Report on State of Climate, Peace and Security in the Horn of Africa

November 2022

ICPAC

PEACE, PROSPERITY AND REGIONAL INTEGRATION

Office of the Special Envoy for the Horn of Africa

Acknowledgments

The report was prepared with substantial inputs and feedback from IGAD Climate Prediction and Application Center (ICPAC), Conflict Early Warning and Response Mechanism (CEWARN), and the UN Office of the Special Envoy for the Horn of Africa (UNOSE). The regional consultation was supported by the German Federal Foreign Office.

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Foreword

Climate change is already a threat multiplier, exacerbating existing problems, including increasing frequency and intensity of disasters. It is one of the greatest threats to local, national, regional and global security in terms of human security, food and water security. This is more so because climate change knows no borders adversely impacting those who are least responsible yet more vulnerable due to their geographical location and socio-economic circumstances.

According to the IGAD Regional Focus of the Global Report on Food Crises 2022, 43.59 million people were estimated to face high levels of acute food insecurity in seven out of the eight IGAD member states in 2021. This represents a 38% increase compared to 2020. This figure is expected to rise to 46.33-47.83 million in 2022 largely attributed to the severe ongoing drought in the region.

The food insecurity situation is threatening a hitherto unseen humanitarian crisis that will have major impacts including insecurity, conflict, migration and displacement. This is the challenge we must urgently address. Such impacts particularly drive communities into conflict over scarce water and food resources, and make the youth more vulnerable to recruitment into crime and terrorist groups.

It is therefore imperative that climate change risk management is integrated into the security sector as a matter of national, regional peace and security, and why we believe this matter should be on the table of the IGAD Council of Ministers and Heads of State and Government.

In order for the Member States to make informed decisions when it comes to preventing conflict and sustaining peace, we need better understanding of these links and improved research of the compounding risks already at play. IGAD needs to take a more active role in managing climate-related security risks. We should strive to create a balance between economic development and environmental protection. Only finding the right balance will lead to realization of climate change and sustainable development.

As I have said before: "We are dealing with scientific facts, not politics. And the facts are clear. Climate change is a direct threat in itself and a multiplier of many other threats."

Dr Workneh Gebeyehu, IGAD Executive Secretary

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1 Executive Summary

Human activities are changing the atmosphere's composition in unprecedented and fundamental ways. Carbon dioxide (CO_2) concentrations in the atmosphere have increased from a pre-industrial level of about 280 to 400 parts per million in 2015. This has led to an enhanced greenhouse effect in the atmosphere causing global warming. The Earth's annual average temperature has increased by about 1.2°C compared to pre-industrial levels. The IPCC has concluded that climate change is unequivocally happening and is undeniably caused by humans (IPCC, 2021). Furthermore, IPCC has documented the observed and projected impacts of climate change. Impacts of climate change range from the direct, as seen by the increasing frequency and intensity of extreme weather phenomena, to the indirect, such as migration, resource scarcity and conflict – situations in which climate change acts as a 'threat multipliWWer'.

The Intergovernmental Authority on Development (IGAD) partnered with the UN Office of the Special Envoy for the Horn of Africa (UNOSE) to hold a technical meeting on Integrating Climate Risk Management into the Security Sector in July 2022 with the IGAD member states and partners. The objective of the multi-stakeholder engagement was to assess the state of knowledge on climate and security risks, identify gaps and strengthen IGAD and the UN's capacities to address climate-related security risks and tools for the provision of reliable, timely and accurate early warning information to decision makers within the security sector. This report summarizes the climate, environmental and related risks and their possible interlinkages to the peace and security sector.

The IGAD region is experiencing an increase in the frequency and severity of climate extremes, this has been compounded by the COVID pandemic, dessert locust invasions, and the spill-over effects of the Russia-Ukraine crisis. The region has also seen an increased conflict that continues to worsen the inflation problem across the region, because of increased food prices. "Climate change has diminished the concept of sovereignty and territorial integrity, as climate change crosses borders whether we like it or not " ~ Amb Dr Mohammed Guyo. Security is a multi-faceted issue and human security must involve individuals, communities and the state. IGAD leaders called for a holistic and global approach to security that addresses climate change, and combines dynamic policy with a pragmatic approach.

The workshop emphasized the need to enhance regional integration, good governance, and devolution of power and resources to the local level; recognize climate change as a serious, long-term risk to national security at the Member State level that requires a multi-agency, cross-sectoral approach; assess institutional gaps and identify the mandates and comparative advantages of multilateral organisations including IGAD, the African Union and United Nations; find ways for technical findings to reach the policy-making organs of IGAD, including the Council of Ministers and Heads of State and Government also linking to local and global processes; and make use of IGAD's convening

power across drought and climate change to move together with multilateral institutions, including the African Union and United Nations.
This report covers the cyclic nature of climate and environmental impact and conflict and describes four pathways explaining the main interlinkages between climate and security as perceived by member states. The report highlights the need for research investment to better understand the context of specific drivers at the various hotspots. Here the need for a clearer, joint understanding of the concept, the assessment of risks and actions to address them are highlighted. The report also stresses the need for regional coordination on climate, peace, and security.

2 Introduction

The Intergovernmental Authority on Development (IGAD) serves a region commonly referred to as the Greater Horn of Africa Region. The region comprises eight countries: Djibouti, Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan, and Uganda. The region is characterized by frequent droughts which necessitated the need for drought early warning information in order to safeguard the lives and livelihoods of people in the region. Hence, IGAD Climate Prediction and Applications Centre's (ICPAC) was established within the Intergovernmental Authority on Development (IGAD) framework to help the region address climate variability and change related challenges. ICPAC has three non IGAD member countries Tanzania, Rwanda, and Burundi; with the eleven-member states covered by ICPAC commonly referred to as Eastern Africa. ICPAC is currently a World Meteorological Organization (WMO) Regional Climate Centre (RCC) for the Eastern Africa region whose main objective is to generate and deliver up-to-date climate information and products for climate services.

Climate variability and change highly impact economies and livelihoods in the Horn as most population directly depends on the total seasonal rainfall and its distribution in both temporal and spatial domains. The main source of livelihood of the population in the arid and semi-arid regions includes pastoralism and rainfed agriculture with approximately 70 % of the population in the region depending on rainfed agriculture[1]. Climate change and climate variability negatively impact the availability of natural resources and often contributes to conflict by worsening livelihood conditions, pushing people to resort to alternative sources of livelihoods sometimes with far-reaching consequences on, for example, the environment, community and service delivery. One key impact of increased climate variability and change is the increase in migration, which often triggers in-migration tensions with the host communities due to the limited natural resources.
The communique of the African Union (AU) Peace and Security Council (PSC) meeting held on 26 November 2021 recognised the risks that climate change poses to human and state security, hindering the achievement of the 2030 goal of silencing the guns.

1. World Bank (2000) Spurring agricultural and rural development. In: Can Africa Claim the 21st Century? World Bank, Washington, DC, USA, pp. 170–207

The communique notes that these risks manifest as food and water insecurity, loss of livelihoods, failure to manage natural resources, and climate-induced displacement. The communique of the AU PSC meeting held on 21 April 2022 further highlighted the importance of a Common African Position on Climate Change in the context of Climate Change, Peace and Security and reiterated the need for mobilising predictable and sustainable climate financing. [2] IGAD's workshop in July 2022, a multi-stakeholder engagement to assess the state of knowledge on climate and security risks, identified gaps and strengthened IGAD and the UN's capacities to address climate-related security risks and tools for the provision of reliable, timely and accurate early warning information to decision makers within the security sector. The workshop informed the regional climate change strategy and the regional response to climate security that will provide pathways for action to build long-term resilience against extreme weather events, which can have cascading impacts and create compound security risks.

Climate change, population growth and economic development are some of the major forces driving the need for improved security in eastern Africa. The region is vulnerable to natural disasters such as droughts and floods. Increasing urbanization and industrialization have led to greater food, water, and energy demand. In addition, increased migration from rural areas to cities will put an added strain on public services such as health care and education. Addressing these challenges is critical to ensuring the long-term stability of the region. However, the region still faces many challenges that must be overcome if Eastern Africa is to thrive in a changing climate. These include inadequate infrastructure (roads, rail lines and ports) that can accommodate both population growth and increased trade; scarce land for agriculture; lack of affordable energy; high poverty levels and inequality; and weak institutions that are vulnerable to manipulation by powerful actors. A report by SIPRI stated that climate change impacts and a misguided climate policy helped trigger the Arab Spring—the wave of unrest that swept the Middle East and North Africa a decade ago—amplifying people's long-standing dissatisfaction with their governments. [3]

In its 5th Assessment Reportiv, IPCC defined human security in the context of climate change as a condition that exists when the vital core of human lives is protected, and when people have the freedom and capacity to live with dignity. The report states that human security will be progressively threatened as climate changes through undermining livelihoods, compromising culture and identity, increasing migration that people would rather have avoided, and challenging the ability of states to provide the conditions necessary for human security. Though there is little evidence showing a direct correlation between violent conflict and climate, there is good evidence about many

2. African Union, the Peace and Security Council, (2021); Communique of the 1051th meeting of the AU Peace and Security Council (PSC) held on 26 November 2021 on the theme: Climate Change and Peace and Security: The need for an Informed Climate-Security-Development nexus for Africa**:**

3. Emilie Broek, David Michel, Karolina Eklöw, et.al. (2022); Environment of Peace: Security in a New Era of Risk; SIPRI, Stockholm, https://doi.org/10.55163/LCLS7037

of the discrete links in the chains of causality between climate change and human insecurity. The report further states that low per capita incomes, economic contraction, and inconsistent state institutions are associated with the incidence of violence, factors which can be sensitive to climate change and variability. Poorly designed adaptation and mitigation strategies can increase the risk of violent conflict. Changing weather and climatic conditions threaten cultural practices embedded in livelihoods and expressed in narratives, world views, identity, community cohesion, and sense of place.

The prominence of indigenous, local, and traditional knowledge, according to the report, will be challenged by climate change impacts. Such forms of knowledge are often neglected in policy and research, and their mutual recognition and integration with scientific knowledge will increase the effectiveness of adaptation. Migration and mobility are reported adaptation strategies in all regions of the world that experience climate variability. Major extreme weather events have, in the past, led to significant population displacement, and changes in the incidence of extreme events will amplify the challenges and risks of such displacement. Migrants may be vulnerable to climate change impacts in destination areas, particularly in urban centers in developing countries. Increased human insecurity may coincide with a decline in the capacity of states to conduct effective adaptation efforts, thus creating circumstances in which there is greater potential for violent conflict, especially in the absence of means to resolve conflicts effectively. The report recognizes climate change as a key driver of human security and also links it to location and circumstance. Some factors identified include poverty, discrimination, inadequate provision of public services and public health, and education opportunities. Adaptation and mitigation strategies and interventions can also positively or negatively affect human insecurity.

3 Ecosystem Vulnerabilities

3.1 Climate Risks

Extreme weather conditions present a serious threat to human livelihoods, and in certain situations, they may even be fatal. Agriculture, water, health, energy, infrastructure, and transportation are just a few of the many sectors that are sensitive to climate change and are negatively impacted by recurrent shocks that have recently grown in frequency and intensity. In recent decades, Eastern Africa has experienced an increase in the frequency and severity of weather and climatic extremes such droughts, prolonged dry spells, floods, and heat waves, which has disrupted livelihoods. We present the temperature and precipitation variability in the following sections.

3.1.1 Observed Rainfall

3.1.1.1 Seasonality of Rainfall in Eastern Africa and Associated Drivers

The Greater Horn of Africa's climate is determined by a complicated set of interactions between global and localized regional feedbacks on the climate system, which are moderated by various of land surfaces. The main climatic

characteristic of Eastern Africa is the seasonal transition of rainfall, which changes across the region in three main rainfall seasons. The March-April-May (MAM), popularly referred to as the 'long rains' season is the main season over the equatorial and southern parts of the region contributing up to 70% over the eastern areas. The bulk of the rainfall is, however, recorded over the western and southern parts that receive on average more than 500 mm (Figure 1). MAM is the main cropping season over the equatorial and southern parts of the region, thus, has a significant influence on the food security situation of the region. The MAM season is driven by local and short-life-span systems that influence the northward movement of the Inter Tropical Convergence Zone (ITCZ).

Tropical cyclones over the south western Indian Ocean during the season can either cause depressed (resulting in failed seasons) or enhanced (increasing flooding probability) rainfall over the region depending on their trajectory, intensity, and the Basin it occurs. A classic example of tropical cyclones influencing the performance of the MAM season was observed in 2019 when cyclone Idai developed at the start of the season. This cyclone caused devastating impacts in the southern parts of Africa and drew away moisture from GHA, thus, causing delayed onset and eventual failure of the season. Other systems influencing the region's climate during this season include the Madden Julian Oscillation and the Congo air mass.

The June to September (JJAS) season is the main season over the northern sector of the region, contributing more than 80% of annual rainfall in Sudan. The highest amounts (>1000mm) are, however, recorded over western parts of Ethiopia (Figure 1). Although the ITCZ remains the main system contributing to rainfall during this season, global drivers such as El Nino Southern Oscillation (ENSO), Pacific Decadal Oscillation (PDO) and local systems, including the Somali Jet, significantly influence the performance of the season. For instance, the positive phase of ENSO (El Nino), is associated with depressed rainfall, and vice versa.

One of the most recent intense El Nino events was observed in 2015, resulting in extensive, severe droughts in Ethiopia, throwing millions of people into a food and livelihood crises[4].

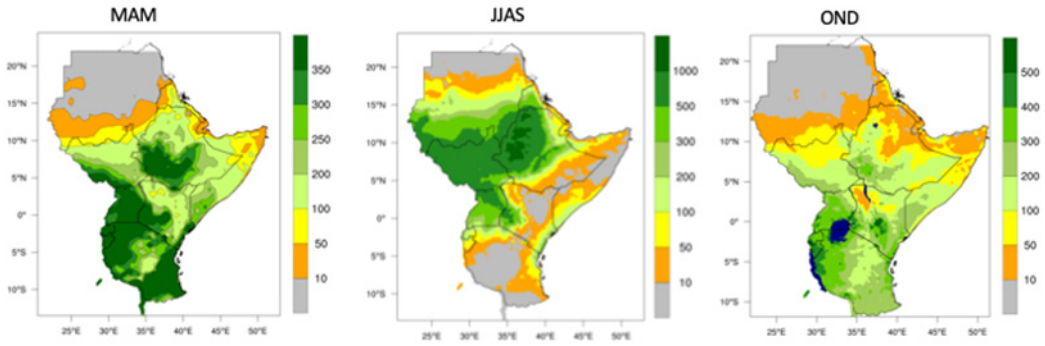

Figure 3.1 Seasonal Rainfall Totals based on long term average (1981-2010) over Eastern Africa

4. Mera, G. A. (2018). Drought and its impacts in Ethiopia. Weather and Climate Extremes, 22, 24–35. https://doi.org/10.1016/J.WACE.2018.10.002

The October to December (OND), popularly known as the 'short rains' season, is essentially significant over equatorial and southern parts of the region, with the highest contribution of more than 60% to the annual over the eastern parts. This season is significantly influenced by global drivers such as ENSO and the Indian Ocean Dipole (IOD). The positive phase of ENSO and IOD are associated with enhanced rainfall over the region, with cases of flooding experienced in extreme years.

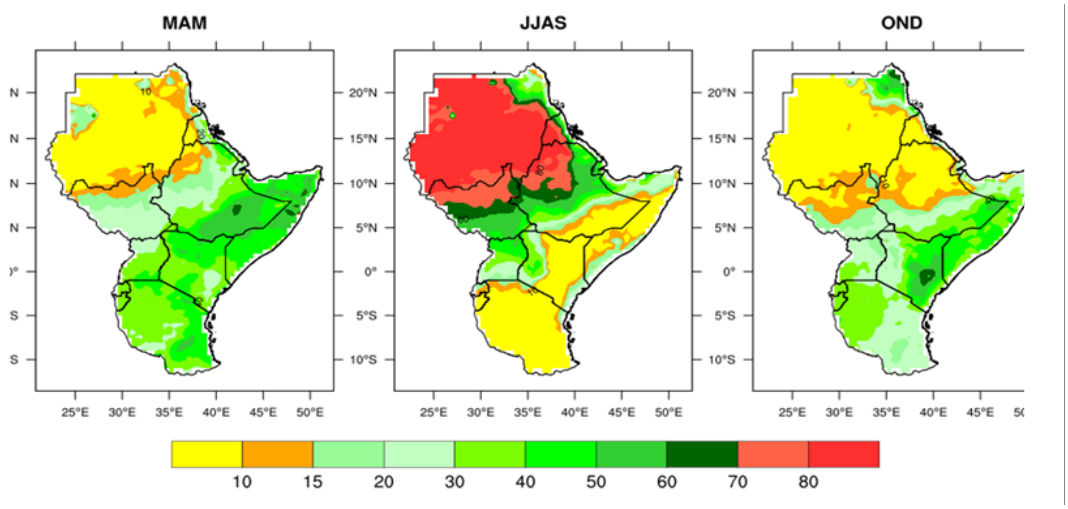

Figure 3.2 b March to May (MAM) contribution to annual total rainfall (left) June to September (JJS) contribution to annual total rainfall (center) October to December (OND) (right) season contribution to the annual total (1981-2010) over Eastern Africa

3.1.1.2 Decadal Spatial Variability of Rainfall

For instance, the 1997-98 El Nino event, caused different impacts globally with most parts of equatorial and southern Eastern Africa experiencing floods that caused displacement and infrastructure damage[5]. Similarly, the positive IOD of 2019 resulted in a record-high number of tropical cyclones over the northern Indian Ocean closer to the region. These caused extensive flooding over Somalia and Djibouti, resulting in the loss of lives and livelihoods, running into billions of dollars.

Decadal variability of rainfall significantly varies from one season to another. Analysis shows that in the first decade of the analysis (1981-1990), the long rains generally decreased over time with a change of approximately –200mm per decade over parts of Tanzania. On the other hand, parts of Uganda and coastal areas of Kenya and Somalia experienced an increase in the total rainfall. A downward trend is evident in the second decade of MAM over the equatorial and southern parts of the region.

The downward trend persists to the third decade of the period of analysis over the equatorial region.

5. Karanja, F. K. and Mutua, F. M. (ed) 2000. Reducing the impact of environmental emergencies through early warning and preparedness. The case of El Niño–Southern Oscillation (ENSO). Impacts of the 1997–98 El Niño events in Kenya. The Case of 1997–98 El Niño. Country Reports. Accessed on 12th July 2022 from www.unu.edu/env/govern/ElNino/CountryReports/pdf/kenya.pdf

However, in the fourth decade, most parts of the region had a positive trend in seasonal rainfall. Analysis of the JJAS season shows that in the first decade, there was an increase in rainfall except over coastal Kenya, extending to the adjacent areas of Somalia and isolated areas in Ethiopia, Uganda, and Sudan. This trend was also observed in the second decade, especially in Ethiopia and South Sudan.
However, the situation drastic changes in the 3rd and 4th decades especially over the western parts of the region where decreasing rainfall trend is evident. For the OND season, an upward trend is evident in the first decade and a positive change is observed in the second decade. A significant shift is observed in the third decade, especially over the equatorial parts where rainfall decline is observed, but a slight improvement was seen during the 4th decade.

The annual trend shows an increased rainfall amount in the last decade, with Tanzania, Kenya, and a few areas in Ethiopia showing a more than 200mm change, at the same time a decline was observed during the 2001 to 2010 decade, especially over central parts of Kenya and western areas of the region. Earlier decades (1981-1990 and 1991-2000) show mixed signals, with areas in Ethiopia and Tanzania showing increased annual rainfall by more than 200mm. The observed decadal trends underscore the need for data at longer time scale to understand the impacts of climate change on rainfall in the region.

