REPORT OF THE SIXTY SECOND GREATER HORN OF AFRICA CLIMATE OUTLOOK FORUM (GHACOF 62) FOR THE OCTOBER- DECEMBER (OND) 2022 RAINFALL SEASON, Hybrid 23-25, August 2022

THEME: " Managing climate risks for resilience"

Mombasa, Kenya, 2022

Table of Contents

PREFACE

The sixty-second Greater Horn of Africa Climate Outlook Forum (GHACOF62) was organized virtually and in person on 23-25 August 2022. The main objectives of the forum were to present feedback on the performance and impacts of the June to September 2022 season, followed by a consolidated objective regional climate outlook for the OND 2022 season, and then deliberate and provide implications of the OND 2022 climate forecast to key socio-economic sectors in the region.

The forum brought together climate scientists, researchers, decision-makers, and users from key socio-economic sectors, governmental and non-governmental organizations, development partners, and civil society, among other stakeholders. GHACOF62 was preceded by sector-specific workshops that focused on the co-production and co-design of climate services, feedback on the use of the previous forecast and its impacts on the sectors, lessons learned, and co-design of forecast-based interventions and mitigation measures for the coming season. This was in addition to a week-long climate prediction development workshop (PRECOF) held from the 15th to 19th of August 2022 to co-develop regional and national climate forecasts.

GHACOF62 was organized by the IGAD Climate Prediction and Applications Centre (ICPAC) in collaboration with the National Meteorological and Hydrological Services (NMHSs) of ICPAC's participating member countries and was supported by partners. The forum was held within the framework of the IGAD regional strategy for mainstreaming climate information in key socio-economic sectors for disaster risk reduction and sustainable development. The theme of GHACOF62 was **"Managing climate risks for resilience".**

The three days-event attracted 111 online participants (80 male and 31 female), while 185 participants attended in person (141 males and 44 females) at the Sarova White Sands hotel in Mombasa

ICPAC will continue to organize GHACOFs as one of the most effective ways to strengthen the dialogue between climate scientists and the users of climate services and proactively innovate and improve efforts to deliver better services to build resilience in the region.

Guleid Artan (PhD)

ICPAC Director

EXECUTIVE SUMMARY

Since the advent of the COVID-19 pandemic, IGAD Climate Prediction and Applications Centre (ICPAC) has adopted a mix of virtual and hybrid formats for its GHACOF forums. The sixty-second Greater Horn of Africa Climate Outlook Forum (GHACOF62), held in Mombasa, Kenya, on 23-25 August 2022, adopted a hybrid format with online participants joining via the zoom platform. The forum issued the region's October-December (OND) 2022 climate outlook and formulated forecast-based mitigation and response strategies. It also reviewed the June-September (JJAS) 2022 seasonal rainfall performance and impacts on the different socio-economic sectors. The forum was supported by the ClimSA and CONFER projects funded by the European Union, the SCII project funded by the Swedish government, and the AICCRA project funded by the World Bank.

The forum was held within the framework of the IGAD regional strategy for mainstreaming climate information into key socio-economic sectors for resilience and sustainable development. It brought together representatives from National Meteorological and Hydrological Services (NMHSs), global climate centres, regional partners, decision-makers, and users from key socio-economic sectors. The agriculture and food security, water and energy, livestock, media, health, and disaster risk management sectors were held in person, while the environment, forestry, and conflict sectors participated virtually. Climate Change experts also had a parallel workshop on day one but joined the various sectors on the second day. All the sectorial sessions were held two days before the main event to formulate responses to the regional climate outlook for the OND 2022 rainfall season over the GHA region. The sectors involved during the sectoral sessions were Agriculture and Food Security, Disaster Risk Management (DRM), Water Resources Management and Energy, Livestock, Health, Environment and Forestry, Media, and the Conflict Early Warning and Response Mechanism (CEWARN). Climate Change experts also had a parallel workshop on day one but later joined the various sectors on the second day.

