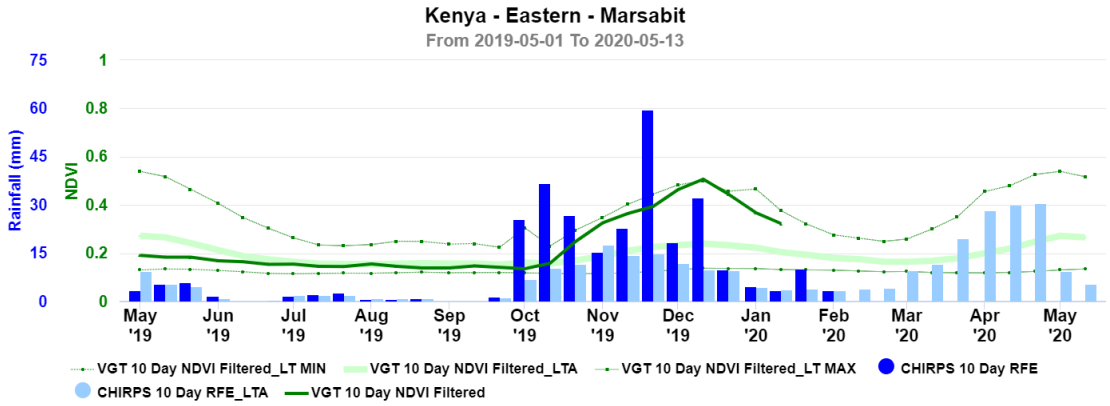

Figure 7: Graph of Vegetation conditions (observed, long term maximum, long term minimum and long-term average) values and rainfall estimate for Kenya, Marsabit-(Source: Mwangi, K. 2020)

In both areas vegetation conditions recorded near highest values and this represents increased forage availability. This means that even with locust invasion in both areas, impact on vegetation and forage availability has been considerably minimal. However, complete vegetation loss was observed in localized cases and but is not widespread. Through the resilience program there have been efforts to prepare pastoral and agro-pastoral communities in the region for time of feed stress. Therefore, after close monitoring of the impact at the end of the growing season, it is important to trigger emergency fodder production (Ethiopia), encourage bulking and storing in the hay shades (Kenya), practice hay making with facilities provided by resilience project (Uganda) and alert NGOs

and government working in pastoral and agro-pastoral setting (Somalia).

4.6.3 COVID-19 Impacts on feed balance

The impacts of COVID-19 region the livestock sub-sector, are even more severe in the arid and semi-arid areas (ASALs) where the local communities wholly depend on livestock and livestock products for livelihoods. The measures rolled out to reduce its spread are weighing heavily on the livestock sector especially restrictions in mobility of both humans and livestock thereby affecting forage accessibility, availability, quantity and quality. For example, the restrictions of movements have meant that in some areas the transhumant pastoralists have over stayed leading to overgrazing and conflict over water and grazing with local semi-sedentary agro-pastoralists.

COVID-19 pandemic has further disrupted input supply chains and service provision affecting accessibility and affordability of industrially produced livestock feeds, forage seeds for reseeding or rehabilitation. Further, livestock markets closure has severely affected local demand for livestock products which has caused a slump in livestock sales and declining intake and offtake thereby extremely slowing down livestock sector economies. If trade and associated movement restrictions continue for a longer period, the impact would be far-reaching to these already exposed livelihoods, and more specifically to the livestock sector.

SECTION 5.0 RECOMMENDATIONS AND WAY FORWARD

5.1 Short Term (0-5 years)

Since management of rangelands is done by indigenous institutions, there should be a continuous peace dialogue and harmonization among clans within and across boundaries. Cultural approaches and indigenous rules should govern peace negotiations complemented by the government and other concerned actors in rangeland areas.

With indigenious institutions undermined, one way to ensure rangelands are managed in the short run is by considering indigenous knowledge on species and their utilization. The locals know more about the rangeland species, and using their knowledge can prove vital to managing these resources.

To manage shortages in feed and forage in the rangeland areas, free range grazing with traditional rules and mechanisms combined with proper health care for animals can enhance the livestock business in the pastoralist communities in the short-run.

Implementing a close monitoring of vital forage indicators both at regional and national levels is needed as the season progresses. This should use a combination of Earth Observation (EO) and ground truthing feed and Forage inventory analysis.

Institutionalize accurate feed balance assessment and monitoring system on current and future supplies and demands of livestock feeds to generate and provide a useful information on availability, gaps and how the gaps can be filled for proper planning and development, as well as implementation of appropriate regional food security policies for sustainable growth of regional livestock sector.

The private actors in the rangelands should be convened with the government to discuss investment opportunities and options for overcoming barriers. This will help provide more information and knowledge about the livelihoods of the locals in specific areas, for better management in every locality.

Control of ranches to minimize conflicts. There should be consideration for re-opening of grazing lands through a consultative and transparent process with the ranch owners and pastoralists. Given the variable nature of the climate in the Horn of Africa region, ranching is suitable only in limited areas.