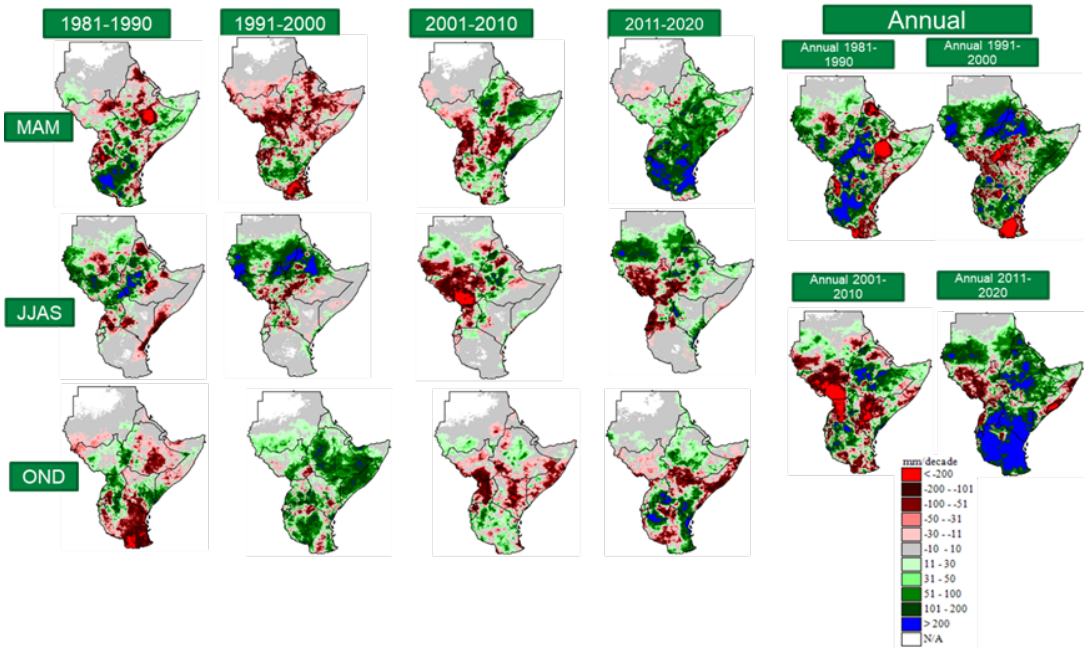

Figure 3.3 Decadal variability of MAM, JJAS, OND and annual total over 1981-1990, 1991-2000 and 2001-2010 over Eastern Africa.

3.1.1.3 Inter-annual variability of historical Rainfall over selected stations

To further understand the details of the variations, time series analysis over specific areas was done to better understand the year-to year variation of rainfall with the associated trend. Figure 3 shows the results for three rainfall stations in Kenya and 1 in Sudan. In general, the spatial variability of rainfall is usually high, and should reflect in the trends at different locations, as highlighted in the selected locations in Kenya.

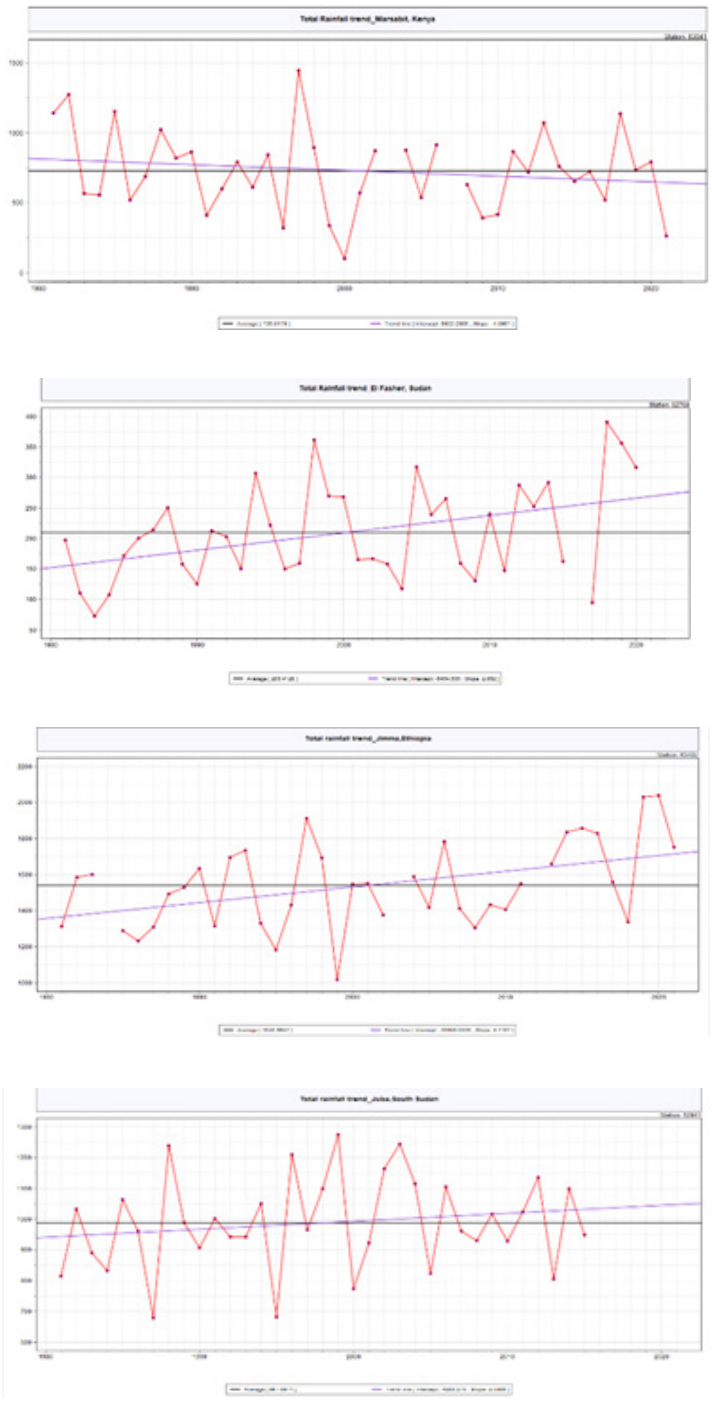

Figure 3.4 Decadal variability of MAM, JJAS, OND and annual total over 1981-1990, 1991-2000 and 2001-2010 over Eastern Africa.

However, even though the trends over Kenya vary from station to station, the trends are not statistically significant compared to the observed rainfall over El Fasher in Sudan which has been increasing significantly over the past 40 years. The apparent variation in trends highlights the need for location-specific climate information to better understand the variability within each country.

3.1.1.4 Historical Frequency of Droughts over the Region

Analysis of drought frequency using Standardized Precipitation Index (SPI < -0.99) 3-, 4-, and 9-month SPI shows that the region has experienced increased number of drought years. Highest number (up to 9) of failed MAM seasons as shown by 3-month SPI (Figure 3-5), are evident over the eastern parts of the region especially over Ethiopia and Somalia. The Horn of Africa region, especially areas bordering Somalia and Ethiopia is the most impacted by extreme dry events, especially during MAM and OND seasons.

A year-to- year variation of rainfall during MAM season over the Horn of Africa (latitudes (-2S-13N; longitudes 37E-53E) shows that the dry years were dominant during the 2000s with MAM 2009 causing devastating drought in Kenya[6]. The northern sector of the region has also experienced failed JJAS (4-month SPI) seasons although no significant spatial pattern is observed. However, arid conditions especially in Ethiopia and South Sudan have caused devastating impacts on lives and livelihoods. The 2015 drought, for instance, was one of the most severe droughts on the record in Ethiopia.

A similar pattern showing high number of dry years is also observed during the October to December season over the horn especially in Somalia. The year-to-year variation shows a high number of dry years during the 1980s with 2015 predominantly showing a negative index in the recent past (Figure 3-6).

The 9-month SPI from September to May also shows a high frequency of droughts over the horn with the highest number of dry years recorded over south eastern Ethiopia and central Somalia. The year-to-year variation, however, shows consistent interannual variability with alternate wet and dry periods. Extremely wet conditions were observed in 1997/98 and 2019/20 while extremely dry conditions were recorded in 2010/11.

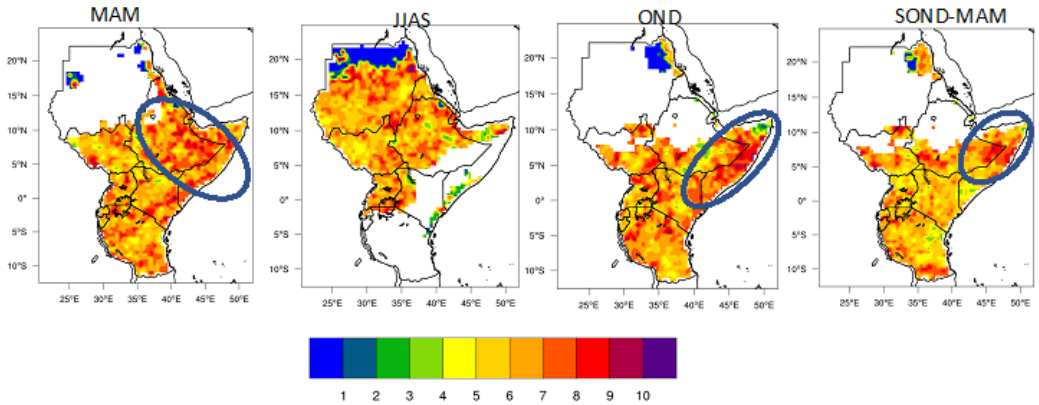

Figure 3.5 Drought frequency (SPI <-0.99) for Standardized Precipitation Index (SPI) over Eastern Africa

6. Reliefweb 2011. An assessment of the response to the 2008 - 2009 drought in Kenya. Accessed from https://reliefweb.int/report/kenya/assessment-response-2008-2009-drought-kenya on 12 July 2022

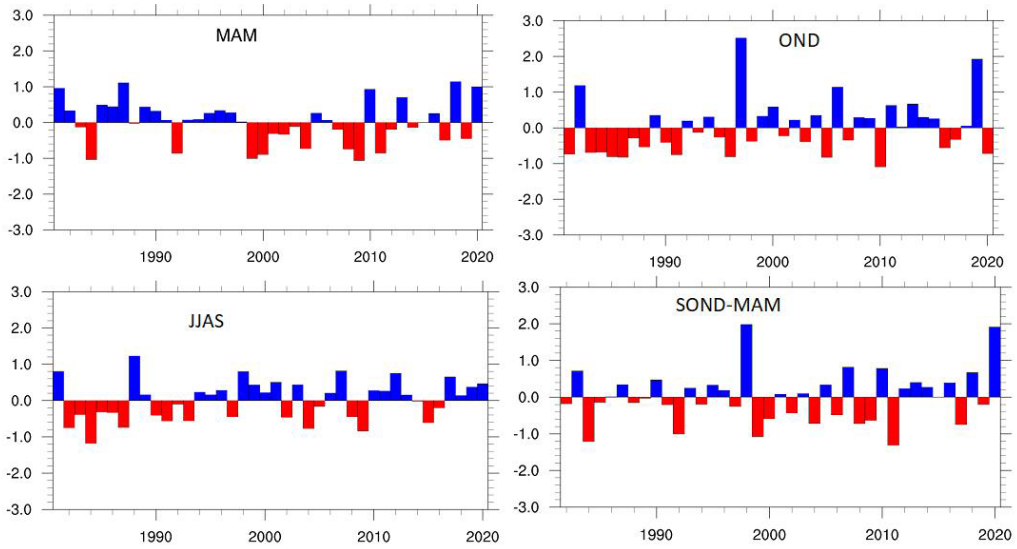

Figure 3.6 Standardized Precipitation Index (SPI): Degree of Wetness and Dryness over Eastern Africa

3.1.1.5 Case Study: 2020-2022 Drought

The analysis in section 1(d), shows that the Greater Horn of Africa is prone to drought events. In 2022, the region faced an unprecedented drought. The drought resulted from four consecutive failed rainfall seasons that began in OND 2020. The 15-month SPI analysis from March 2021 to May 2022 shows widespread extremely dry conditions over the equatorial parts of the region Figure 5. This condition left millions of people in severe food insecurity crisis with thousands of livelihoods destroyed.

Although no official reports on loss of lives had been reported at the time of writing this report, thousands of livestock had been lost and massive crop failure had been witnessed.

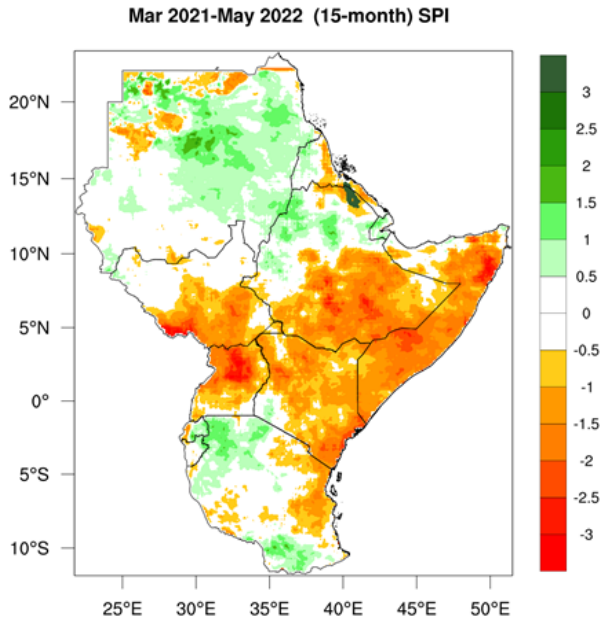

Figure 3.7 Standardized Precipitation Index (SPI) analysis from March 2021 to May 2022 over Eastern Africa

3.1.2 Observed Temperature

Temperature distribution over the region varies from high over the Desert, arid, semi-arid and low over the humid & semi-humid areas. The MAM season is characterized by temperatures above 30 degrees Celsius over South Sudan and southern to eastern Sudan and temperatures above 24 degrees are normally recorded over western, northern and coastal Sudan, north eastern Ethiopia, and eastern parts of the region. Temperatures less than 24 °C are normally recorded over central to western Ethiopia, central to western Kenya, southern Uganda, Rwanda, Burundi, and much of Tanzania.

During the JJAS season, northern Sudan, Eritrea, Djibouti, and north eastern Ethiopia record above 30 degrees Celsius while southern areas of Sudan, South Sudan, south eastern Ethiopia, Somalia and northern to eastern Kenya record above 24 °C. The rest of the region records less than 24 degrees Celsius.

The average temperatures during the October to December season are, however, lower with much of Sudan, South Sudan north eastern Ethiopia, northern & eastern Kenya, central to southern Somalia, and coastal Tanzania recording an average of between 24 and 30 degrees Celsius. The rest of the region records below 24 degrees Celsius. Across the 3 seasons, it is observed that the lowest temperatures are recorded over parts of central Ethiopia and central Kenya.

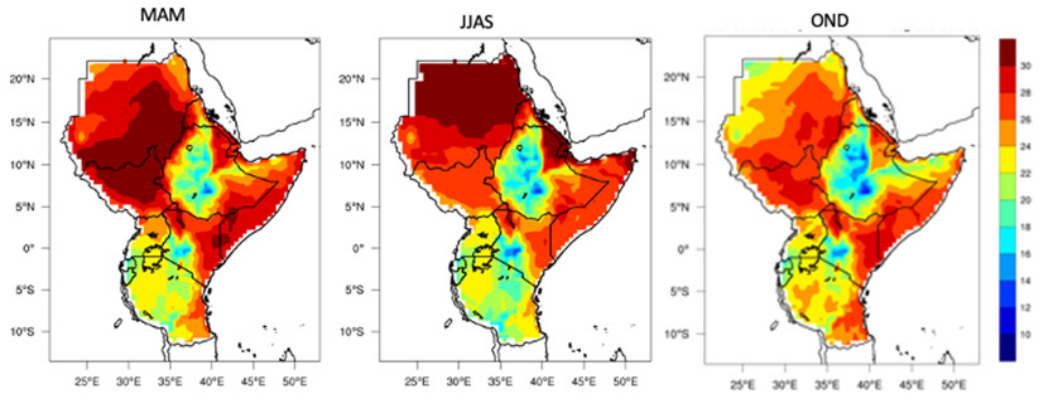

Figure 3.8 Temperature Distribution Over Eastern Africa (1981-2010)

As a result of global warming, which has caused increased global temperatures, average temperatures over the Greater horn of Africa have increased significantly over the past century (figure 3-8). This increase has led to a sharp rise in the number of heatwaves in parts of the region.

The Greater Horn of Africa is currently experiencing record-breaking heat waves. These record-breaking temperatures have been linked to the combined effects of a strong El Niño event, natural variability, and human greenhouse gas emissions. These heatwaves have been particularly recorded in parts of north eastern Ethiopia, Djibouti and Sudan during the June to September season. Analysis shows that there has been a steady increase in temperature over the region with the last decade being the warmest on record (figure 3-9).

An increase in mean temperature is directly linked to a higher rate of transmission of pathogens, which has been observed in the region. Increase/ resurgence in diseases such as Malaria has been observed in parts of the region.

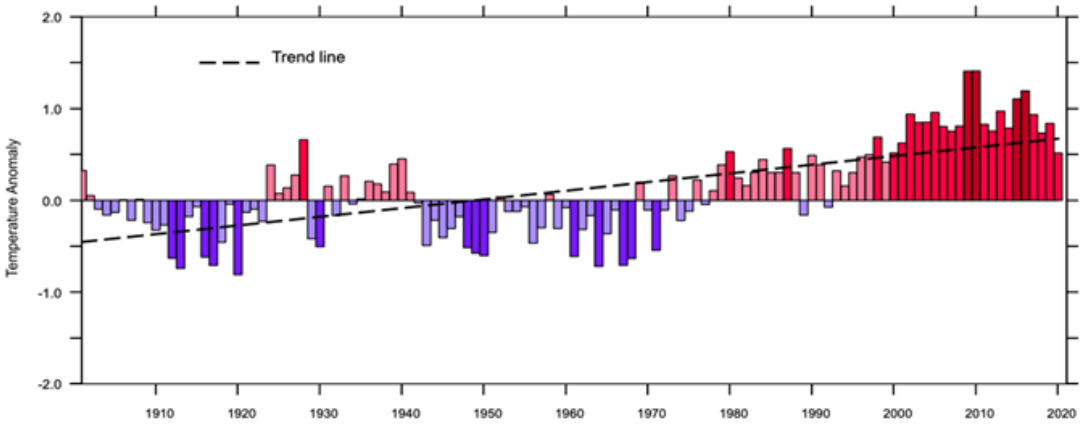

Figure 3.9 Average Temperature Distribution Over Eastern Africa

3.1.3 Climate Change

The projected changes in precipitation and temperature for the different seasons and scenarios are shown in figure 3-10. For the Long Rains seasons, under the low emission scenario reduced rainfall is projected over parts of Uganda, western parts of Kenya, northern Tanzania, Rwanda, Burundi, and South Sudan while an increase in rainfall is projected over the eastern parts of

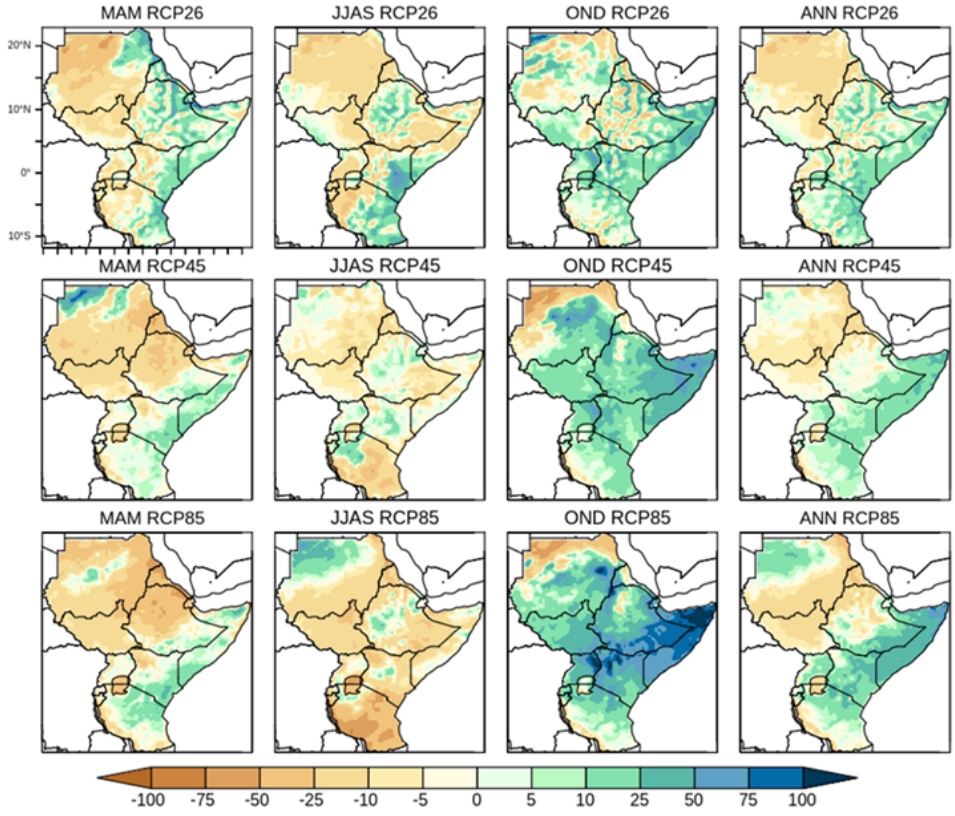

Figure 3.10 Projected scenarios of seasonal changes in precipitation over Eastern Africa under low emission scenario Representative Concentration Pathway (RCP) 2.6, intermediate scenario RCP 4.5 and high emission scenario RCP 8.5

the region. During the JJAS season a reduction in total rainfall is projected over parts of Sudan, eastern South Sudan, and parts of Ethiopia while an increase in rainfall is projected over the Ethiopian Highlands.