The objective seasonal forecast was developed during the PreCOF62 climate capacity building workshop held from 15th to 19th August 2022. The consolidated objective climate outlook generally indicated a higher chance of drier conditions over much of the region, specifically over Tanzania, Burundi, Rwanda, Kenya, southern, central, and north-western Somalia, southern and south-eastern Ethiopia, and the Red Sea coast of northern Eritrea. Consistent with increased probabilities for below-normal rainfall, the start of the season is predicted to be delayed, especially over eastern Kenya and southern Somalia. The temperature outlook indicates an increased likelihood of warmer-than-average surface temperatures across most parts of the region.

The forum provided a structured means for users, researchers, and climate services providers to interact at the regional level to ensure that user needs for the seasonal prediction are met. The forum attracted 111 online participants, 80 male and 31 female while185 participants attended in person (141 males and 44 females).

1. SETTING THE STAGE AND OFFICIAL OPENING CEREMONY

Speech by Dr. Gikungu, Director of the Kenya Meteorological Department (KMD)

Dr. Gikungu, Director of the Kenya Meteorological Department (KMD), acknowledged all participants and congratulated IGAD-Climate Prediction and Applications Centre (ICPAC) for successfully organizing the Greater Horn of Africa Climate Outlook Forum (GHACOF62). In his remarks, Dr. Gikungu highlighted that Kenya was privileged to host many GHACOFs, and we look forward to supporting future Forums. He appreciated the cooperation among

stakeholders, including NGOs, regional, government, and international organizations, and assured ICPAC of KMD's continued support.

Speech by Dr. Guleid Artan, Director, IGAD Climate Predictions and Applications Centre

Dr. Artan acknowledged the presence of the directors and WMO Permanent Representatives (PRs) of member country NMHSs, partners, and stakeholders and thanked workshop participants for accepting the ICPAC invitation to discuss the current issues and the way forward. He appreciated the opportunity to hold GHACOF62 after 2-years of COVID-19 restrictions. Dr. Artan expressed concern over the historic drought currently facing the region and its adverse impacts on the livelihoods of millions of people. He noted that the situation is being exacerbated by the prolonged and consecutive failed seasons since 2020. The possibility of a 5th consecutive failed season, as indicated by the OND 2022 forecast, is a wake-up call to all the actors to take action before it's too late. Early warning alone is not enough. It needs to translate into early action by making reliable decisions for mitigation and resilience. He also emphasized the need for ICPAC to work to ensure that the climate information is timely and easy to understand by many.

He further highlighted that ICPAC is committed to improving its climate services in the region. We have recently adopted co-production as a mode of knowledge production to enhance user and stakeholder involvement. Co-production allows interaction between producers and users of climate services to co-design products and solutions for their sectors. He further explained that ICPAC provides seasonal forecasts three times a year based on rainfall patterns through GHACOF as a User Interface Platform (UIP). For the Long Rains, GHACOFs are held in mid-February (lead time less than a 1-month); for the northern states, JJAS is their primary rainy season, and GHACOF is held in May (lead time of less than a month), while for the Short Rains, they are typically held late in August (lead time greater than 1-month). Additionally, ICPAC produces forecast updates on monthly and weekly timescales to complement the seasonal products. He further mentioned that ICPAC will continue to work tirelessly to support vulnerable communities in East Africa and appreciated the member states' Permanent Representatives, development organizations, EU, and Swedish government for their continued support.

1.1 Introduction

The organization of Regional Climate Outlook Forums (RCOFs) was initiated in 1996 in Victoria Falls, Zimbabwe, by the WMO's Climate Information and Prediction Services (CLIPS) project in collaboration with NMHSs. RCOFs gained momentum as a regional response to the 1997–1998 El Niño event. IGAD Climate Prediction and Applications Centre (ICPAC), formerly known as Drought Monitoring Centre (DMC), organized the first RCOF in Nairobi, Kenya, for the March to May (MAM) 1998 rainfall season in February 1998.