There is need for alternative products and ecosystem services in the pastoralist areas. The literature review revealed that most rangeland areas are predominantly pastoralist areas. By identifying alternative areas that can support such ecosystems, communities can be saved from problems of drought and hunger.

Community rangelands management: By creating an enabling policy environment, pastoralists can be the best custodians of dryland environments. The best way to achieve this is by decentralizing the management of pastoralist areas at the community level, leveraging the immense power of the traditional pastoralist institutions, and creating harmony with the formal government structure.

Community participation in monitoring and evaluation. The participation of pastoralist communities in the development, monitoring and evaluation of these policies will protect their way of life and ensure that interventions complement rather than substitute the good practices that already exist in their communities.Other areas that the communities should be involved and build capacity is in the

Protection of degraded land, Reseeding and pasture production, Introduction of lost species within the rangeland areas, addressing challenges of invasive species.

Training, capacity enhancement and exposure visit to Botswana where livestock production is flourishing to learn from the best practices. This cross learning will Promote commercial livestock production and Promote good relationship between farmers, pastoralist and conservancies.

IGAD to mobilize resources from member governments and support partners to scale up investment in technologies that support rangelands management.

5.2 Medium Term (5-15 years)

In order to restore the sustainable use of the rangelands in the present times, an integrated approach that combines traditional and conventional land use planning should be employed. Since traditional management mechanisms did not marry with the national policies on rangeland, coupled with unrecognition of indigenous institutions, national governments need to adopt policies for the conserved use of rangelands and where possible of rangeland improvement, supported by the local community, with the help of international multilateral agreements and development programs.

Research by rangeland experts and scientists is needed to develop monitoring systems that predict and track changes in land use and cover. Tracking of nomads is also essential, as control of animal and human diseases can be easily traced within pastoralists. Strong links among managers, researchers, and local land users are also needed in improving management of rangeland ecosystems in the long run.

Strengthening the traditional institutions is paramount to the management of rangelands. This can be done through government policy that recognizes these institutions, or through integrating into decision making processes. In addition, since there is the Land Act that recognizes communal ownership of land, managers should harness the Act to protect grazing lands for the livestock purposes.

Since these areas are accompanied with recurring droughts, there is a need to strengthen the enabling environment, including provision of supporting services like livestock insurance, animal health and climate information. With this information, the locals can be able to plan for droughts, and also avoid losses by insuring their livestock.

IGAD should support Member State relevant agencies in advocating for improved investment in rangelands management research. IGAD and Member States should mobilize resources from governments and partners and invest in scaling up of proven technologies in rangelands management. IGAD/ICPALD, Member States and development partners should generate some evidence to show the benefits of improving rangelands and do raise awareness on existing tools and instruments to enable mobility continued in coordinated manner and in peaceful co-existence among pastoral groups. *Prosopis juliflora* was cited as affecting most pastoralist areas. Research should be conducted on how to control and use these invasive plants.

There is a need for IGAD to strengthen institutional and human capacity of regional organizations to effectively plan, implement, monitor and evaluate, coordinate/collaborate with regional programmes; develop and implement agricultural policies and strategies that support livelihoods and disaster risk reduction through resilience and coping mechanisms against shocks (e.g. safety nets, insurance, and nutrition interventions); and promote conservation of genetic resources (crops, livestock and fisheries) that can diversify available nutritious foods for local consumption.

Promote investment in agriculture and support the investment climate. Given the large financing gap in the agriculture sector in Member States, governments and development partners should increase their investments in the sector particularly in rural areas and support infrastructure and regional integration.

Establishing stronger communal land tenure security: Land tenure security is the most critical factor for rangelands management and pastoralism development. Land administration is not an end in itself. It has to be supported by integrated land use planning. The plan should identify the potential and current constraints and should provide a framework, taking into account the indigenous systems and conflicting interests of the government in rangeland management.

The study recommends special focus should be given on the development particularly of water and pasture, as rangelands management should be regional for peace and pastoral development.

Collaborations and partnerships: Given the porous nature of borders in the region, governments in the region should collaborate to find sustainable solutions including increasing investments in training courses on rangeland management and diversified livelihoods in the IGAD clusters as a possible long-term plan to increase rangelands management.

IGAD and member state agencies develop a common knowledge-base on the scope of rangelands management for enhanced decision making.

IGAD member state to focus on value chain development in developing rangelands management strategy and policies.

IGAD to provide practical guideline on formulation and implementation of rangeland policies and investment projects in rangelands.

IGAD to provide the basis for sharing knowledge in workshops and programs with various stakeholders, and training of dissemination of guidelines.

IGAD to work with Member States and stakeholders in generating evidence and showing the benefits of enhance rangelands. This may involve raising awareness on existing instruments to facilitate mobility and in a coordinated manner and enable peaceful engagement among pastoral groups.

Providing sufficient advisory services in the areas of improved rangeland management system and behavioral change towards improved and market-oriented animal husbandry, as well as providing support with good extension and training packages that are suited to rangeland environments. This strategy could be effectively adopted across the country. Support should be given to the development of land use and administration policies, which guarantee communal land security and support pastoral mobility. Strengthening the traditional institutions so that they can work with the governments for the good of the nation.