The total rainfall during the Short Rains season is projected to increase over most parts of the region. Annually the total rainfall is projected to increase over the Eastern parts of the region and reduce over parts of South Sudan and Sudan.

In the intermediate scenarios (RCP45) the total rainfall during the long rains is projected to increase over the eastern parts of the region and reduce over the western parts. The total rainfall during the JJAS season is projected to slightly reduce over most parts of the northern region. On the other hand, the total rainfall is projected to increase during the short rain season.

Under the high emission scenario an increase in total rainfall is projected over the eastern parts of the region for both the long and short rains season, with the short rain seasons projected to have an increase in a total amount of rainfall of up to 100 mm over the tip of Somalia. While an increase in the amount of total rainfall is projected over most parts of the region during the short rains season, a decline in rainfall is projected over parts of South Sudan, Uganda and Tanzania.

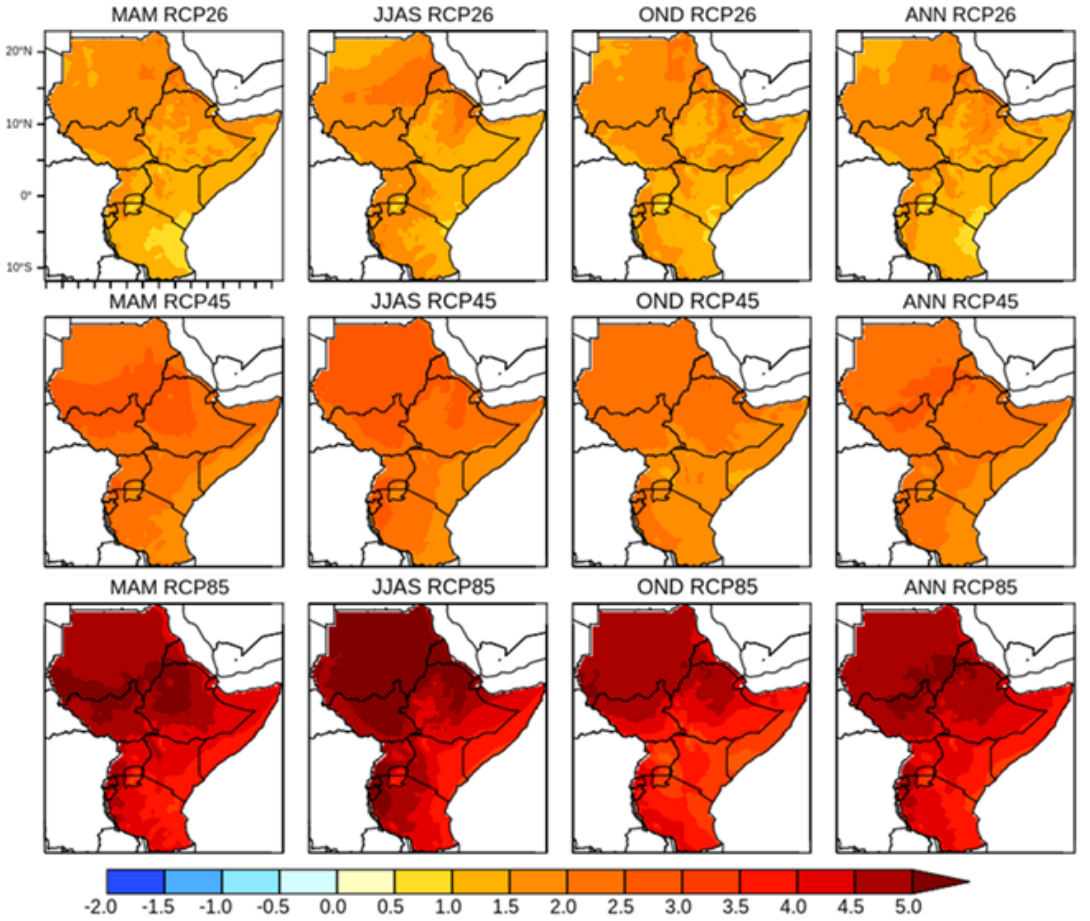

Figure 3.11 Projected scenarios of seasonal changes in temperature over Eastern Africa under low emission scenario Representative Concentration Pathway (RCP) 2.6, intermediate scenario RCP 4.5 and high emission scenario RCP 8.5

The total rainfall during the JJAS season is projected to decrease over most parts of South Sudan, Sudan, coastal area in Kenya and Tanzania, and the western parts of Ethiopia.

Over Eastern Africa the temperature is projected to increase for all 3 different scenarios. In the low emission scenario (RCP26), the temperature is projected to increase by up 2°C by the year 2100, with the highest increases in temperature occurring over the northern parts of the domain in all the three seasons. Temperature increases up to 3°C are projected under the RCP 4.5 scenario, just as in the low emission scenario the highest temperature increases are projected over most parts of Sudan. The high emission scenario has temperature increases of over 5°C over parts of Sudan and South Sudan for all three rainy seasons. In all the seasons and scenarios, the eastern parts of the domain have the slightest increases in temperatures.

3.2 Environmental Risks

Land is at the center of climate change discussions and plays an integral role in climate systems. Firstly, the main driver of climate change is global warming. When comparing the warming over land and the oceans, temperatures over land have warmed comparatively more and faster than the temperatures over the oceans. Secondly, land is a critical resource for human-life and biodiversity, providing livelihoods, food, and water. Land acts both as a sink and a source of greenhouse gas (GHG) emissions directly affecting climate change.

Land-use and land management practices are the greatest contributors of GHG emissions when carried out in unsustainable manner through mal-practices such as deforestation, charcoal burning, overgrazing yet when carried out sustainably through practices such as reforestation, afforestation and restoration land becomes a sink absorbing some of the GHG. The biodiversity and ecosystems on land are vulnerable to the impacts of climate change.

Land governance and land rights are at the center of land use and land cover change and understanding contextual dynamics is integral in adaptation and mitigation. IGAD in its report on gender and land rights states that property rights in land, whether customary or formal, act both as a form of economic access to key markets and as a form of social access to non-market institutions, such as the household and community-level governance structures. Where there is a breakdown of governance, there is an exacerbation of land theft and invasion, in addition to newer threats to the security of tenure.[7]

In the IGAD region substantial gaps exist between formal land laws and the reality on the ground, despite progressive legal frameworks. Women's land rights in IGAD region continue to lag behind those of men, due to poor implementation and enforcement of the laws .[8]

7. Inter-Governmental Authority on Development, 2020, Tools for Gender Responsive Land Governance https://bit.ly/3zZNqI0
8. Inter-Governmental Authority on Development (IGAD), 2022, Regional Gender Assessment of the Land Sector https://bit.ly/3PpEAJe

3.2.1 Land cover

The region is characterized by highly heterogeneous land cover. The latest global land cover product (Copernicus) generated from Sentinel-2 satellite imagery groups the land cover types over the region into 8 categories: forests, shrubland, herbaceous vegetation/wetlands, bare/spare vegetation, cropland, built-up and permanent water bodies.

The most dominant land cover type in the region is Shrubland (27%), present over the Eastern parts of the area mostly in Kenya and Somalia. Bare land is the second dominant land cover type mostly present over the northern parts of the region, dominant in Sudan, Eritrea, Djibouti, and Somalia. Agriculture in the region is highly dependent on rainfall, and thus the location of croplands is heavily consistent with the region's climatic zones and proximity to the river Nile. The cropland areas are located in the Ethiopia highlands, western and central Kenya, eastern Sudan and large areas in the southern countries of the region. South Sudan exhibits the lowest area under cropland, which could be attributed to conflict and insecurity conditions in the country.

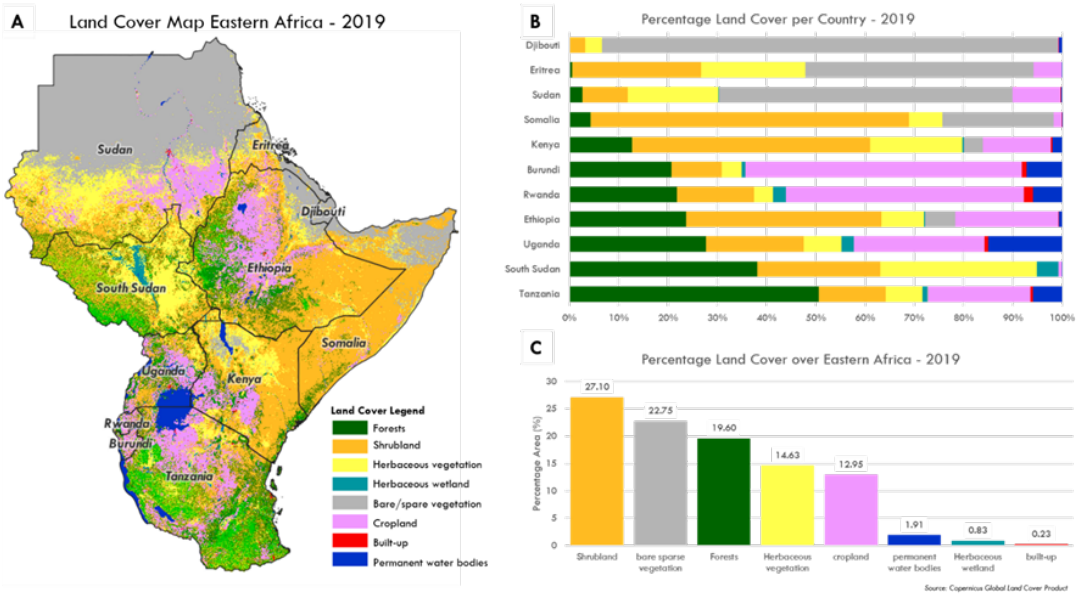

Figure 3.12 A) Land cover map over Eastern Africa showing spatial distribution of different land cover types. B) Land cover type distribution as a percentage of total area of each country highlighting Tanzania as the country with the highest forest. C) Percentage

While global products give a general representation of local conditions, localized data and analysis are needed to validate and generate more accurate land cover products.

3.2.1.1 Hotspot land cover analysis

Hotspot land-use-land-cover analysis information has been conducted over selected areas of interest across the region. Forests and protected areas are some of the areas of interest over which hotspot analysis has been conducted.

The hotspot analysis is conducted over smaller areas of interest and ground data is collected to calibrate and validate the outputs. The results highlight consistent deforestation and forest degradation across the forests analyzed. Forest degradation is land degradation that occurs in the forest while deforestation is the conversion of forest to non-forest land .

The results highlight the link between agricultural expansion and loss of forest as shown by the conversion of forest to croplands in both Gishwati forest in Rwanda and Mabira forest in Uganda. Ruvubu also exhibits high levels of forest degradation as shown by the conversion of open forest to grassland. In contrast the open forests in Mabira in 1995 were converted to agricultural lands by 2015, 20 years later.

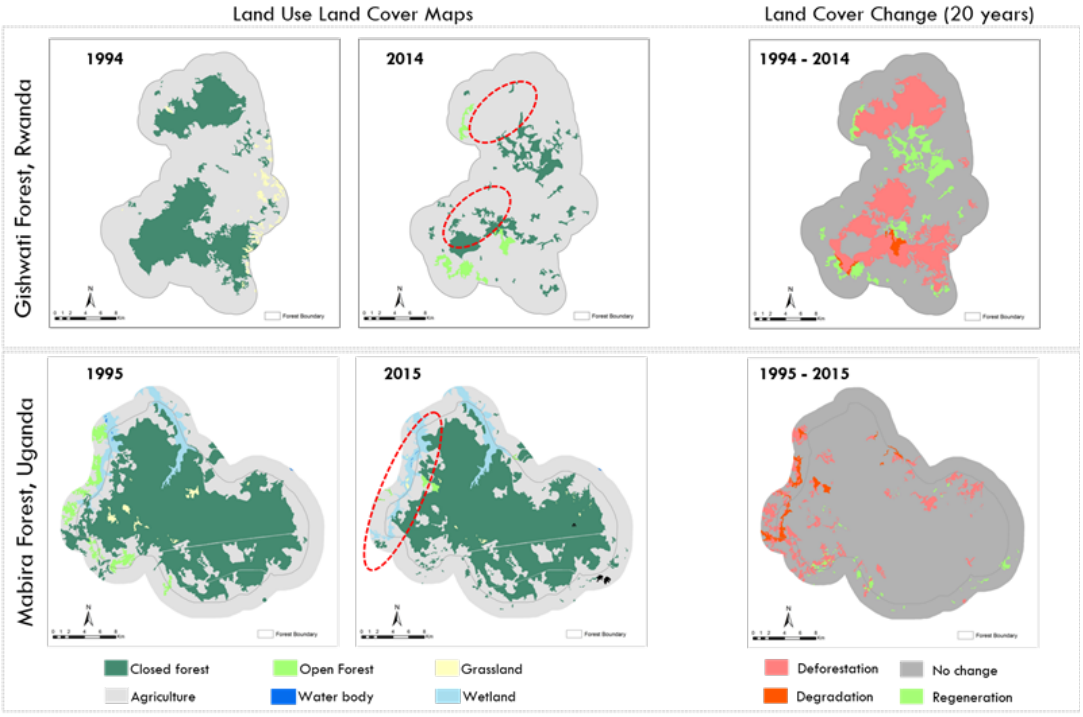

Figure 3.13 Land use land cover maps over Gishwati forest in Rwanda and Mabira forest in Uganda showing land cover changes over a 20-year period. The area under closed forest in Gishawiti reduced from 30% to 10% while the area under agriculture increased by 20% between 1994 and 2014 showing conversion of forest land to agriculture

3.2.1.2 Land Degradation and Desertification

Land degradation is both a security and climate change amplifier. UNCCD defines land degradation as any reduction or loss in the land resource base's biological or economic productive capacity. Land degradation leads to decreased agricultural productivity enhanced food insecurity, reduced income, and increased water insecurity. These impacts are also the main drivers of migration and conflict. Land degradation therefore is an active threat to livelihoods amplifying security risks.

While land degradation is mainly attributed to anthropogenic, a large body of evidence links climate change and land degradation. The link between land degradation and climate change is two ways: climate change exacerbates

the rate and intensity of land degradation through prolonged drought, high temperatures and recurrent floods and land degradation contribute to global and regional climate change and variability.

IPCC reports that land degradation and climate change, individually and in combination, have profound implications for natural resource-based livelihood systems and societal groups . The report further states that Climate change exacerbates the rate and magnitude of several ongoing land degradation processes and introduces new degradation patterns.

In general, the global population is rapidly increasing at the same time the total dryland areas in drought annually are also on the rise while the extent of the wetland is shrinking. Except for a few pocket areas in Ethiopia, Uganda and Tanzania classified Humid most of the region is classified under semi-arid, arid areas.

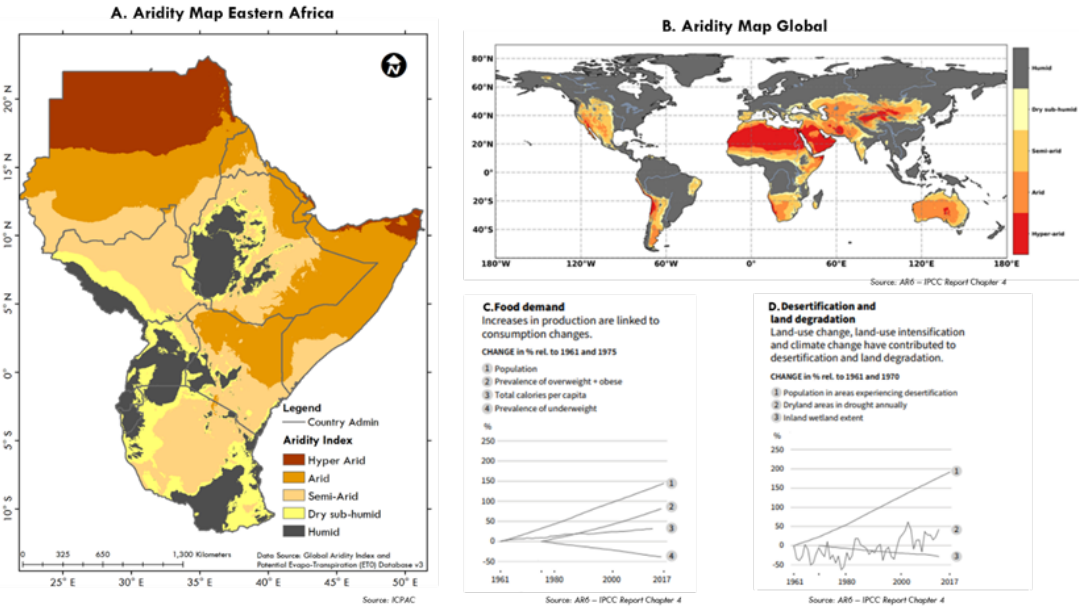

Figure 3.15 A) The Aridity map over Eastern Africa shows the spatial distribution of drylands in the region, highlighting a region dominantly made up of drylands. B) Global Aridity map allowing for comparison of the regions drylands and the global drylands. C) The graph shows trends in global food demand which highlights growing consumption needs that have been linked to increase in production. D) The graph shows global trends of desertification and land degradation showing an increasing trend in areas that experience drought annually and a decreasing trend for inland wetland extent. It also shows the rapid population growth that is considered a major contributor to land degradation through land-use changes and unsustainable land management practices. Figure B, C, and D are excerpts from the AR6-IPCC Special Report on Climate Change and Land.

3.2.1.3 Wildfires in Eastern Africa

Wildfire also known as wildland fire, bushfire or forest fire depending on the type of vegetation available, is an uncontrolled fire in an area of combustible natural vegetation. Although some fire origins are by natural phenomena such as lightning strikes or volcanic eruption, majority of fires in Eastern Africa are as a result of human activity and mostly for agriculture purposes.

These agricultural activities include slash and burn to prepare the land for crop planting or after crop harvest, pastoral activities which include clearing land for livestock or for regeneration of pastures, honey collection and charcoal burning. People, willingly or unwillingly, often initiate fires that sometimes spread uncontrollably, causing significant losses of human lives, destruction of properties, natural habitats and biodiversity. Fire distribution happens in patterns depending on the season or time of the year as seen in the Figure 3 16.