The sixty-second Greater Horn of Africa Climate Outlook Forum (GHACOF62) was organized by ICPAC in collaboration with the GHA National Meteorological and Hydrological Services (NMHSs), World Meteorological Organization (WMO), and other partners to document and share the climate impacts across the region and to formulate mitigation measures to the regional climate outlook for the October- December 2022 rainfall season over the GHA region. October-December (OND) is a vital rainfall season, particularly in the equatorial parts of the Greater Horn of Africa (GHA). The forum is part of the IGAD Regional Strategy for Mainstreaming Climate Services in Key Socio-economic Sectors' Plans for Sustainable Development.

This report summarizes the deliberations of the sixty-second Greater Horn of Africa (GHA) Climate Outlook Forum (GHACOF62), held in person at Sarova Whitesands Hotel in Mombasa and virtually via zoom on 23-25 August 2022.

1.2 Objective of the forum

The forum's main objective was to provide the regional climate outlook for the October- December (OND) rainfall season, analyze the potential impacts of the expected climate conditions on different socio-economic sectors and formulate appropriate mitigation measures and advisories. Assessment of the performance and impacts of the preceding seasonal climate was also undertaken. The sectoral reports highlighted the experiences and lessons learned in using the forecast and good practices. The challenges encountered during the season were also reported. The forum also provided a regional interaction platform for decision-makers, climate scientists, research scientists, users of climate information, and development partners.

1.3 Participants for the forum

The key stakeholders included the National Meteorological and Hydrological Services (NMHSs) of Eastern Africa (Institut Géographique du Burundi, Agence Météorologique Nationale de Djibouti, Eritrea Meteorological Service, Ethiopia Meteorological Institute, Kenya Meteorological Department, Rwanda Meteorological Agency, South Sudan Meteorological Service, Sudan Meteorological Authority, Somalia Meteorological Service, Tanzania Meteorological Authority and Uganda National Meteorological Authority) as well as international partner organizations such as the World Meteorological Organisation (WMO), European Union, and Organisation of Africa, Caribbean and Pacific Group of States (OACPS) among others.

The hybrid forum comprised climate scientists from the National Meteorological and Hydrological Services (NMHSs) of ICPAC member countries (Institut Géographique du Burundi, Agence Météorologique Nationale de Djibouti, Eritrea Meteorological Service, Ethiopia Meteorological Institute, Kenya Meteorological Department, Rwanda Meteorological Agency, South Sudan Meteorological Service, Sudan Meteorological Authority, Somalia Meteorological Service, Tanzania Meteorological Authority and Uganda National Meteorological Authority), universities, research institutions, regional and international organizations engaged in climate modeling and applications (European Union, and Organisation of Africa, Caribbean and Pacific Group of States (OACPS). Others were from socio-economic sectors such as agriculture and food security, health, water resources, energy, disaster risk reduction, civil society, and conflict early warning response. Various regional and international Governmental and Non-Governmental organizations and the donor community also participated in the forum. A total of 185 participated in person (141 male and 44 female), while 111 participants from the various sectors participated online (80 male and 31 female).

1.4 Methodology

Presentations and plenary discussions were the primary modes used during the online forum. On 23 August 2022, sectors organized a working session to review and discuss the climate products needed by each sector, and on 24 August 2022, the sectors reviewed the impact of the MAM 2022 season, shared lessons and good practices, discussed the outlook of OND 2022, and generate advisories and mitigation measures. On 25 August, the sectors gave consolidated regional presentations on the previous season's impacts and OND 2022 advisories that were coproduced in the preceding days. Five side events on various topics were held during the afternoon sessions on the 23- 24 August 2022.

2. FEEDBACK ON JJA 2022 SEASONAL CLIMATE PERFORMANCE AND IMPACTS

This session was mainly dedicated to showing the meeting participants the performance of the previous season and to showcase some of the sectors' impacts observed during the season with regards to the observed rainfall and temperature and other climatic-related factors from seven sectors, including Agriculture and food security, Conflict, Disaster Risk Management, Livestock and Rangelands, Health, Water resources, and energy and Environment and forestry.