Stakeholders should advocate for repositioning of fodder value chain by strengthening investments and agribusiness enterprises. There is need to strengthen coordination and linkages between stakeholders in each country through formation and strengthening of national feed and range platform to share good practices, lessons and enhance complementarities and synergies.

Strengthen linkages and coordination between stakeholders across the IGAD states through development of national platforms to share appropriate practices and lessons and facilitate synergies.

Policy document on management of rangelands and its biodiversity. Proactive population policy, education on family planning and implementation of poverty reduction strategies.

Climate modeling and mitigation information system - The problem of climate change and its potential impacts on rangeland biodiversity should be addressed through adoption of a various drought and climate mitigation and adaptation measures including activities such as deforestation, adoption of proper land management practices (including agroforestry), changing energy technologies (e.g. the use of efficient wood stoves and biogas), adoption of integrated land and water management practices.

SECTION 6: PROPOSED APPROPRIATE COURSE CONTENTS

This section lists what are considered to be essential course contents for sustainable rangeland management and diversified livelihoods

A) Proposed Sustainable rangeland management

1. Rangeland ecology and management
2. Rangeland plant identification
3. Renewable natural resources
4. Principle of vegetation management
5. Global environment impact
6. Integrated rangeland management
7. Remote sensing of environment
8. GIS application
9. Range reseeding- range lands grass seeds reseeding management techniques
10. Bush control & invader species management (invasive and unpalatable plant species management in range lands)
11. Seed bulking in range lands
12. Range lands production systems: Community based range land management systems and community conservancy
13. Range lands pasture/ Fodder / hay production, preservation and conservation management
14. Water harvesting for range lands management- for grass/fodder/tree production
15. Natural pasture / grass improvements
16. Capacity building on community participatory Land management approaches
17. Soil and water conservation management in range lands
18. Nursery management and Tree planting in range lands
19. Sustainable range lands ecosystems management training
20. Leadership and governance management skills to improve governance on range lands
21. TOT training on rangeland managements and livelihood diversification.
22. Topics on Introducing an alternative to free range grazing

B).Proposed Livelihoods diversification courses

Training courses to strengthen community skills and knowledge for increased diversified and sustainable food production systems production should include:

1. Sustainable livestock production systems in ASALs
2. Improving fodder/feed and pasture production in range lands
3. Entrepreneurship skills trainings for enhanced capacity to undertake agribusiness activities that improve economic empowerment of pastoral communities.
4. Apiculture management trainings (bee keeping and honey production)
5. Production of indigenous poultry trainings
6. Integrated Dryland farming techniques in range lands (vegetables gardening, micro catchment drip irrigation through use of water harvesting technologies.
7. Youth and women empowerment (gender trainings in range land management)
8. Community conservancy management in range lands
9. Community based livestock health-care trainings in rangelands
10. Seed production for food production in ASALs.

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APPENDICES

Appendix I: Key Informant Questionnaire

KEY INFORMANT QUESTIONNAIRE FOR STUDIES ON RANGELANDS MANAGEMENT AND DIVERSIFIED LIVELIHOODS WITHIN IGAD REGION - 2020

Dear Colleague/Participant.

We are conducting a survey on rangelands management and livelihoods to identify and understand the current systems of rangeland management and diversified livelihoods within the rangelands of IGAD-SECCCI cluster areas of South Omo-Turkana. Moyale-Marsabit and Mandera.

Your answers to the interview questions are important to IGAD. To make our study successful, your views count and will greatly assist us in generating relevant and reliable research findings towards improved rangeland management and livelihoods diversification within IGAD rangelands.

Instructions:

1. Please read clearly and understand each question in this questionnaire and fill in the answers in the spaces provided appropriately.
2. Kindly indicate your cluster.
   a) (IGAD Cluster I) **South Omo-Turkana**
   b) (IGAD Cluster II)**Marsabit-Moyale**
   c) (IGAD Cluster III) **Mandera Triangle**

QUESTIONS

1. What systems of rangeland management are currently used in this cluster?

2. How differently were the rangelands managed before (in the traditional way) in this cluster.

3. How are the rangelands used in your area apart from pastoralism? (*List the alternative uses*)

4. What are the current land tenure systems?

5. What law(s) protect the rangelands in your area?

6. In your cluster area, is there climate information system available for monitoring the current situation and early warning for effective planning? Please explain if any.

7. Are there drought mitigation/management strategies in this area? What are the most common drought mitigation/management strategies in your cluster area?

8. What are the most common conflicts experienced in this cluster area?

9. How can the conflicts be mitigated?

10. (i) What are the key areas of concerns and gaps in rangeland management and livelihoods diversification in this area? Please expound.
    (ii) Please provide recommendations for action.

11. Please recommend any appropriate training courses and or contents on Rangeland management practices and Diversified Livelihoods.

THANK YOU VERY MUCH FOR YOUR TIME AND RESPONSES!