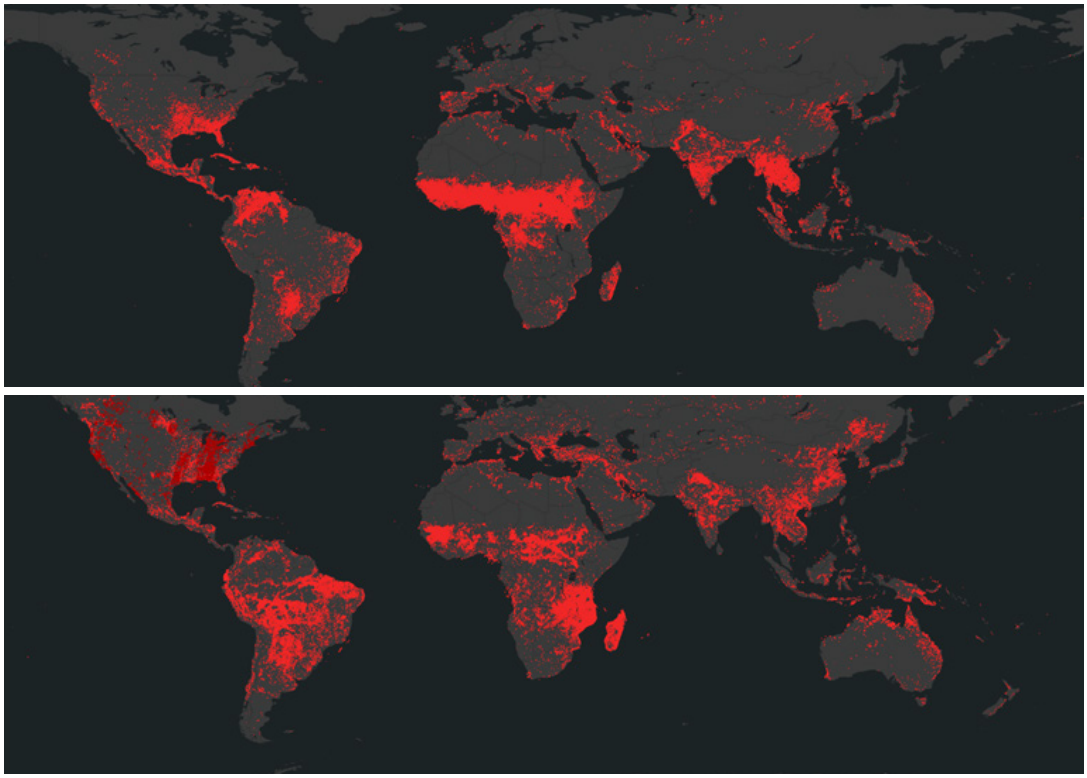

Figure 3.16 Map of the world showing fire locations recorded by satellite in the 7 days between January 26-February 1(top), and between November 1-7(bottom), 2022. Source NASA firms (Fire Information for Resource Management System)

Though fire is mostly associated with disaster, some fires are good for the ecosystems. For instance, in Protected Areas and Forests, controlled fires are set intentionally by park or forest officials to pre-emptively prevent a more serious wild fire by burning the fuel early before accumulation. At the same time, this also benefits the ecosystem by eliminating plant debris and dead trees, making way for young, healthy trees and vegetation to grow and thrive. Another type of beneficial fire is the backburning used to manage an already occurring wildfire. Backburning involves setting a controlled fire in the path of the approaching wildfire thereby eliminating all fuel such that when the wildfire arrives it dies out. However, this type of fire management using controlled fires should involve professionals who are trained to manage such kind of fires, otherwise they become uncontrolled and end up harming than helping.

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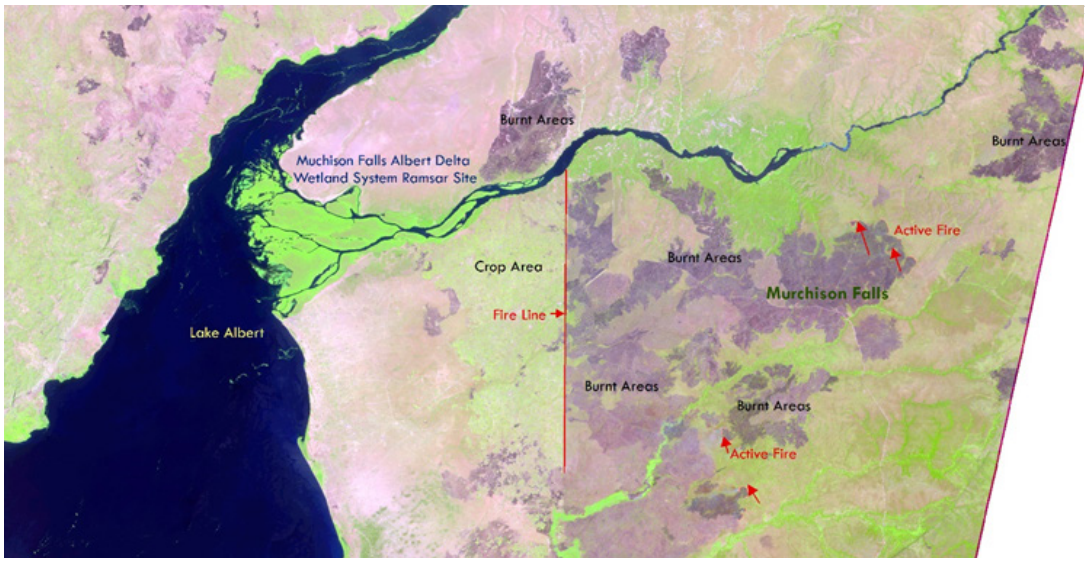

Figure 3.17 Effective fire management using a Fire Break Line as seen from Sentinel 2A Satellite for Murchison Falls National Park undertake by Uganda Wildlife Authority on January 2019. (Source: GMES & Africa ICPAC project)

Wildfires in the Eastern African region are a regular occurrence especially after the rain season, when the environment is conducive for fire. They are a natural cycle in many ecosystems especially the savanna but also the forests ecosystems. There are two fires seasons in the region; September - March in the areas north of the Equator and April – August in the areas south of the Equator (see maps in 3-17). These seasons coincide with the farming and harvesting times. Farmers cut down some of the vegetation and set fire to the rest in order to clear the land to plant crops. This type of clearing lands is considered the cheapest and also has the advantage of killing pests and diseases while providing nutrients for future crops and rangelands. However, these techniques are controversial as it can lead to deforestation, soil erosion and loss of biodiversity.

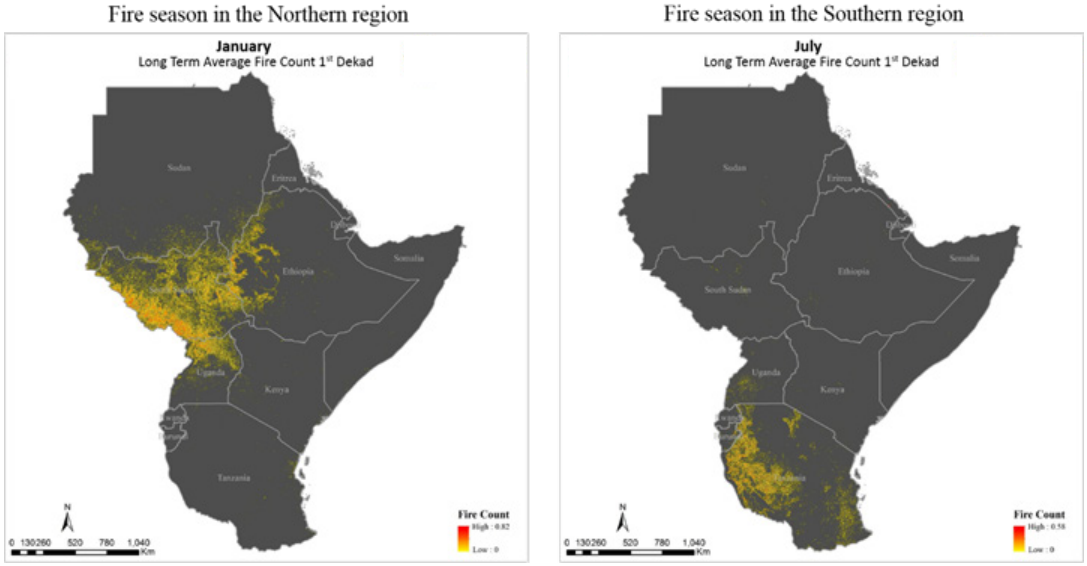

Figure 3.18 Eastern Africa maps showing spatial fire distribution and intensity for selected months in the two fire seasons. The data used is the based on the Long-Term Average active fires for the period 2000-2017. (source: eStation courtesy of GMES & Africa project)

Recent examples include Mount Kenya and Aberdare forests, key Kenya water towers and biodiversity hotspots, were set on fire by people clearing lands for farming, destroying thousands of hectares of land and killing biodiversity.
The fire season in South Sudan is November – March. The graph below illustrates the number of fires in South Sudan for 2018/2019 and 2019/2020 fire seasons. After a good rainfall season, good vegetation development is observed (NDVI between June – October), providing abundance of biomass and consequently increased numbers of fire incidences (above average numbers of fires for 2019 between January – February and from October 2019 to January 2020).

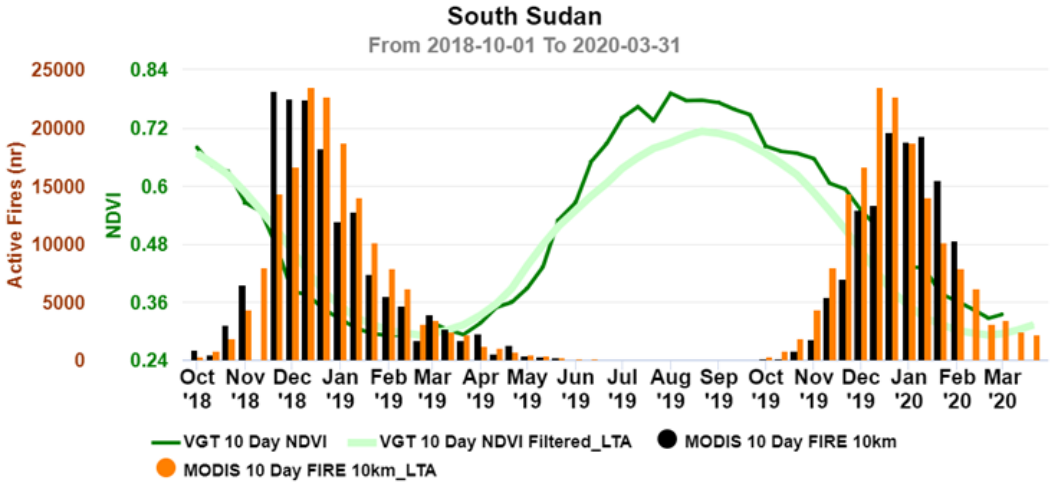

Figure 3.19 The orange vertical bars represent Long Term average numbers of active fires (2000-2017), the black vertical bars the actual active numbers up to today. The bold dark green curve is the current vegetation index NDVI, while the light green curve is the Long-Term average NDVI. (source: eStation courtesy of GMES & Africa project)

There are a number of climatic and non-climatic factors that create a conducive environment for the start and the spread of wildfires. Direct climatic factors include temperature, humidity, winds and indirect climatic factors include precipitation which in turn affects the soil moisture and vegetation biomass. Non-climatic factors include topography, soil and vegetation type.

The Climate Change projections for Eastern Africa include increase in annual mean temperature. Quantitatively the amount of rainfall is expected to remain the same, however, the temporal and spatial distribution of rainfall is expected to change. The rain seasons as we know them are expected to change in that 'short' rains will get longer and the 'long' rains will get shorter yet the intensity is expected to increase. The frequency and intensity of extreme events, primarily droughts and floods are expected to increase and there are possibilities that these extreme events will extend to new locations. Projected higher temperatures and extended drought conditions coupled with population growth pressure are likely to increase occurrence and intensity of wildfires in the region in the future.

Climate change therefore will affect the fire seasons in one way or another; increased precipitation will result into increased fuel (vegetation), if this is followed by prolonged dry season or drought conditions coupled with increasing

temperatures then we expect the frequency and intensity of fires to increase and a disturb in the length the fire seasons. The last five years have been the hottest on record, and the period of 2010-2019 was the hottest decade since records. In the region, we are already observing successive extreme events, 2019 was the hottest year and 2020 the wettest year on record. The Z-score graphs for some of the Eastern Africa countries show a general increase (above average) in fire incidences from 2002 to 2019 in some countries.

The effects of climate change coupled with unsustainable management practices will increase wildfire risk thereby making our region more vulnerable to wildfires. Measures need to be put in place to monitor and manage these wildfires. Currently ICPAC has a database of observed active fires derived from MODIS satellite and availed through the eStation system. However, while it is important to monitor the active fires, it is equally important to develop an alert system for the region to help avert potential catastrophic impacts of wildfires. Various information needed to monitor fire risks such as weather/climate data and forecasts can be sourced from ICPAC or from National Meteorological Agencies, satellite derived information such as vegetation condition, biomass, soil moisture can be sourced from ICPAC and other satellite derived data providers.

3.2.1.4 Rising /shrinking lakes

Increasing lake levels in the region have led to the destruction of property, and displaced communities, most notably around Lakes Baringo and Naivasha. A report by Herrnegge (2021) stated that changes in boundary conditions (e.g. changes in catchment properties due to anthropogenic influences, inter-catchment leakages, and changes in underground permeability) are not necessary to explain the lake level rises. Generally, the increases in (adequate) rainfall are sufficient to explain the lake level rises.[1]
In addition to increasing rainfall, which is projected for the region under all future climate change scenarios; other proposed drivers include deforestation and degradation and land use change, poor land-use practices and increased water runoff; Increased paved surfaces and urbanization; Catchment degradation due to anthropogenic activities enhancing sediment loading into the lakes; Long-term lakes sedimentation through rivers feeding the lakes; Climate change impacts - e.g. the effect of the phase of the Indian Ocean Dipole in Eastern Africa; Shifting the location of the Intertropical Convergence Zone (ITCZ), El Niño Southern Oscillation (ENSO) events; and Tectonic activity which may have opened the floodgates of the groundwater recharge systems.

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9. Mathew Herrnegger, Gabriel Stecher, Christian Schwatke, Luke Olang, Hydroclimatic analysis of rising water levels in the Great rift Valley Lakes of Kenya, Journal of Hydrology: Regional Studies, Volume 36, 2021, 100857, ISSN 2214-5818,https://doi.org/10.1016/j.ejrh.2021.100857.

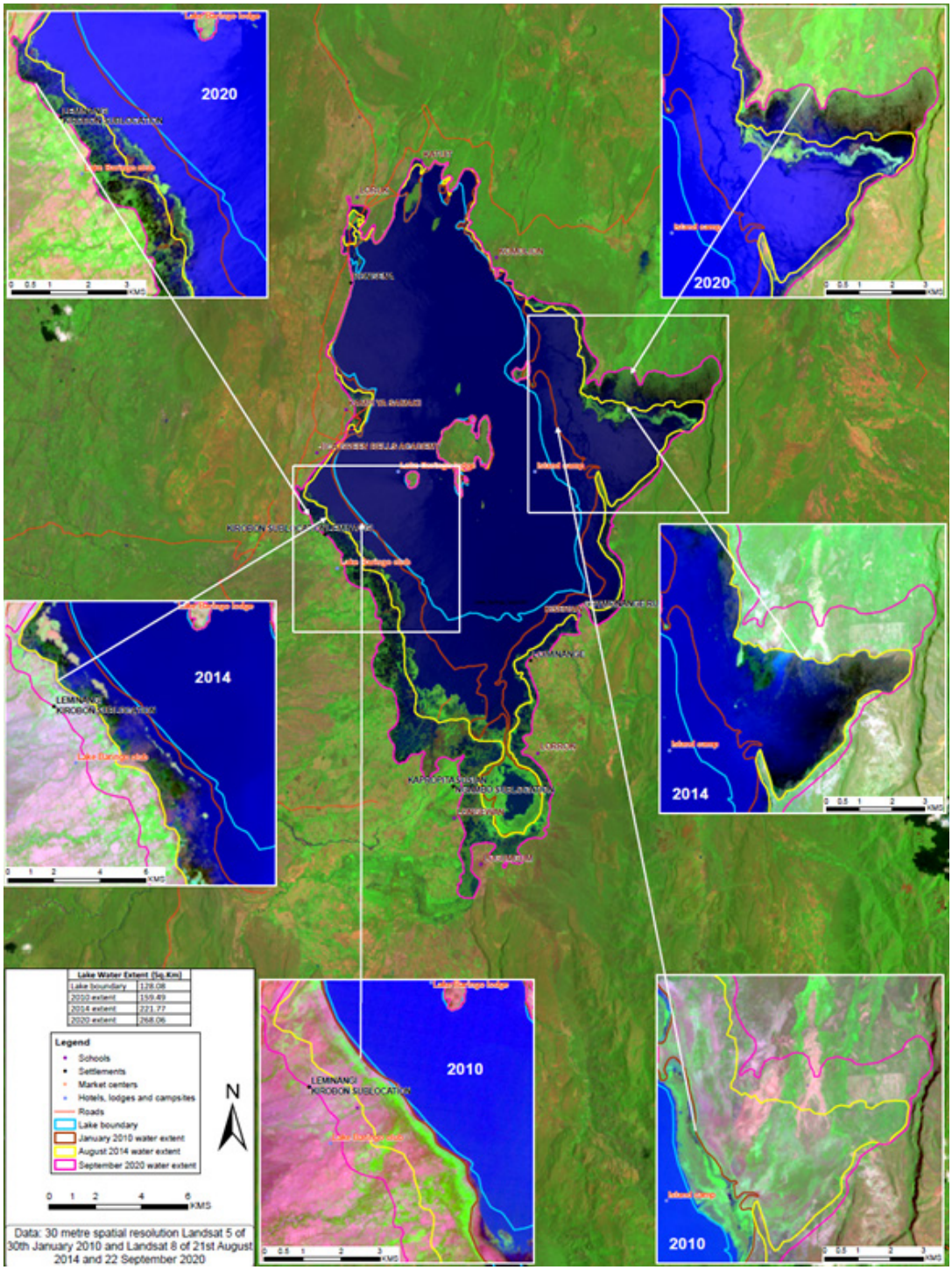

Figure 3.20 Images of Lake Baringo between 2014-2020 Source: Simon Onywere, James Magige : Kenyatta University, Nairobi, Kenya

Catchment degradation due to anthropogenic activities enhancing sediment loading into the lakes; Long-term lakes sedimentation through rivers feeding the lakes; Climate change impacts - e.g. the effect of the phase of the Indian Ocean Dipole in Eastern Africa; Shifting the location of the Intertropical Convergence Zone (ITCZ), El Niño Southern Oscillation (ENSO) events; and Tectonic activity which may have opened the floodgates of the groundwater recharge systems.

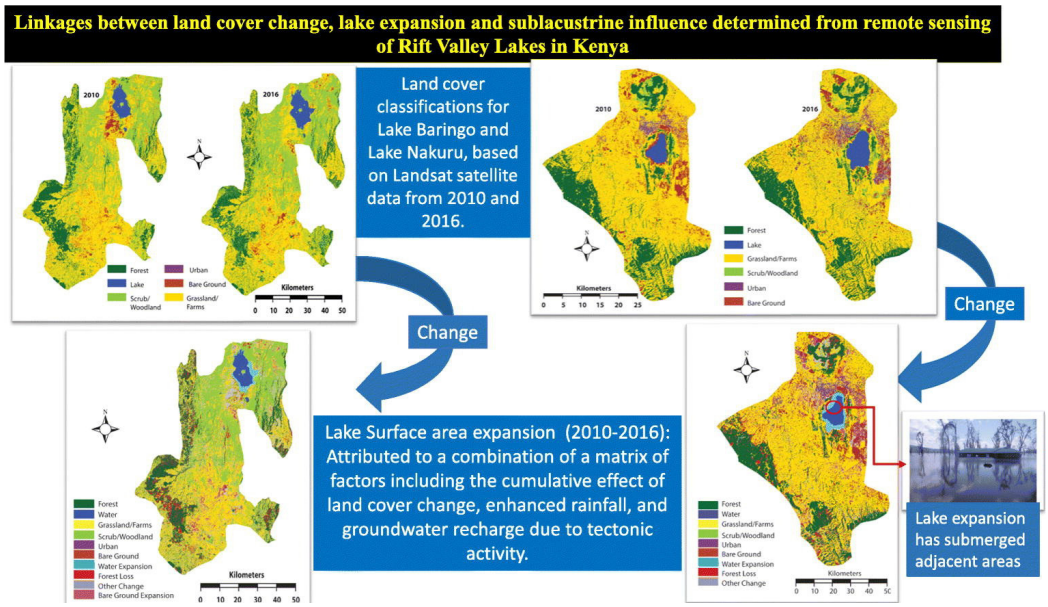

Figure 3.21 Expansion of lakes in the Rift Valley Kenya Source: Simon Onywere, James Magige: Kenyatta University, Nairobi, Kenya

IGAD Climate Prediction and Application Centre in a 2018 a report on the climate change vulnerability assessment of three main water Towers in Kenya (Mount Elgon, Mau Forest and Cherangani) showed increased frequency of extreme rainfall events and floods in the water towers that are the catchments for the Rift Valley Lakes . The study evaluated the increasing ecological changes (land use and vegetation changes caused by increasing human population) driven by human activities that respond and further worsen climate change impacts.