2.1 Agriculture and Food Security

The JJA season performed quite well over Ethiopia, Sudan, and South Sudan. The notable positive impacts recorded included the boost on crop growth during the developmental stages, it also helped most staples and cash crops recover from localised dry spells which occurred during June. In other countries such as Tanzania and Burundi, JJA season was generally dry providing a conducive environment for harvesting. However, there were some negative impacts which were observed during JJA and these included occurrence of African Army Worm (AAW) in Oromia, Amhara in Ethiopia and in 37 Counties in Kenya. In general, a total of 448,063.5 ha and 370,713 ha were affected by AAW and Fall Army Worm (FAM) respectively in Ethiopia. Regionally, there was shortage and high cost of farm inputs driven by high fuel costs. Farmers, therefore, did not use optimal farm inputs and this could affect the total yield for the JJA season. There were also observed cases of prolonged dry spells in Sudan and South Sudan which affected crops at germinating and vegetative stages. Additionally, there were incidences of flooding, water logging and soil erosion in Warap State in South Sudan and Haron area in Sudan where 50% of the cropland was destroyed. In Uganda, there was at least 30% loss in maize crop yields due to extensive wilting while in Sudan, there was weed infestation on cultivated land which delayed agricultural operations. Regional prices in staple food have increased significantly. This, in addition to below average harvest expected over some countries like Kenya, is likely increase the number of people in need of food aid especially in Somalia, Kenya and Ethiopia.

Some of the observed long term seasonal changes during JJA season included: extended drought and prolonged dry spells (Borena and Guji) during the last Belg season in Ethiopia, poor start of the season in Kenya and Uganda in MAM, and increased occurrence of frost in the southern highland areas of Tanzania. Some of the implementation and impact of climate services and advisories during JJA included: cultural and chemical control of AAW and FAM in Ethiopia and Kenya, dissemination of seasonal outlook and agro-meteorological advisories and regular updates through different channels regionally, provision of food relief and humanitarian assistance to 4.1 million people affected in the ASAL regions of Kenya, and expansion of livestock and crop insurance in Kenya and Rwanda.

2.2 Disaster Risk Management

The countries with the most reported disasters (including floods, drought, landslide, hailstorm and conflicts) during the JJA season were Uganda, Ethiopia, Kenya, Somalia, Sudan and South Sudan. In general, a total of 480, 806 people were affected by floods, while those displaced by floods, drought and landslide were approximately 2,772,744, a total of 29,843 households were affected, while approximately 6000ha of crop land was affected by floods. It was estimated that approximately 10.9 billion USD is needed for humanitarian response in the region.

The measures taken by countries and other actors included: issuing of early warning information through various media, the use of an integrated multi-sectoral assessment in disaster affected areas, issuing of flood alerts based on the forecast, activation of the Federal Emergency coordination Centre, provision of relief assistance to

the affected communities, sensitization of communities against settling within river/lake buffer zones. With regards to the COVID-19 pandemic, it was reported that a total of 111.7 million doses of the vaccine have already been administered. Out of this number, a total of 63.9 million people above the age of 18 years have been fully vaccinated. The main key lesson learnt was that multi-agency approach in response to disaster works best at member state and cross-border levels.

2.3 Environment and Forestry

The positive impacts observed in the environment and forestry sector during the JJA season included: good establishment of forage production for both wildlife and livestock due to above average rainfall in Ethiopia, Kenya, South Sudan, Sudan and Uganda; there was water available for wildlife and livestock; good tree seed production; enhanced forest productivity; good regeneration in natural forests; reduced pressure on highland forests from livestock; low incidences of forest fires; and increased income from sale of seedlings and other planting materials due to the favourable planting conditions. There were also negative impacts reported and these included; degradation of land and soil erosion due to increased rainfall especially in Ethiopia, S. Sudan, and Uganda; decreased water and forage for wildlife and livestock in drought affected areas; wildlife death due to continued drought; increased human-wildlife conflict due to wildlife migration; reduced survival and/or growth of seedlings and trees due to drought and dry spells in some parts of the region; destruction of forests due to agriculture expansion and petrol; increase in illegal cutting of forest for charcoal; and fire incidences as a result of collection of wild honey, green pasture for livestock and bushmeat.

Some observed seasonal changes included delayed start of rainfall season and flooding in Eastern Uganda. Climate information issued during JJA season was utilized in the following ways: provision of water and forage to wildlife; mobilization of Problem Animal Control (PAC) teams/ rangers and Veterinary Units to handle HW conflicts and injuries to wildlife respectively; continuation of campaign of tree seedling plantation; watershed management, proper farming, soil and water conservation strategies; and planting of drought resistant tree species in drought prone areas.

2.4 Water Resources and Energy

Rainfall performance was varied over the region with both positive and negative impacts. Some of the positive impacts highlighted included; no occurrence of floods and damage to infrastructure in Burundi, S. Sudan, Uganda and Tanzania; significant recharge of water sources in Laikipia (mixed farming zones) and western parts of Kenya; near normal flows into Sondu Miriu, Turkwel dam levels are still high, good hydropower output from western Kenya hydropower plants of Turkwel, Sondu Miriu and Sang'oro; in Ethiopia and Sudan, there was enhanced rainfall which led to enhanced power generation and water availability for irrigation and supply; in Tanzania, there were a series of activities such as construction of infrastructure, water harvesting, river training, as well as geophysical survey and drilling of boreholes; while in Djibouti, there was ground water recharge due to enhanced rainfall in north and southern regions.

Some of the negative impacts observed during the JJA season included: declining water levels in the three large lakes of Victoria, Kyoga and Albert in Uganda; there was decreased hydropower generation, reservoir, river and groundwater levels observed in Somalia, Sudan, Tanzania and Kenya; in Djibouti, drought affected water availability for livestock and irrigated agriculture particularly in June and July while floods damaged water supply

pipes during August; there was increased evaporation from reservoirs in Sudan; there was also reported riverine flash floods in Addis Ababa and Lower Awash in Ethiopia, and in Mbale (Uganda), Unity State (S. Sudan) and Gambela; finally, in Uganda gardens dried out and perennial crops (coffee and banana) were affected due to drought in some parts of the country.

The observed seasonal changes of the JJA season includes; increase in rainfall over the south, coastal and the north regions in Djibouti during August; increase in temperature in Somalia, Kenya and Sudan; enhanced rainfall (from end of July) in Ethiopia, S. Sudan and Sudan; increased drought severity and water scarcity in across Somalia; decreased inflows into rivers in Sudan; and suppressed rainfall, inflows and reservoir water levels and consequently reduction in hydropower generation in Kenya. Climate information issued during JJA season was used for the following purposes; monitoring of surface and groundwater levels; management and monitoring of hydropower generation; sourcing of funds for the rehabilitation of hydrologic infrastructure; timely dissemination of information; follow-up of dam operations and management and flood contingency planning; water tracking and raising awareness of communities; drilling of new boreholes in some water stressed regions; rehabilitation of some gauging stations; preparation of monthly hydrological bulletin and catchment conservation; flood monitoring and advisories not to use flooded roads; and enhanced monitoring of rivers using WhatsApp group.

2.5 Livestock and Rangelands

The good rain received in some areas of Djibouti, Eritrea Ethiopia, Kenya, Somalia, South Sudan and Sudan contributed to improved pastures and water availability. This in turn contributed to increased kidding, lambing, calving & milk production in areas that received rain. Animals were in good body condition and fetched better market prices or terms of trade