3.3 Risks, Impacts and Vulnerability

3.3.1 Food Security

3.3.1.1 Overview

Food security remains a significant concern in the IGAD region. For many years, the region has continued to witness an increasing trend in food insecurity and malnutrition mainly due to climatic shocks| weather extremes, conflict and insecurity and macro-economic challenges. In 2021, for instance, 43.59 million people were estimated to face high levels of acute food insecurity (IPC Phase 3 or above) across seven of the eight IGAD member states, according to the IGAD Regional Focus of the Global Report on Food Crises 2022, representing a 38% increase compared to 2020. This figure is expected to rise to 46.33-47.83 million in 2022.

Despite being endowed with a considerable range of natural resources, the IGAD region struggles to cope with the vagaries of its harsh and worsening climatic circumstances. The predominant livelihood systems in the region – pastoralism and agro-pastoralism, including livestock production and rain-fed agriculture – continue to bear the brunt of climate and weather extremes. The frequency and severity of these weather extremes, including droughts and floods have increased with negative impacts on livelihoods and food security.

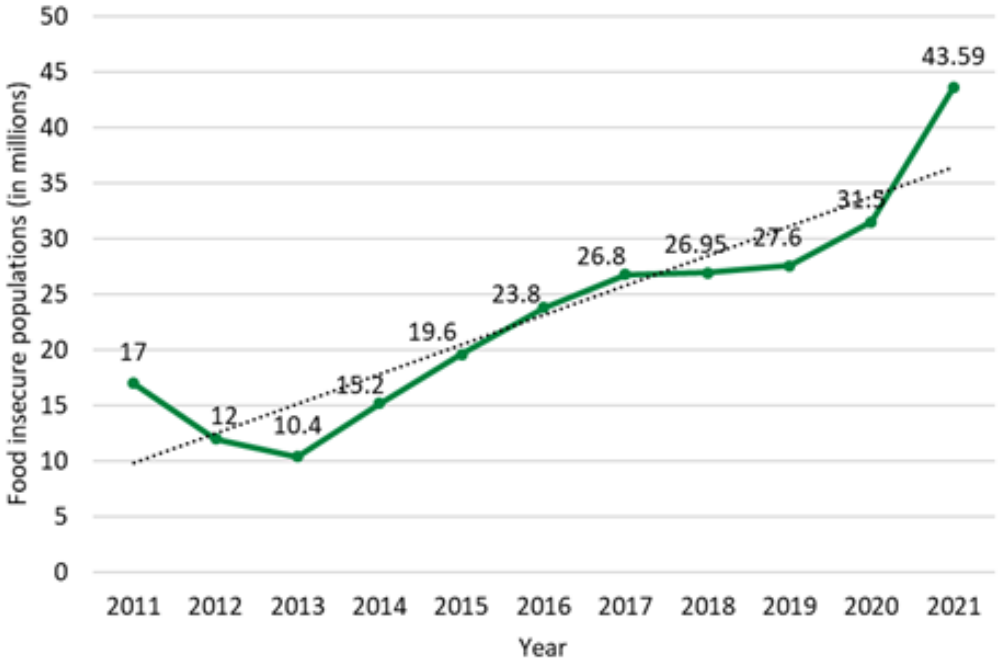

Figure 3.22 Number of highly food insecure populations in the IGAD region – 2010-2021 Source: FSNWG

Data available shows an increase in those affected by crop failure in the short term to the long-term.[2] In Djibouti for instance, close to 0.1% of the population will be exposed to crop failure by 2040 even with the current policies in place to address climate change (CAT Current policies scenario). This would rise to over 0.4% at the close of the century. This situation threatens food security and would have far-reaching socio-economic implications. The graphs below show the changes in the IGAD member states under the two scenarios.

3.3.1.2 Impacts of Drought on Food Security

More than 60% of the IGAD region is comprised of arid and semi-arid lands (ASALs) (figure 3-15), which receive less than 600 mm of annual rainfall on average . In recent decades, increased climate extremes have increased the susceptibility of these areas to droughts, resulting in a deterioration in productivity, worsening food insecurity, and disruption and or erosion of livelihoods. Resource scarcity, land degradation, overgrazing, deforestation, and climate change effects are adding pressure to the fragile ASALs environment, undermining their ability to survive recurrent droughts.
In the last decade alone, the region has witnessed three major droughts – 2010|2011, 2016|2017 and the ongoing 2020|2022 one. The 2010|2011 drought affected at least 13 million people across parts of Ethiopia, Kenya and Somalia, mainly due to poor performances of both the 2010 October-December seasonal spots of rain and the 2011 March-May seasonal, resulting in crop failure, livestock deaths and loos of livelihoods. The situation was much worse in southern and central Somalia where Famine killed over 250,000 people.

10. Climate Analytics, 2022 UNDP (United Nations Development Programme). 2020. Human Development Report 2020: The Next Frontier: Human Development and the Anthropocene. New York hdr2020pdf.pdf (undp.org)

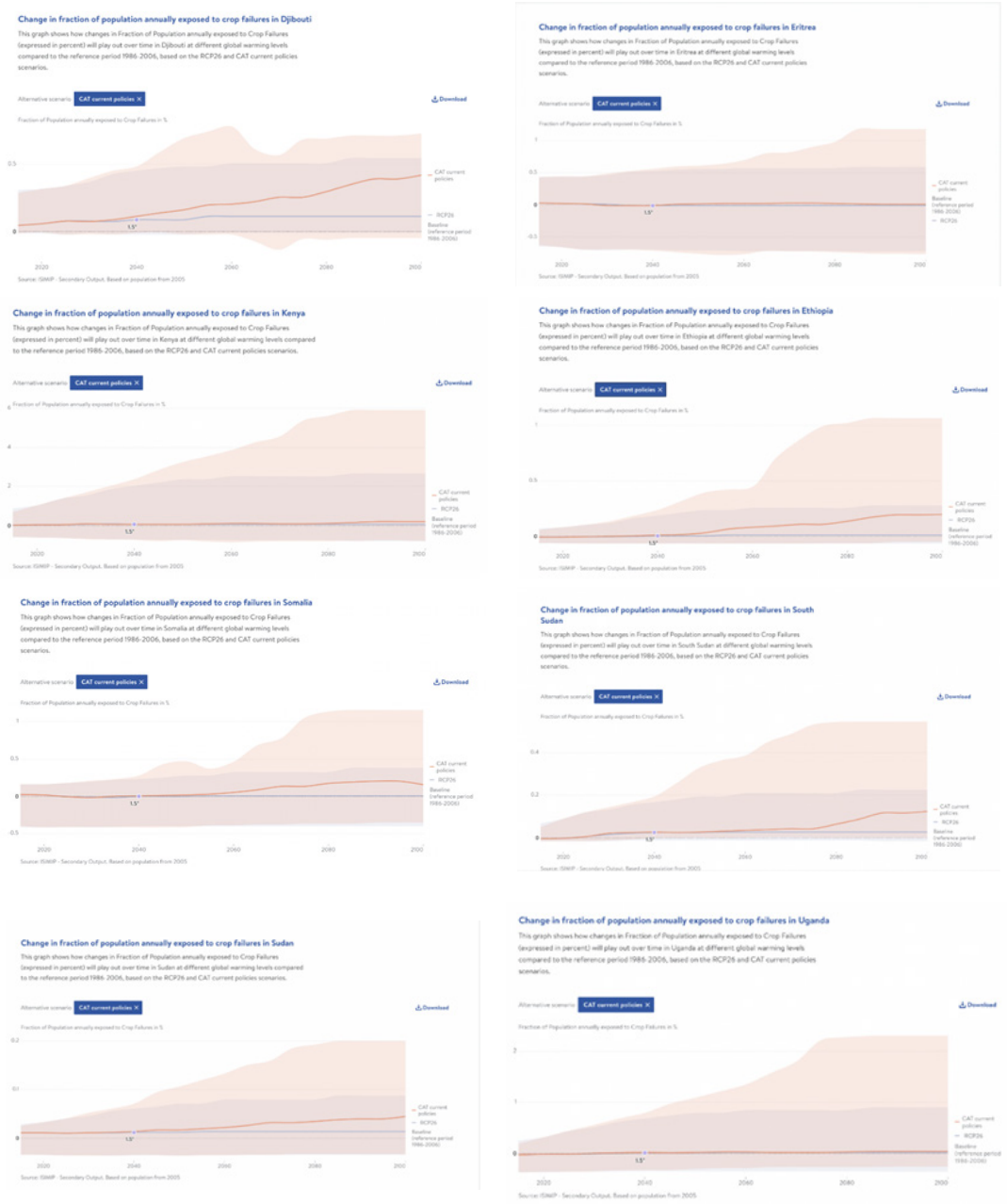

Figure 3.23 Climate Change Impact in terms of fraction of population exposed to annual crop failure in the IGAD region under different global warming levels compared to the reference period 1986-2006, based on the CAT current policies and RCP2.6 scenarios. Source: Climate Impact Explorer, Climate Analytics

From mid-2016 to mid-2017, another severe drought occurred, adversely impacting crop production, pasture growth and water availability. The worst affected areas included the eastern Somali region of Ethiopia, localized areas of northern Kenya and central Somalia. In Ethiopia and Somalia in particular, food security impacts were severe. This was mainly attributable to two consecutive below-average rainfall seasons – the 2016 October-December seasonal spots of rain which were less than 50% of average across much of south-eastern Ethiopia and Somalia, and the 2017 March-May rainfall seasons which were less than 70% of average across most of the affected areas.[3]

3. Fews Net, July 2017. Illustrating the extent and severity of the 2016/17 Horn of Africa drought: https://fews.net/sites/default/files/documents/reports/FEWS_NET_Horn_of_Africa_June%202017_Drought_Map_Book.pdf

The ongoing drought that began in October to December 2020, affecting southern and south-eastern Ethiopia, the ASALs of Kenya and large swathes of Somalia, and northeast Uganda has been prolonged, widespread, and extreme. This follows four consecutive seasons of below-average rains – a climatic event not seen in the last four decades. The 2022 March-May rainfall season was one of the driest on record, with the total amount of rainfall recorded over Ethiopia and Somalia being the lowest since 1984, and with Somalia receiving just slightly above 50% of the season's average rainfall, at 58% (ICPAC analysis of satellite data) (EU Joint Research Centre) .[4]

3.3.1.3 Impacts of Floods on Food Security

While drought events prevail in the region, there is also evidence of flood events with devastating consequences that have been witnessed. These events have been linked to large-scale systems that control regional climate variability such as the El Niño Southern Oscillation (ENSO), Indian Ocean Dipole (IOD), Madden-Julian Oscillation (MJO), Tropical cyclones, and Intertropical Convergence Zone (ITCZ) among others. The observed floods over the region in 1982|1983, 1997|1998, 2015|2016 among several others in recent years were linked to El Niño, while those of 2019|2020 were linked to IOD.

IOD Negative (Yellow) and Positive (Green)											
1960	1961	1963	1964	1972	1974	1981	1982	1983	1989	1992	1994
1996	1997	1998	2006	2010	2012	2014	2015	2016	2019		

Table 1 Major IOD events since 1961 from Australian National Meteorological and Hydrological Services (NMHSs) (https://bit.ly/2snl2QT)

Floods continue to threaten to the livelihoods and food security of the IGAD people (Ayugi et al., March 2020). Looking at the most recent floods in 2019|2020, perceived to have been severe and rivalling those of 1961-963, enhanced 2019 October-December and 2020 March-May seasonal rains, caused riverine and flash foods, and landslides in parts of Djibouti, Eritrea, Ethiopia, Kenya, Somalia, and Uganda leading to loss of lives, displacement, destruction of infrastructure and disruption to social services. An estimated 2.4 million people were affected, including over 700,000 displaced people and over 500 killed . In this respect, while various analyses had projected an improvement in the food security situation in the region in 2020, the compounding impacts of the floods, and other non-climatic factors such as COVID-19 worsened the levels of acute food insecurity in the area.

3.3.1.4 Effects of climate change and variability on food security

Climate change and variability adversely impact the four pillars of food insecurity – availability, access, utilization, and stability – and their interactions. Low-income producers and consumers are likely to be most affected because of their limited resources to invest in adaptation and diversification measures.

4. https://estation.jrc.ec.europa.eu/eStation2/

Availability

Climate change and variability are impacting food availability through their effect on the production (focus) of food, storage, processing and distribution. In recent years, the yields of staples such as maize, wheat and sorghum have decreased across the IGAD region partly due to the impact of climate change as below-average rains lead to dry spells or droughts on one hand, and above-average rains lead to floods or flash floods and hence crop inundation or damage. The ASALs, are perceived to be highly vulnerable to climate change and to have low coping capacities, climate change is becoming increasingly detrimental to crop productivity as warming levels increase.

Looking at livestock, climate change, mainly through increasing temperatures and precipitation variation and| or a combination of both, adversely affects livestock production. This is as their impacts on water availability, rangelands and pasture, animal health (mainly through heat stress) and livestock diseases negatively affect livestock body conditions, potentially leading to livestock morbidity, mortality, or distress sales. For instance, some 1.8 million extra cattle in Kenya could be lost by 2030 because of increased drought frequency[5].

Climate change is also changing the dynamics of pests and diseases of crops (desert locust) and livestock, and hence production, by affecting their distribution and population sizes.

Access

Declining food availability caused by climate change and variability is causing an increase in food prices, reducing purchasing power, especially among low-income consumers who tend to suffer the most from high food prices. This in turn also leads to less healthy diets, and in worst case scenarios diet related mortalities.

In addition, agropastoral and pastoral communities impacted by the loss of crops and| or livestock due to effects such as droughts or floods tend to have reduced purchasing power, negatively impacting their access to food. Effects of extreme events on infrastructure, such as transportation and markets, also affect access as such infrastructure is rendered non-functional.

Utilisation

Health and diet constitute the two keyways through which climate change and variability impact food utilization.[6]

Looking at health, climate change is making water scarcer in the region, which coupled with increased demand, adverse impacts sustainable access to water and sanitation. Conversely, it has also increased the risk of flooding from sea-level rise and heavy precipitation. This has resulted in increased exposure to diarrhoea and other infectious diseases and malnutrition, thus lowering the affected population's capacity to utilize food effectively.

Furthermore, there is some evidence that climate change is and will continue to impact food safety due to changes in salinity and the distribution of microorganisms.

5. IPCC. Special Report on Climate Change and Land: https://www.ipcc.ch/srccl/chapter/chapter-5/
6. Aberman, N. L. (2014). Impacts of climate change on food utilization.

Regarding diet, available evidence shows that climate change is driving a decline in crop yields as well as the nutrient content of food crops. As supplies of highly nutritious food crops reduce, vulnerable households are forced to substitute food crops with high nutrient content for less healthy food crop, as adaptive behaviour.

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Stability

With increased frequency, duration, and intensity of some extreme events due to climate change and variability, there has been a rise in instability in global grain trade and prices, especially for low-income consumers who are most vulnerable to food price spikes.

	Examples of observed and projected climate change impacts
Availability	Reduced yields in crop and livestock systems
	Reduced yields from pests and diseases e.g., the desert locust Reduced food quality (e.g., from spoilage) affects the availability
	Disruptions to food storage and transport networks from climate change, including extremes
Access	Yield reductions, changes in farmer livelihoods, limitations in regard to the ability to purchase food
	Price rise and spike effects, particularly on low-income consumers
	Effects of increased extreme events on food supplies, disruption of agriculture trade (markets) and transportation infrastructure
Utilisation	Impacts on food safety due to increased prevalence of micro-organisms and toxins
	Increased exposure to diarrhoea and other water-borne diseases due to increased risk of flooding
Stability (continuous availability and access to food without disruption)	Greater instability of supply due to increased frequency and severity of extreme events, food price rises and spikes, and instability of agricultural incomes (affecting access)
	Widespread crop failure contributes to migration and conflict
Combined systemic impacts from interactions of all four pillars	Increased environmental degradation
	Increasing food insecurity due to competition for land and natural resources

Table 2 Summary of the relationship between climate change and food security (to be expanded) Source: IPCC

3.3.1.5 Regional food security situation – January-June 2022

The food security situation in the region remains a major source of concern as millions of people face severe levels of acute food insecurity. According to the IPC-Global Support Unit (GSU) for East and Central Africa, about 31 million people from six of the eight IGAD member states – Djibouti, Kenya, Somalia, South Sudan, Sudan and Uganda were highly food insecure in June 2022.

Among the key drivers of the situation is intensifying drought – after four consecutive seasons of below-average rains (2020 October-December 2021 March-May, 2021 October-December, and 2022 March-May rainfall seasons) – in various parts of the region, particularly in southern and south-eastern Ethiopia, the arid and semi-arid lands (ASALs) of Kenya, and most of Somalia. This has resulted in significantly below-average cereal production, poor pasture and rangeland conditions, widespread livestock deaths, severe water shortages and to a significant extent, drought-induced displacement and resource-based conflict.

Looking at the 2021 October-December crop harvest, which wrapped up in February 2022 in most areas, cereal harvests were significantly below average, leaving some of the worst-affected households with little to no food stocks. In Kenya for instance, the national maize production was estimated at 47% of the recent five-year average . while in Somalia this was the third lowest October-December (Deyr) cereal harvest since 1995, after the 2010 and 2016 harvests . Looking at the 2022 March-May (Gu) harvest, widespread crop failure (more than 40-60 percent of long-term average) is expected in Somalia [7].

Consequently, due to rising demand, cereal prices have sharply increased, constraining household purchasing especially among poor households who have to purchase most of their food in local markets. Pasture and rangeland conditions are also well below average. The Normalised Difference Vegetation Index (NDVI) reveals poor vegetation conditions in many pastoral areas across the region. Combined with severe water deficits, this has resulted in poor livestock body conditions and production, unseasonal livestock migration and excess livestock deaths. Available estimates at the time of reporting indicated that at least 7 million livestock had died in the three countries, that is, 2.5 million in southern Ethiopia, 1.5 million in Kenya and over 3 million in Somalia.

These factors have caused an increase in population displacement. At the time of reporting for instance, more than 800,000 people had been internally displaced in Somalia and 16,000 has crossed the border into Ethiopia due to the drought.

As a result, an estimated 18.4-19.3 million people currently face high levels of acute food insecurity in the three countries, solely due to the drought. This includes at least 213,180 people in Catastrophe (IPC Phase 5) in Somalia.

7. IPC, June 2022: Somalia: IPC Risk of Famine Snapshot May- September 2022: https://www.ipcinfo.org/fileadmin/user_upload/ipcinfo/docs/IPC_Somalia_AFI_AMN_Snapshot%20Update%20RoF_May%202022%20Final.pdf

The risk of Famine is also likely in some localised areas in south-central Somalia. Exacerbating the situation is conflict and insecurity and macro-economic challenges in various parts of the region.

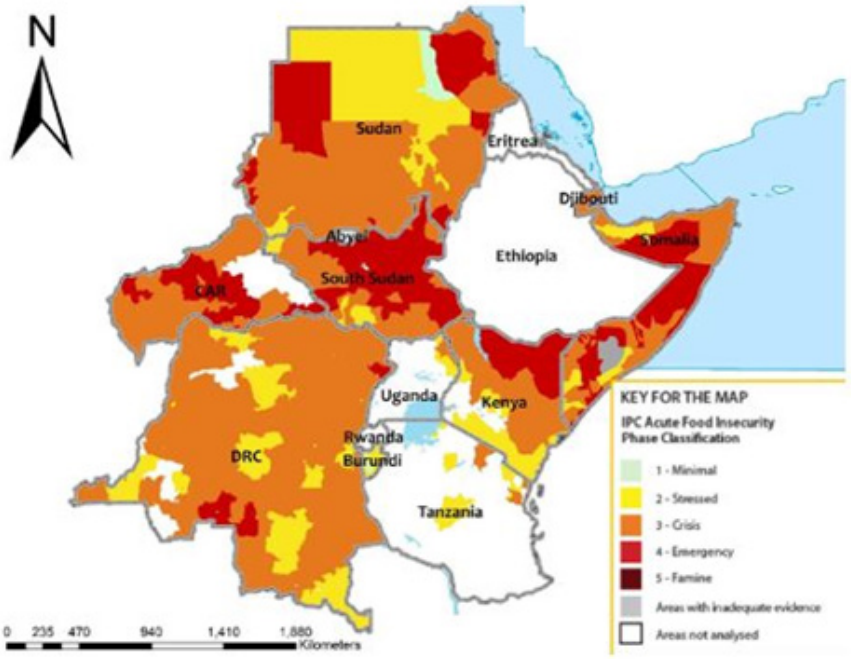

Figure 3.24 IPC acute food insecurity situation – June 2022 Source: IPC-GSU for East and Central Africa

3.3.2 Disasters

IGAD, under the Disaster Risk management program, developed a regional flood risk profile based on probabilistic models in current and future climates. The findings of the regional profile show that floods affect nearly two million people and displace over a million on average every year in the Greater Horn of Africa. This figure is expected to increase by up to 75% in the future with business-as-usual or worst-case-scenario; (RPC 8.5).

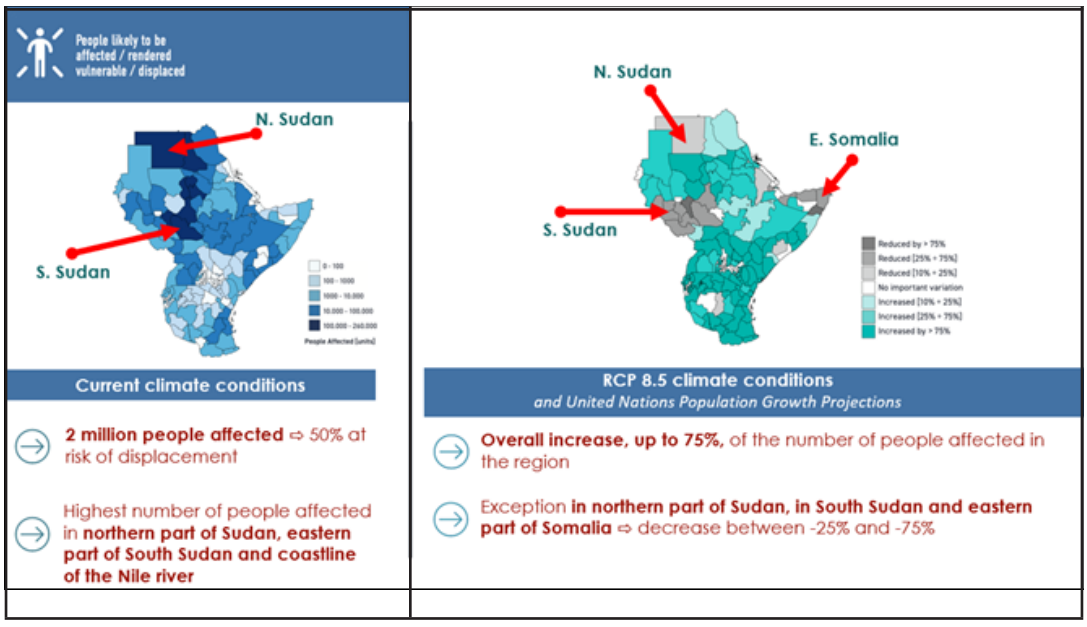

Figure 3.25 People likely to be affected/rendered vulnerable/displaced in current and future climate in the greater horn of Africa region

Currently, South Sudan is struggling with protracted floods, the intensity of which has not been seen in decades. Overflowing rivers have flooded thousands of farmlands, preventing people from cultivating. Close to 800,000 livestock are also estimated to have perished as a result. This has decimated subsistence farming and substantially worsened food insecurity. Food availability has been negatively affected by the disruption of livelihoods, increased crop damage and post-harvest losses, and livestock losses. Simultaneously, the flooding has occasioned widespread population displacement in affected areas, aggravating existing security concerns. Food access and stability have also been adversely impacted by the flooding through disruption of basic services and destruction of infrastructures such as markets and roads, leading to increased food prices, and a reduction in affected populations' incomes and purchasing power. The impacts are especially harsh in Jonglei, Unity and Upper Nile states. [8]Over 800,000 people across eight of the country's ten states have been affected.[9]

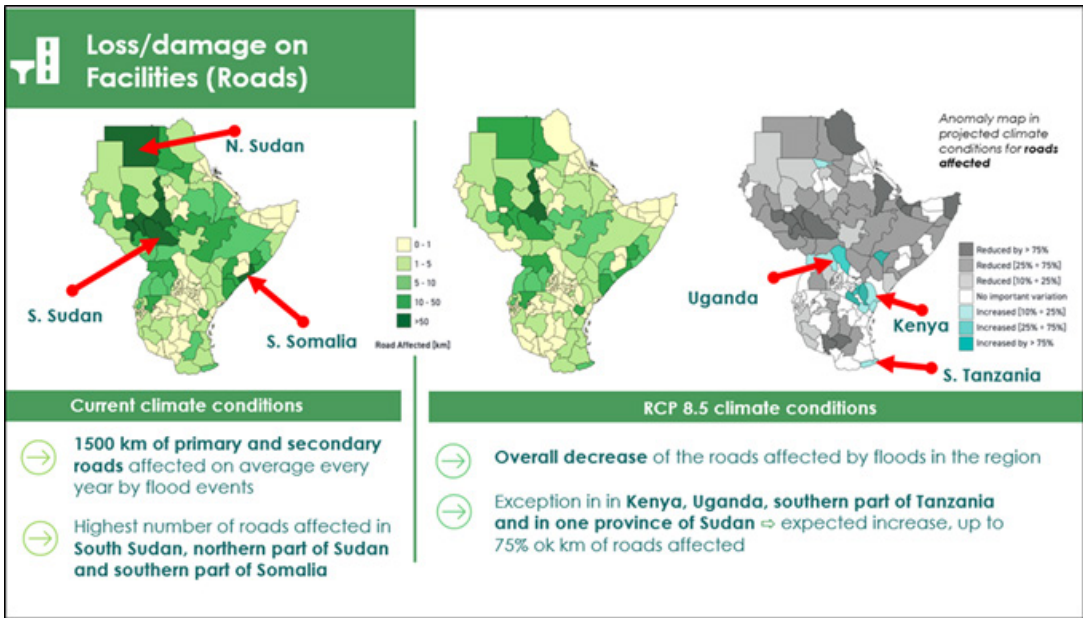

Figure 3.26 Loss/damage to road infrastructure

Overall, these kinds of weather extremes (droughts and floods) are projected to become the norm and not the exception in the future.

According to the recent Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5), among other literature, the frequency, intensity, and duration of extreme weather events have been changing as the climate system warms. This is because, climate projections from global climate models point to increased rainfall and average temperature rise up to 5°C by the end of the century under a high Greenhouse Gas (GHG) emission scenario.

8. Inter-Réseaux Développement Rural and SOS Faim Belgium. May 2012. Food Sovereignty Brief no 4. Pastoralism in Sub-Saharan Africa: Know its Advantages; Understand its Challenges, Act for its Sustainability. Retrieved from URL: http://www.fao.org/fileadmin/templates/agphome/documents/rangelands/BDS_pastoralism_EN.pdf

9. ICPALD, 2017. Mapping of cross border transhumance routes, resources and services along Kenya Uganda border.

3.3.3 Human mobility in the context of climate and conflict

The IGAD region experiences a mix of permanent, temporary, and cyclical human Mobility (displacement, migration, and planned relocation). This is attributed to complex drivers and structural factors that often compel people to leave their country or homes of origin.
The Region hosted 1 million refugees and 3.6 million internally displaced people in 2010. A decade later, at the end of 2019, the Region is home to most of Sub-Saharan Africa's refugees and IDPs, hosting 4.5 million of the 6.3 million refugees and 12 million of the 18.5 million IDPs. IGAD region hosts 4.5 million refugees and asylum seekers as of 31 March 2022, spread across Uganda (1.5M), Sudan (1.1M), Ethiopia (844,589), Kenya (547,884), and South Sudan (344,895). It also hosts over 12 million IDPs hosted in Ethiopia (4.2M), Sudan (3.M), Somalia (2.9M), and South Sudan (2M).

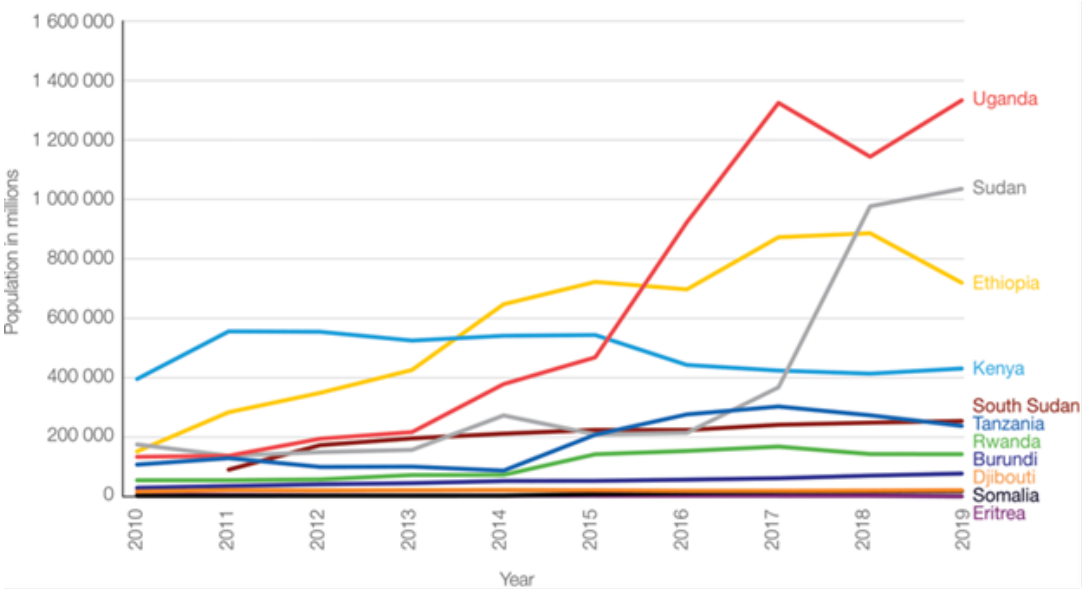

Figure 3.27 Number of displaced persons and refugees (millions) has risen almost three-fold from 2012 as a result of conflicts and natural disasters in the GHA region (Source WFP, 2022)

Climate and environmental change threaten the IGAD region. The region is frequently exposed to various natural hazards that cause forced and other types of migration, most frequently severe droughts and floods, landslides and tropical cyclones, slow-onset changes such as sea-level rise, and environmental degradation, and changing rainfall variability.
In addition, the region faces conflict, food insecurity, unemployment, and the loss or vulnerability of livelihoods.

Climate change and disasters can aggravate other socioeconomic problems, instability, and violence. For instance, climate change and disasters can exacerbate existing resource disputes or spark new conflicts that exacerbate existing social and political tensions, leading to Internal and cross-border displacement resulting from conflict and inter-communal violence. Likewise, Climate change is increasingly impacting agriculture, primarily associated with livelihoods and the primary source of income for people in the IGAD region.

In the African continent, the IGAD region is considered to be particularly vulnerable to the adverse effects of climatic variability, namely rainfall variability, floods, temperature increases with heat waves, and increase in droughts.[10]

Conflict, climate change, migration, and displacement interact to create an adversarial environment and limit options. Regional conflicts, inter-clan conflicts, and resource conflicts are significant causes of internal and cross-border displacement and migration.

On the other hand, Floods frequently displace agropastoralists and other settled populations. Severe and protracted Drought also forces many population groups to relocate in search of water. Drought forces clans to leave their usual location or access a specific area at a different time, leading to disputes and animosity over obtaining other's resources.

Poverty, conflict, and climate change are the main factors driving human Mobility in the IGAD region's border areas. These issues are interconnected and interact to magnify negative consequences and security risks.

Although it is acknowledged that conflict can undermine coping mechanisms and leave populations unable to resist climate change and disasters, further rigorous research and analysis are necessary to provide satisfactory explanations about the relationship and to differentiate between the impact of different types of disasters in different contexts. According to the International Crisis Group, the United Nations, other multilateral organizations, and concerned governments still have a lot of work to understand how climate change processes, such as desertification and forced migration, will influence future conflicts.

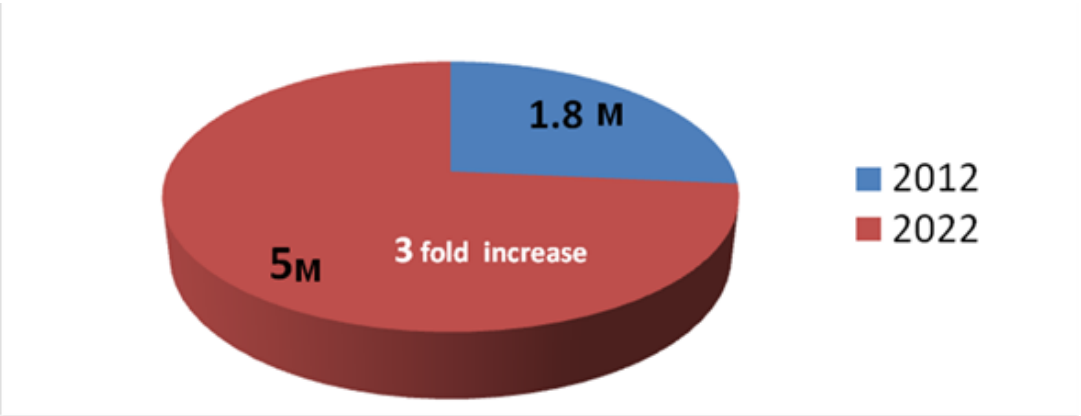

Figure 3.28 Refuge Trends by Country of Asylum and Year :2010-2019 (Source UNHCR ,2021)

10. Shongwe, M. E., Van Oldenborgh, G. J., Van den Hurk, B., & van Aalst, M. (2011). Projected changes in mean and extreme precipitation in Africa under global warming. Part II: East Africa. Journal of climate, 24(14), 3718-3733.

3.3.4 Transhumance

Strategic mobility by which pastoralists move their herds in pursuit of pasture and water is key to deriving profit from rangeland ecosystems.[11]

To a great extent, the ecosystem in the IGAD region is arid and semi-arid, accounting for 70% of its landmass. Climate variability, high spatial-temporal rainfall distribution and fluidity in natural resources within this expansive geographical extent, remains the status quo. Subsequently, seasonal mobility then becomes a core-adaptation, inherent mechanism, and a crucial aspect of risk management in harsh and unpredictable environments. This is experienced more so, within the IGAD cross border areas, where mobility is intensified during the dry seasons. With the changing times, population pressure, urbanization, land use land cover, gazettement of grazing areas as reserves, and mineral concessions amongst others, are grappling over the pastoral landscape.[12]
The mobile pastoral communities are increasingly being negatively perceived as both an environmental and a national security threat. Stricter cross-border mobility control and defective tenure policies threaten the sustainability of pastoral livelihoods.

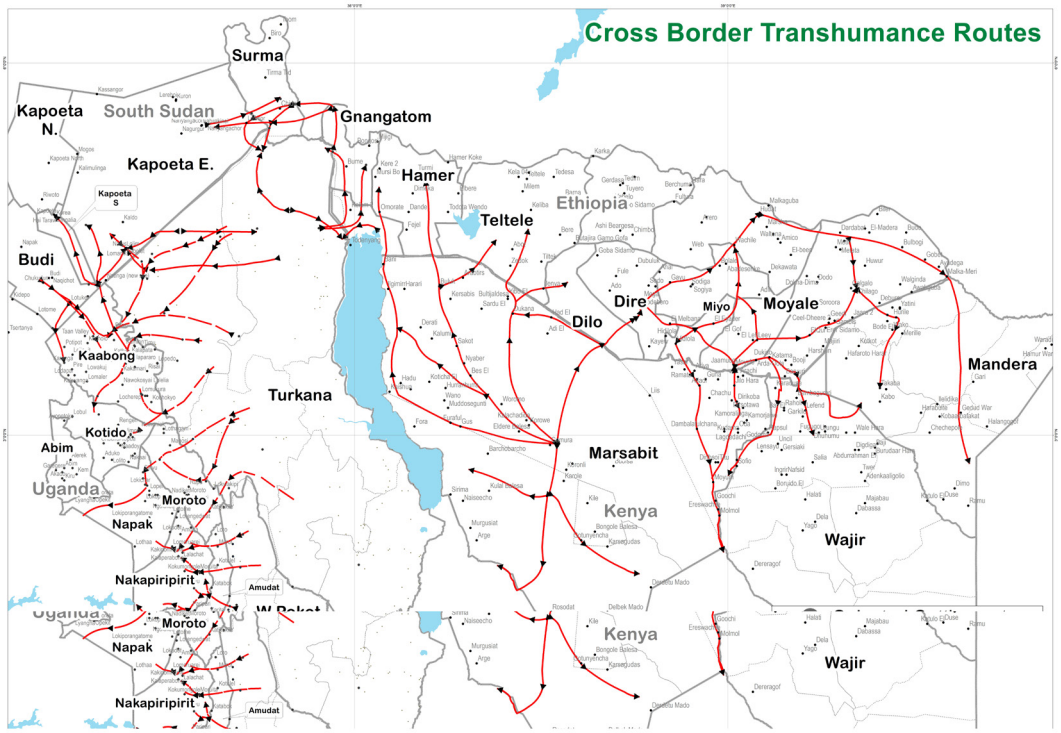

Figure 3.29 The Transhumance route - showing how the livestock moves in search of water and pasture, along Ethiopian – Kenyan (Source ICPALD)

To protect and address these challenges within the region, IGAD Member States have adopted the regional Protocol on Transhumance that will facilitate free and orderly cross-border transhumance in the region (ICPALD, 2020)

11. Kaufmann, B. A., Hülsebusch, C. G., & Krätli, S. (2019). Pastoral livestock systems.
12. ICPALD, 2017. Mapping of cross border transhumance routes, resources and services along Kenya Uganda border.

This is pegged on facilitating tactical mobility that is guided by a strategic response to the availability of natural resources in a coordinated manner.

As a facilitative tool, the protocol was contextualized with the continent-wide AU policy framework on pastoralism in Africa, adopted in January 2011 . This framework recognizes pastoralism as a viable and economically efficient way of life. It reaffirms the strategic importance of pastoral mobility and the adoption of a regional approach, particularly in terms of policy reforms and pastoral legislation.

The protocol not only comes in as a facilitative tool but also has an implementation Roadmap covering 2020 – 2030, to ensure that upon signing and adoption, the domestication process including Strengthening of IGAD Cross-Border Transhumance Clusters; Mapping and Designation of Transhumance Corridors; Investment in Pastoral Areas; and Monitoring of Transhumance Cross-Border Mobility (Transhumance Tracking) which is aimed to allow livestock-keeping pastoral communities to adjust to the effects of climate change and weather variability to continue living in the resource-constrained ecosystems of the Arid and Semi-Arid Lands.

The IGAD Livestock Policy Initiative (IGAD LPI) Working Paper No. 12 declares an urgent need to facilitate cross-border intra-regional trade and supports the call for the creation of a "Transhumance Certificate" to formalize and facilitate the movement of pastoralists across borders.

Notable other sub regional organizations such as the Economic Community of West African States (ECOWAS), West African Economic and Monetary Union (WAEMU), Permanent Interstate Committee for Drought Control in the Sahel (CILSS) have embraced cross-border transhumance system as an important system for safeguarding and increasing livestock production, and various measures have been taken to make better use of pastoral resources .

3.3.5 Peace and Security in the Region

3.3.5.1 Conflict Early Warning in the Region;

Even though there isn't much evidence of a direct cause-and-effect relationship between climate change and violent conflict, the Intergovernmental Panel on Climate Change contends that climate change could increase the risk of armed conflict. [13]However, because of the nexus's complexity, the relationship must be examined through the lens of conflicts caused by climate change and environmental degradation, which result in forced or voluntary migration.

The Conflict Early Warning and Response Mechanism-CEWARN was established by the IGAD protocol in 2000 initially to address the rampant pastoral conflicts in and along the cattle corridors of the of IGAD member states. It was mandated to collect early warning information and alerts on

13. Abshir, Sagal 2020: Climate Change and Security in the Horn Of Africa: Can Europe Help to Reduce the Risks. Berlin: CSEN.

potential incidences and provide response options. This was done through a mechanism of national Conflict Early Warning and Response Units (CEWERUs) at the national levels who regularly received early warning information and deliberated and proffered response options through their committees. Additionally, the CEWERUs have a network of Local Peace Committees at sub national level and Cross border Peace Committees at member states common conflicted borders who directly interact with the critical conflict actors.

Through its new strategy, while still maintaining its original structures CEWARN has since morphed into a broader outfit and has had its mandate expanded to not only look into the pastoral conflicts and areas, but to broaden its early warning coverage both geographically to the entire region and thematically to include the broader conflict sectors. As such, CEWARN's conflict early warning indicators have been broadened to include Economy, Security, Social, Environment, and Governance.

The early warning indicators are collected through a data collection and analysis system dubbed the "CEWARN Reporter", a data portal through which information on conflict events from media reports is collected and processed. The mechanism is in the process of establishing a mechanism of curating and validating the information at the national and sub national level. It is supplemented by information from other sources such as ACLED, and media events.

The information gathering and analysis system are enhanced with a fully equipped Geographic Information System (GIS) platform through which conflict spatial data and information is collected, analysed and disseminated. The mechanism includes a network of researchers from National Research Institutes-NRIs who provide conflict sectoral analysis from the member states every quarter. For each member state, there are experts from the Social, Economic, Security, Governance and Environmental Sectors who provide quarterly analyses on their respective sector status and implications on the general conflict status of the country. The reports are collated to give a general broader perspective of the situation.

Some of the analytic reports include;

- CEWARN IGAD Conflicts annual reports
- IGAD annual conflict atlas
- Scenario building reports
- Conflict issues-based research reports
- IGAD quarterly conflicts reports
- Conflict monthly roundups
- Weekly media conflict events summaries

The Conflict Early Warning and Response Mechanism of IGAD-CEWARN regularly produces report updates on the state of conflict in the region. These are in the form of weekly, monthly, quarterly and annual reports. The current analysis places the region's state of peace and security as fragile, and plagued with political conflicts, terrorist atrocities and widespread inter-communal

violence including cattle rustling. These are driven by several underlying factors including but not limited to; political disputes, border frontier demarcation contestations, youth unemployment, resource competition including land and competing livelihoods (Agro-pastoral conflicts) and environmental factors occasioned by weather extremes and variabilities at both national-sub national and regional levels. These in addition to natural disasters, have contributed significantly to the high number of displaced persons and refugees and the dire humanitarian situation in the region.

	Issues
1	Youth unemployment
2	Pandemics
3	Mismanaged electoral process
4	Extreme climatic conditions
5	Land and natural resource-based disputes
6	Polarized ethnicity and tribalism
7	Violent extremism including organized armed criminal gangs
8	Intrastate conflicts
9	Proliferation of small arms and light weapons (SALW)

Table 3 Key issues of conflict early warning concerns in the IGAD region derived from the conflict early warning scenario building exercise that was carried out by CEWARN in 2020-21

In addition to collecting early warning information, CEWARN commissions studies and assessments in different thematic areas to understand the nexus between various thematic phenomena and hypotheses with conflict. This includes a recent study on the "Climate-Conflict Nexus" in the CEWARN Karamoja cluster which was carried out in September 2021. The study explored the climate conflict nexus and established an indirect climate –security relationship through the direct impact of weather on vegetation health in association with other social and economic sectoral risk factors including livestock disease, natural disasters, and male migration.

3.3.5.2 Conflict Trends

According to ACLED data from 1997 to 2021, the region has been registering an increase annually in the number of conflict incidents recorded. These include; armed battles, riots and protests, use of explosives, violence against civilians and strategic developments including peace initiatives. The level of vulnerability to conflicts is increasing and so are the exacerbating or multiplier factors like climate variability.

Table 3 Key issues of conflict early warning concerns in the IGAD region derived from the conflict early warning scenario building exercise that was carried out by CEWARN in 2020-21

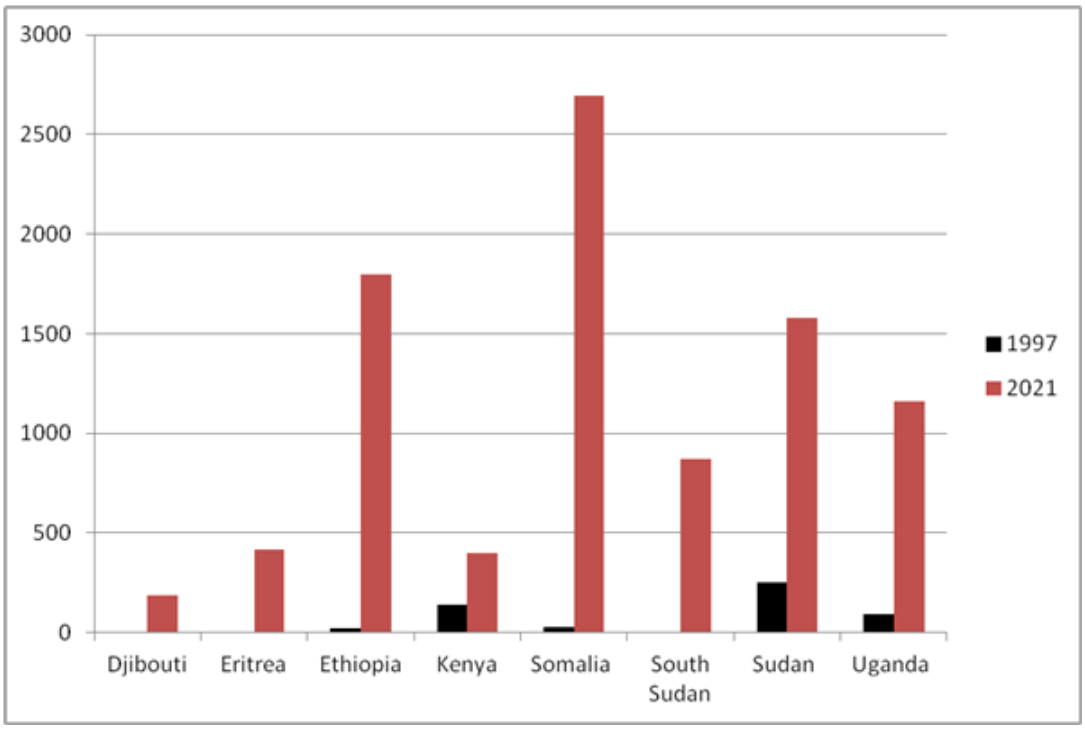

Figure 3.30 A comparison of reported incidents in 1997 and 2021 based on ACLED data shows a large increase in the number of conflicts in the region, a situation which is being exacerbated by multiple factors including climate variability

The CEWARN January –June 2022 statistical report indicates close to 5,000 incidents were reported out of which more than 6,000 were human fatalities. Studies conducted by CEWARN over a long period show that the hotspot areas have been experiencing insecurity and the absence of effective administration of justice and the rule of law. The hotspot areas also experience the increased proliferation of small arms and light weapons due to intra-state conflicts. There is a persistence of cultural attitudes and dynamics on livestock keeping, cattle raids and 'warriorhood', large numbers of livestock for marriage, revenge attacks, child abduction, etc. Many have argued about climate refugees, but CEWARN notes that changes in climatic conditions have forced to a greater extent the displacement and cross-border migration of many people in the IGAD region. Climate security agendas are also experiencing political interference, what we term politicization of conflicts and climate change issues. This phenomenon is affecting the weakening traditional institutions that used to oversee natural resource governance. Climate change knows no borders but is now affecting the simmering inter-state disputes border disputes.

Conflict trends also depend on seasonal variability which triggers issues relating to access to water and pasture, and along that there occur conflict incidents. This has been very common especially, during the dry season, with the pastoralists, who sometimes move over long distances with their livestock in search of water and pasture, temporal settlement and making sure the routes are clear. Therefore, climate change affects natural resource management, which is directly linked to micro and macro-level conflict dynamics.

Many recent kinds of research have shown that conflicts usually occur in locations where the resources that communities compete for access are located and concentrated. Following figure 3-32 below, conflict hotspots, the anecdotal evidence show that weather extremes are a threat multiplier to conflict.

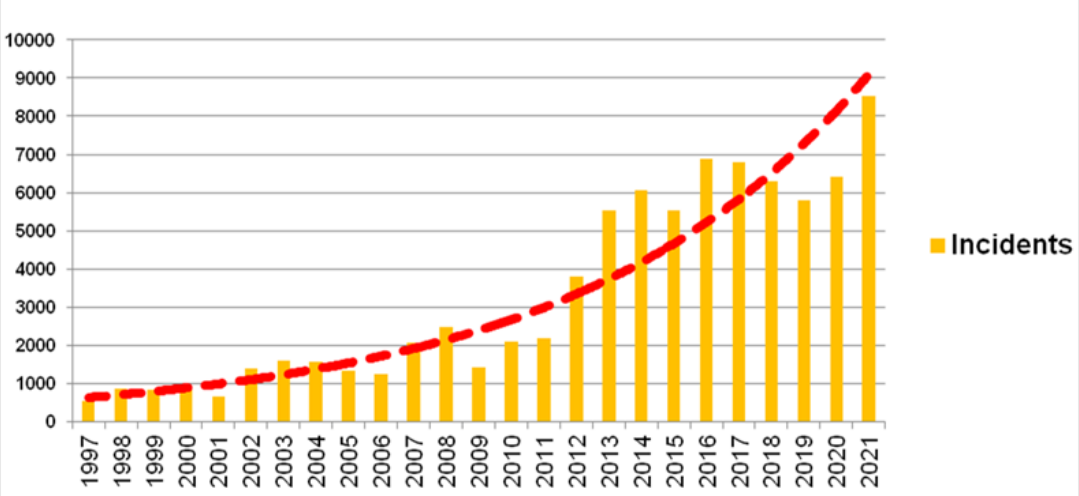

Figure 3.31 Summary of Conflict Incident Trends in the Region from 1997 to 2021 (Source ACLED)

Additional scientific studies will be required to strengthen the hypothesis and character of the climate security nexus in the entire region and what has already been done in some localized areas. This is crucial because in addition to causing direct human displacement and migration, the combination of climate security is currently the major factor compounding the humanitarian conditions and situation in the region.

According to the UN WFP, in the past decade the number of refugees in eastern Africa has nearly tripled, from 1.82 million in 2012 to almost five million today including 300,000 new refugees last year alone. Most of these result from direct weather extremes or conflicts associated with knock-on ripple effect of climate variability and extremes.

The victims continue to get exposed to other insecurities including domestic violence, child abuse and loss of habitat and livelihood. Climate change manifests in the forms of droughts, floods, and other weather events and reduced productivity. In turn, it affects underdevelopment, which is the absence of social services and economic opportunities.

Insecurity of communal land tenure are usually implicated by climate variations. Climate variations usually implicate insecurity of communal and land tenure. Studies conducted by CEWARN over a long period of time show that, the hotspot areas have been experiencing insecurity and the absence of effective administration of justice and the rule of law.
The hotspot areas also experience the increased proliferation of small arms and light weapons due to intra-state conflicts.

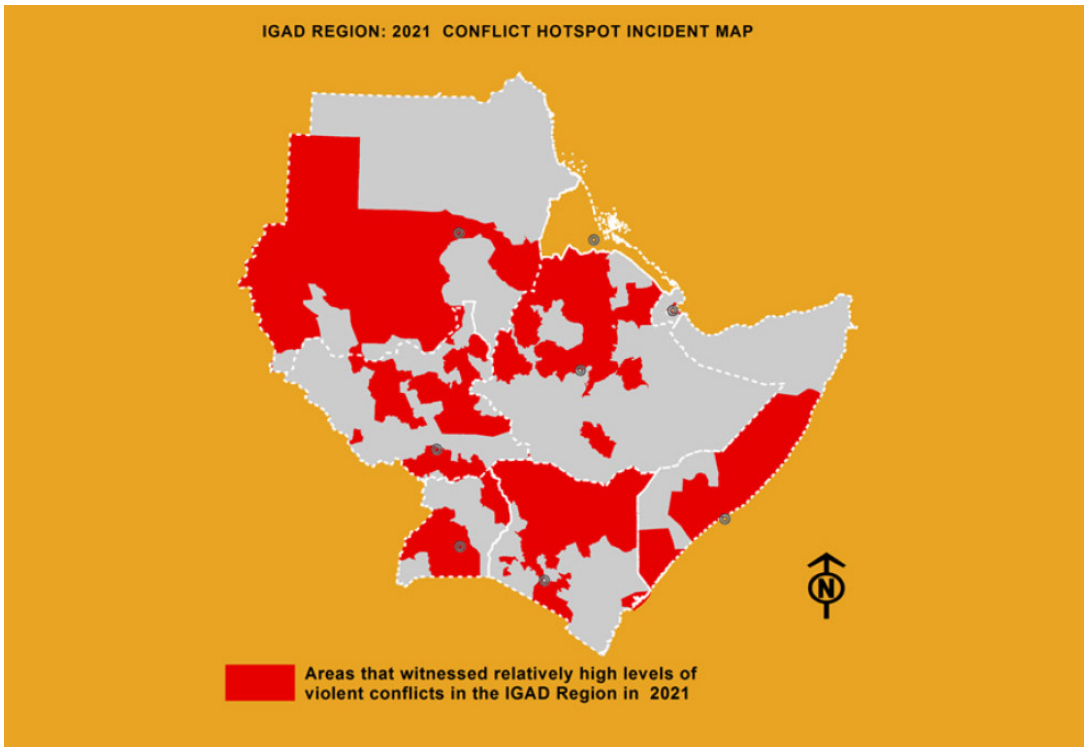

Figure 3.32 IGAD Region 2021 Conflicts Map

There is a persistence of cultural attitudes and dynamics on livestock keeping, cattle raids and 'warriorhood', large numbers of livestock for marriage, revenge attacks, child abduction, etc. Many have argued about climate refugees, but CEWARN notes that changes in climatic conditions have forced to a greater extent the displacement and cross-border migration of many people in the IGAD region.

Climate security agendas are also experiencing political interference, what we term politicization of conflicts and climate change issues. This phenomenon is affecting the weakening traditional institutions that are used to oversee natural resource governance. Climate change does not know borders but is now involving the simmering inter-state disputes border disputes.

4 Climate Security Pathways

There is an urgent need for a regional response to climate and environmental security as environmental stresses and competition over dwindling resources present one of the most pressing threats to the region. This calls for a systematic regional approach to climate security.

IGAD has been at the forefront of assessing climate and peace and security related risks led by the IGAD Climate Prediction and Applications Centre's (ICPAC) and the Conflict Early Warning and Response Mechanism (CEWARN), with support from the Land Governance Unit, and the IGAD Centre of Excellence for Preventing and Countering Violent Extremism (ICEPCVE), among other offices in its Peace and Security and other Divisions.

A workshop was held in Nairobi 26 - 28 July 2022 at Hermosa Garden Hotel with support from the United Nations Office of the Special Envoy for the Horn of Africa (UNOSE). Participants represented member states from the ministries of Internal affairs, Environment and Defence.

Development partners included the African Union, UNEP, UNDP Regional Resilience Hub, EU, IOM, WFP, CGIAR, African Development Bank, UN-HABITAT Land and conflict, International Committee of the Red Cross (ICRC) and International Crisis Group.

Member states identified the following gaps in IGAD region:

- Communication barriers;
- Systems of governance/policies diverge (democratic, economic);
- Geopolitics and alignment to west/east/global north/global south, which affects how to view security;
- Demographic and cultural diversity;
- Financing mechanisms and economic diversity;
- Conflict resolution focus and priorities on violence and drivers (tend to build up military and install military leaders).
- Difficulties in accessing and interpreting climate data, with limited infrastructure and some meteorological stations have been destroyed by war;
- Competing priorities and protracted humanitarian crises;
- Coordination of all relevant stakeholders is challenging;
- Policy gaps on climate security.

Existing and potential opportunities identified include:

- Regional integration mechanisms including AU, COMESA, EAC, IGAD;
- Growth in youth population;
- Partnerships with willing international organisations;
- Opportunities through technology to speed up development;
- Growth in awareness especially through media and ICT;
- Integration of technology for early warning, mitigation, response and recovery mechanisms;
- Willingness for formulation and establishment of regional policy on the integration of climate security awareness and response mechanisms;
- Positive growth in the political will;
- Opportunity to reorganize institutions and better integrate military, diplomatic, internal security, financial functions to be oriented to climate security and preventing conflict.

The linkages between climate change and security and complex and in some ways cyclic. While climatic factors can exacerbate various conflict drivers, human responses to conflict can also contribute to climate change. This includes the contribution of military and peacekeeping missions to environmental degradation and greenhouse gas emissions.

The discussions between IGAD member states found that while the linkages between climate change and human security might be complex, some common pathways are emerging. Intersections can be found between all the paths and should be approached more holistically in policy and planning.

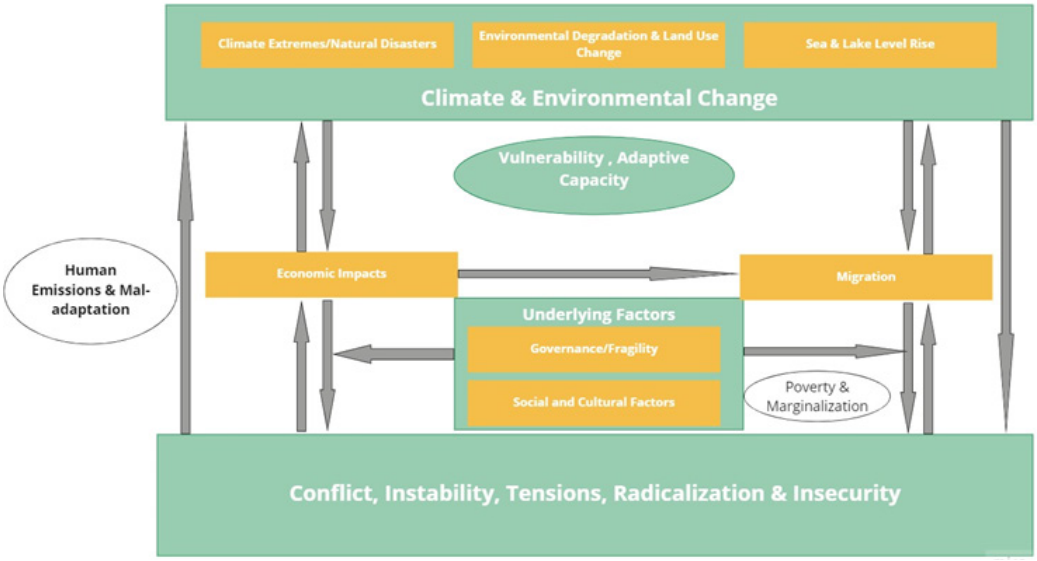

Figure 4.1 Climate Security Conceptual Framework as Derived from Workshop Discussions

Climate security is so central to IGAD's original mandate on drought disaster management and the need to use a climate security lens when implementing the IGAD strategy is therefore critical.

Several IGAD divisions, including IGAD Centre for Excellence on Preventing and Countering Violent Extremism (ICEPCVE) and the Office of the Special Envoy for the Red Sea, Gulf of Aden and Somalia, have stressed the importance of climate diplomacy in the region and the need to sharpen approaches linking technical and political tracks.

In common with peacebuilding and P/CVE approaches, climate security requires shifts in mindset, capacity building, understanding of gendered impacts, multi-agency efforts and a common joint between the Member States. This year, ICEPCVE research will focus on climate change, with an annual conference to be held in Addis Ababa. Liaising and sharing data with other RECs and UN departments is important.

Member States in July 2022 through the Kampala declaration on '*Migration Environment and Climate Change*' by the ministers responsible for Climate Change, Migration and Foreign Affairs of the Governments of the Member States of IGAD and the East African Community (EAC); and in October 2022 through the ministerial meeting '*to agree on the process of strengthening, adapting, and accelerating national and regional efforts to address food crises in East Africa*' and the inter-ministerial meeting on 'Land Conflict in The Horn of Africa, promoting access to justice for peace, sustainable development and climate change adaptation' have stated their deep concern by the adverse effects of the climate change and its impact on displacement, food security and conflict.

There is a need for greater focus on implementing climate security actions through existing platforms, protocols, and political processes. For example:

a) The Women, Peace and Security initiative and country-specific mechanisms to strengthen links between the Federal Government of Somalia and the Federal Member States could also be opportunities for climate action.

b) The Protocol on Transhumance, led by ICPALD offers an essential opportunity for strengthening climate security around border areas.

c) IGAD's Land Governance Unit high-level conference in October and outcomes of this workshop can find their way into ministerial statements and outcome documents.

d) ICPAC launched a climate change strategy to support the Member States in accessing climate finance, developing proposals and promoting more excellent domestic and private sector financing, creating opportunities for addressing climate security.

There is a need to map mandates and comparative advantages to synergies around this issue, and there remains a need for regularized engagement. The region identified climate risks and associated impacts in the region.

The forum identified the complex relationship between climate and environmental factors with socio economic, governance and cultural factors contributing to conflict and insecurity. This includes extreme drought ravaging the region characterized by five failed rainfall seasons, which has never been experienced before according to all existing records in the equatorial parts of the region with some likelihood of a projected failed sixth rainfall season.

Parts of the area is being ravaged by recurring floods that is displacing populations in South Sudan, Sudan, and Uganda. Environmental challenges are making the land less productive thus contributing to food insecurity.

On the other hand, some local communities' resort to maladaptive practices such as charcoal production which in turn contributes to environmental degradation. Workshop discussions focused on some pre-identified categorised to guide the discussions including environmental, economic, social, cultural and governance factors.

The criteria for selecting of each category was to harmonise results with national research being conducted by CGIAR's Building Systemic Resilience Against Climate Variability and Extremes (ClimBeR) initiative in Kenya. Participants identified key climate security drivers under each category as shown in the table 4 in the next page.

Climate/Environmental Factors	Economic Impacts	Social & Cultural factors	Governance/ Fragility
• Drought • Flooding • Heatwaves • Cyclones • rising sea/lake levels • Pollution • Wild fire • Land Use Change • Degradation • Landslides • Desertification	• Food Insecurity • Loss of Livestock • Loss of livelihood • Poverty • Pest and Diseases • Water Security	• Cultural practices like cattle rustling and raiding • Overstocking • Youth unemployment • Youth bulge • Limited access to education • Limited access to health services • Energy poverty • Population increase • Technology • Historical Grievances • Erosion of indigenous practices and systems • Migration & Displacement	• Armed Groups/Militia • Weak Governance • Political grievances • Corruption • Limited Industry • Limited Land Tenure/Rights • Inflation • Marginalization

Table 4 Drivers of Climate Security

The map displayed in figure 4 2 shows the interlinkages between the different drivers listed in table 4 above as stated by participants.

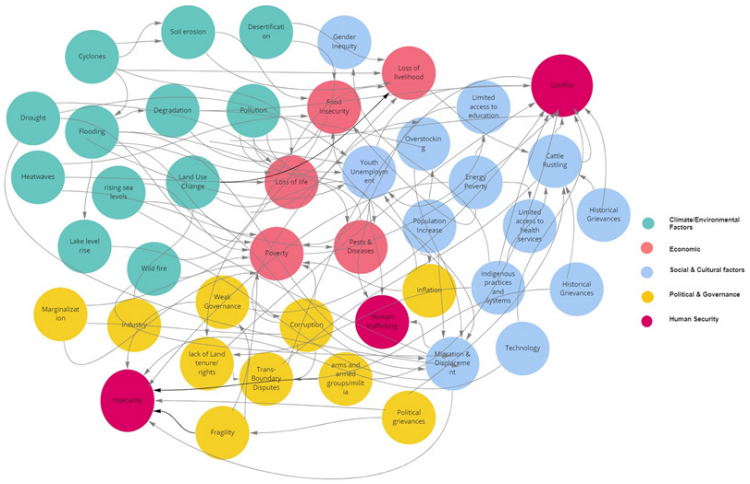

Figure 4.2 Climate Security Pathways

The discussions found that while the linkages between climate change and human security might be complex, some pathways showing the interlinkages between climate risks, conflict, peace, and security emerged. Intersections can be found between all the pathways and should be approached more holistically.

1. ***Threats to Food and Water Security:*** Climate extremes and environmental degradation can lead to food and water insecurity making it difficult for vulnerable populations to break the cycle of poverty, particularly for developing countries where many governments lack safety nets.

Impacts on food productivity could lead to inflation. Drought for example has been known to lower productivity, deteriorated health/ body conditions in livestock, susceptibility to disease and livestock mortality. The challenges to the blue economy threaten to the livelihoods of economies that are reliant on it.

Reduction of biodiversity due to temperature change is for example negatively impacting the fishing industries. Environmental degradation including soil erosion and desertification has contributed to water and pasture shortages and reduced productivity.

In pastoral communities where, climatic impacts have led to massive losses in livestock, youth are reportedly abandoning pastoralism as a livelihood option; in parts of the region where access to education is limited, youth unemployment is increasing creating an enabling environment for radicalization.

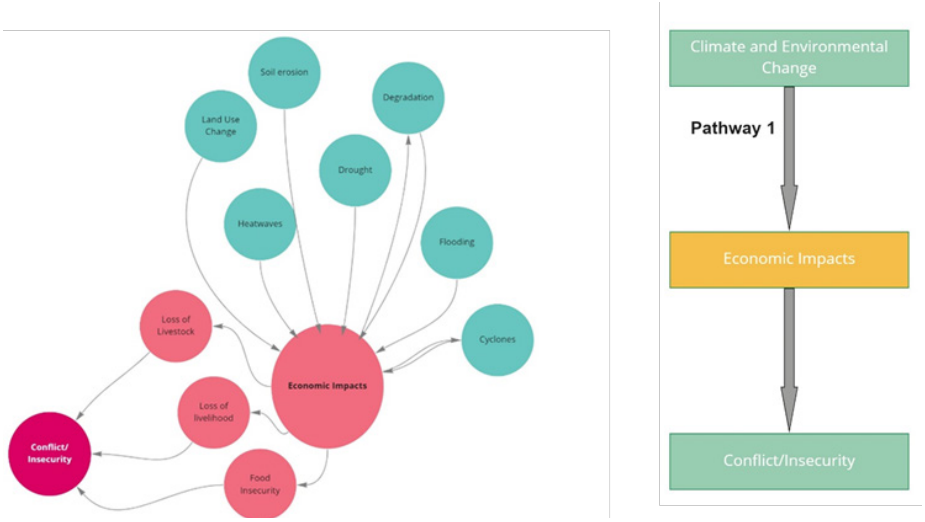

Figure 4.3 Pathway: Food and Water Security

2. *Climate Induced Mobility:* Climate extremes can directly lead to the movement of persons. Floods for example, have necessitated movement as a response mechanism; though in many parts of the region where flooding is expected, the action is often temporary. The region has experienced an increase in the occurrence of cyclones, and increased lake levels that have damaged property and displaced populations. Environmental factors like deforestation and land degradation have also led to increased mudslides in the region. Movement by pastoral populations is indigenous to many communities in the greater Horn of Africa.

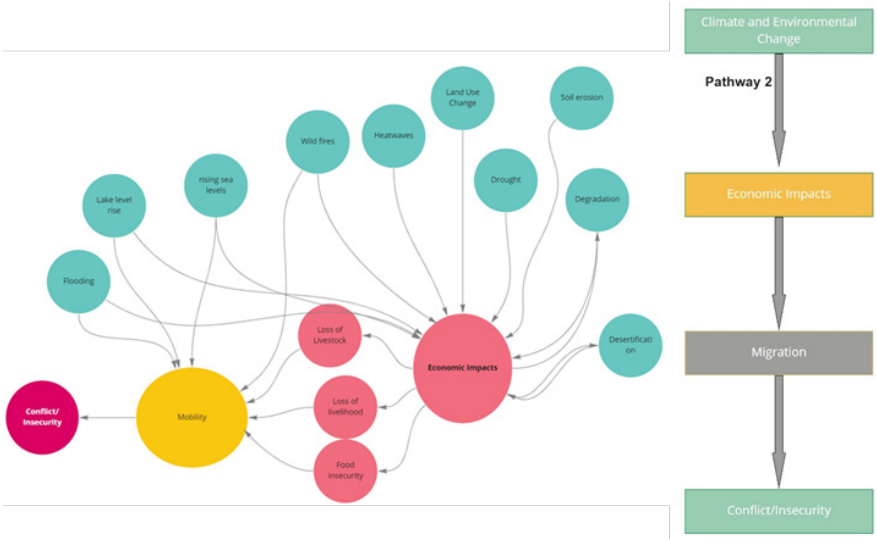

Figure 4.4 Pathway: Climate Induced Mobility

However, the rise in the population of both people and livestock over the years has led to a decrease in pasture and water availability, which when exacerbated by drought has led to increase in conflict.

Drought and its impact on agriculture and food security was said to be driving rural to urban migration. Forest fires in the region that are projected to increase with warming temperatures were also stated to lead to the displacement of persons. The projected rise of the sea levels along the Indian Ocean coastline is stated as an issue of concern as it could lead to the displacement of persons.

3. *Historical grievances and cultural practices:* One of the pathways identified are driven by historical and cultural factors. Cattle rustling/raiding for example is an artistic practice amongst some pastoral communities that are commonly used for re-stocking livestock. Climate extremes such as floods and drought have increased the need to restock lost cattle, triggering conflict.

Climate extremes easily start historical grievances and mistrust among bordering communities and countries when shared natural resources are affected. Historical cultural grievances originating from disputes over limited pasture and water have carried over in some countries with migration from rural to urban areas, increasing the complexity of the conflict in urban areas. Transboundary conflict over natural resources threatens to escalate tensions in the region. As the region continues to explore adaptation and mitigation strategies, such tensions are bound to increase within.

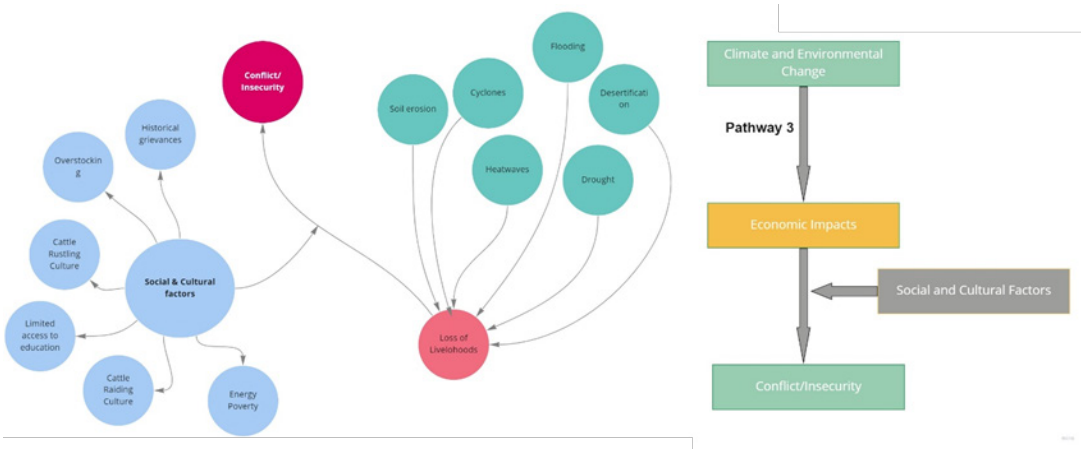

Figure 4.5 Pathway: Historical Grievances and Cultural Practices

4. *Governance and Fragility:* Where climate variability and change have not directly led to violent conflict, its interaction with other factors such as weak governance and in the context of fragility can exacerbate drivers of conflict and insecurity and have negative impacts on peace, stability, and security. The proliferation of arms, marginalization, and lack of access to social services have kept traditional practices such as cattle rustling/raiding alive.

The climate crisis has been exploited by actors including political actors, extremist groups, and commercial groups, among others in the region to incite conflict and insecurity for their gain particularly in the context of weak

governance and fragility. The presence of state and non-state armed groups in some areas has contributed to increased communities' vulnerability communities by preventing humanitarian aid and resilience building.

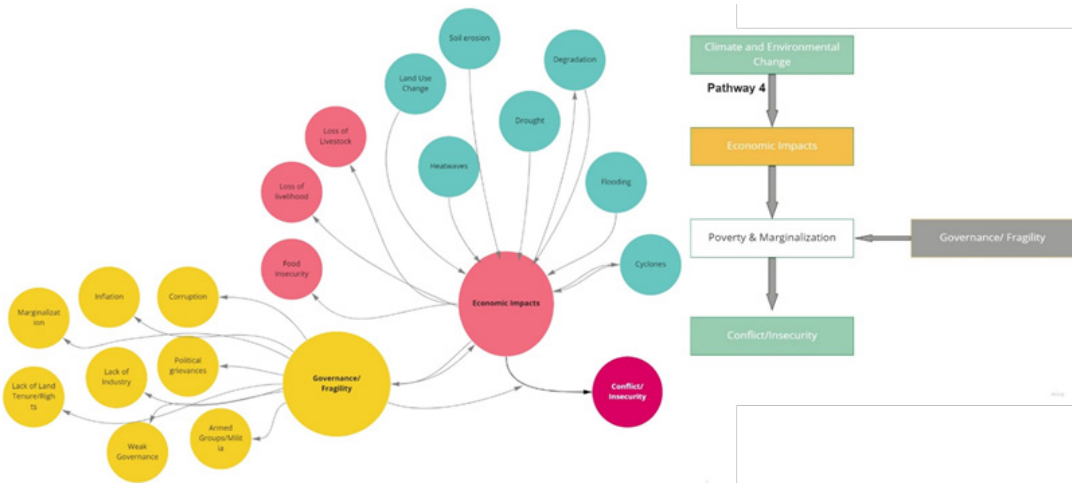

Figure 4.6 Pathway: Governance and Fragility

In some cases, extremist groups take advantage of the humanitarian crisis resulting from climate extremes to provide aid and strengthen their strongholds. With increasing instability and clashes in the Horn of Africa, the linkages between climate and insecurity and conflict are cyclic in many ways. Increased competition can result in food security and economic poverty, increasing communities' vulnerability even with excellent climatic conditions; on the other hand, climate extremes can also amplify poverty gaps.

Some parts of the region identified as having weak governance structures are characterized by limited access to essential social services like energy, education, and health. Land access and rights are critical underlying factors that have contributed to mistrust in governments, conflict over boundaries, pastoral and wildlife conflict, just to name a few.

4.1.1 Recommendations

1. Strengthening the shared understanding of climate, peace and security in the IGAD region: The regional consultation has been inclusive, broad and incorporated actors that are not typically included in discussions i.e., security actors. As a result, our collective understanding of climate, peace and security in the region has been strengthened. However, there is still a need for a clearer, joint understanding of the concept, the assessment of risks and actions to address them. A lack of clarity remains on the terminology, data/ evidence available and a common framework for addressing climate, peace, and security risks. Developing this understanding between IGAD, AU, UN and the Member States is essential for the following reasons:

- To increase awareness and improve communication and information sharing between these entities;
- To ensure that we do not make assumptions in assessing and addressing risks that lead us to unintended outcomes or 'business-as-usual' interventions;
- To sharpen our collective ability to translate scientific data and evidence into actionable advisories and policies;
- To enable Member States and regional bodies to better access climate finance and other resources to address the climate, peace and security issues facing the region;
- To move towards a unified, common position on climate, peace and security in the Horn of Africa that can inform the AU Common African Position on Climate Change and the UNFCCC negotiations at COP27 in Egypt this year;
- There is an ambition to conduct further integrated, interdisciplinary risk assessments, find more efficient ways of sharing data, conducting joint analysis and describe and describing a common technical understanding of climate, peace and security in jointly published documents.

2. Improving coordination on climate, peace and security in IGAD region: The call for clarification of mandates and joint strategy has been clearly articulated in the meeting. Within IGAD, ICPAC and CEWARN's leadership on climate, peace and security and the inclusion of the different IGAD offices through this meeting has demonstrated the value and opportunities for connecting further across IGAD entities. Similarly, engagement on this issue by the UN at the regional level is coordinated by OSESG-HoA, under the existing frameworks of cooperation and UN's regional strategy. Efforts to coordinate across UN agencies, funds and programmes and Resident Coordinators' Offices must continue. AU is recruiting experts and is conducting key studies and reviews of climate, peace and security. IGAD, AU, UN and Member States all need to continue working towards structuring themselves internally on this issue, identifying focal points and cross-sectoral coordination mechanisms. These focal points must then connect across the organisations, forming a working group at technical level that can clarify respective mandates and inform the respective principals for political impact. IGAD can employ its convening power to bring together Member States, international organisations, national and local civil society organisations, think tanks, academia, youth and women

groups, faith-based groups regularly, preferably biannually to discuss climate, peace and security at the highest political as well as local levels.

3. Towards a common regional position on climate, peace and security: There was consensus across all stakeholders participating in the regional strategy for a unified, common position for the IGAD region on climate, peace and security. Where global efforts have stalled, for example at the UN Security Council, African Union has been quick to step in with subsequent communique on climate, peace and security in November 2021 and April 2022. Member States have identified the issue as critical to their national security and development under the leadership of IGAD have the opportunity to clearly articulate the problem and concrete actions to address it. In the coming months there are several key for providing opportunities to develop the regional position, including among others: the concurrent IGAD-IOM inter-ministerial meeting on migration, climate change and environment in Uganda in July; ICPAC's Greater Horn of Africa Climate Outlook Forum in Kenya in August; UNFCCC Africa Climate Week in Gabon in August-September; AMCEN in Senegal in September; the upcoming IGAD land and conflict ministerial in Uganda in October; UNFCCC COP27 in Egypt in November. The text agreed upon at the regional level will provide a critical reference point for AU and UN Member States that remain committed to pushing the issue at the global level. In this meeting, the commitments of the Special Envoy of the Secretary-General for the Horn of Africa Hanna Tetteh and IGAD SE Red Sea, Gulf of Aden and the IGAD Executive Secretary Hon Workneh Gebeyehu to advance the agenda and support a common position have been reaffirmed.

4. Identifying international law principles and developing a regional legal framework on climate, peace and security: Further to developing a common position on climate, peace and security, it is essential to assess which legal tools currently applied at the international level may need to be redesigned to be fit for purpose for the lived realities of the Member States. Recognising global efforts to promulgate law and practice guides such as the 27 Draft Principles of the International Law Commission (ILC) of May 2022 on the Protection of the Environment in relation to Armed Conflict, the Member States may, under the leadership of IGAD, develop common regional principles on climate, peace, and security. Moreover, legal mechanisms may be necessary to create both intra-national and international dispute resolution mechanisms and forums in the region to facilitate peaceful determination and settlement of climate-related conflicts. To do this, the following issues would need to be addressed:

- What are the gaps in the regional legal framework to address existing and emerging climate, peace and security issues in the region?
- What tools are needed to build the capacity of Member States to prevent and mitigate the socio-economic challenges underpinning climate, peace and security in the region? (See recommendation 5 on finance below)
- What are regional legal protections are necessary before, during, and after climate-related conflict?
- What institutional frameworks need to be established for resolving regional climate conflicts considering local contexts?

5. Increasing access to finance and capacity building for addressing climate, peace and security: Beyond these next steps, the urgent need for financial and technical resources at all levels remains and must be addressed. Each organization must play its' respective roles in assisting Member States and regional bodies to access available climate finance to address identified climate, peace and security priorities. As overseas development assistance is in decline and the region faces severe humanitarian, economic and geopolitical impacts, public finance for longer term action are becoming even more scarce. The importance of the private sector and domestic finance have been emphasized and Kenya has provided an excellent example of how national security budgets can contribute to climate, peace and security outcomes by implementing and financing action via national defence forces. This forum commits to actively exploring options for financing climate, peace and security in the IGAD region. IGAD commits to take the findings of this consultation into the draft IGAD Regional Climate Change Strategy, under review in the coming weeks. Other stakeholders, including the Member States, recognize the scope for further integrating climate, peace and security into national and regional plans and strategies. In addition, partners need to work together on the design of context-specific solutions based on studies of identified hotspots, such that resources are targeted in line with priorities.

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The IGAD Region

The Intergovernmental Authority on Development (IGAD) in Eastern Africa was created in 1996 to supersede the Intergovernmental Authority on Drought and Development (IGADD) which was founded in 1986 to mitigate the effects of the recurring severe droughts and other natural disasters that resulted in widespread famine, ecological degradation and economic hardship in the region.

Djibouti, Ethiopia, Kenya, Somalia, Sudan and Uganda – took action through the United Nations to establish the intergovernmental body for development and drought control in their region. Eritrea became the seventh member after attaining independence in 1993 and in 2011 South Sudan joined IGAD as the eighth member state.

The IGAD Member States


INTERGOVERNMENTAL AUTHORITY ON DEVELOPMENT
IGAD
AUTORITÉ INTERGOUVERNEMENTALE POUR LE DÉVELOPPEMENT

ICPAC