However, nineteen (19) ASAL counties in Kenya experienced drought which led to government and partners to supply animal feed and facilitated destocking in drought affected counties. In Ethiopia most part of Somali region; Borena, Guji, Bale, Oromia region; and harrege experienced drought conditions. 592,504 bale of hay and 22,986.56 quintals of concentrate feed supplied were supplied in Borena region. In Somalia**,** drought conditions continue to prevail across the country, even in areas where it rained since quantity received only in localized areas and inadequate. Humanitarian assistance, social support – cash voucher was offered by development partners. In Djibouti**,** there was flooding of Wadis, disease outbreaks such as LSD, CCPP, PPR, risks of Desert Locust and RVF outbreak were experienced. In S. Sudan and Eritrea Spread of major water related livestock disease e.g worms, haemorrhagic septicaemia (HS), foot rot and others were experienced in addition to inaccessibility to flooded areas which limited animal health service delivery. Uganda experienced extremely high temperatures, and dry spell, inadequate animal feed/ fodder/ pastures. Some poultry and swine farmers abandoned enterprise. There was overflow of riverbanks, drowning some cattle, goats, and sheep in Mbale, Eastern Uganda.

Health and Nutrition

There were both positive and negative impacts observed during the JJA season over the region. Some of the positive impacts observed included; no malaria outbreak in most parts of Somalia; reduction of COVID-19 cases eased pressure on health services infrastructure in all countries; less power interruption led to stability in health services; improved nutrition status due to availability of vegetables, fruits and milk due to good rains in Ethiopia; no marked change in the incidence of other climate sensitive diseases in Kenya and Tanzania; decrease in the number of malaria cases in the eastern and southern parts of Rwanda and along lake Kivu from June 2022; and

decrease in cases of schistosomiasis and Soil Transmitted Helminthiasis in Rwanda from May 2022. The following negative impacts were recorded during the JJA season; cases of Rift Valley fever were recorded in the Eastern and Southern Provinces of Rwanda; cases of, giardia, dysentery schistosomiasis, scorpion stings, Hepatitis A, Visceral leishmaniosis (Kala-azar), Escherichia Coli (E. coli) and typhoid fever were recorded in Sudan; cholera, Hepatitis E Virus and Measles cases were recorded in S. Sudan; and cholera in Somalia.
Climate information issued during the JJA season was used for the following activities: rapid needs assessment from nutrition, Water Sanitation and Hygiene (WASH), surveillance and expansion of immunization program in all countries; carrying out distribution of Long-Lasting Insecticidal Nets (LLINs) and Indoor Residual Spray (IRS), control of flying and crawling insects in Ethiopia, S. Sudan Uganda, Rwanda and Tanzania; allocation of resources for early detection of cases, and treatment in all countries; strengthening of infrastructure in the field of water treatment, monitoring, and training the staff, in order to provide safe and quality water in all countries; and decline in malaria cases after intervention in Ethiopia; dissemination of advisories to sub-national administrative units for preparedness, mitigation planning and response in Kenya; and strategic planning of national and local medical supplies and public health responses in Kenya.

3. OCTOBER- DECEMBER 2022 SEASONAL FORECAST

Global temperature trends according to the global climate system indicates that 2022 is expected to be at the top ten of the warmest years. All models show and predict La nina conditions and negative IOD suggesting decreased OND 2022 rainfall. On the Greater Horn Africa, drier than normal conditions are expected over coastal Sudan, equatorial and southern parts of the region with enhanced probabilities over eastern Kenya and southern parts of Somalia. While, wetter than normal conditions expected over central to eastern South Sudan, parts of central, western, and northeastern Ethiopia. Delayed onset is expected in eastern Kenya, southeastern Ethiopia, southern Somalia, and Tanzania with high chances of early onset over western Kenya, Uganda, South Sudan, Southwestern Ethiopia, and northern Somalia (continuing JJAS season. Drier than usual conditions expected during October in areas where late onset is expected (eastern part of the region). Warmer than average conditions are indicated across the GHA over parts of Tanzania, Kenya, Somalia, and Djibouti and cooler than normal conditions over northern Ethiopia and northwestern Eritrea. SPI analysis based on observation and model predictions indicate continuing (multi-season) drought conditions over Uganda, parts of Kenya, Ethiopia, and Somalia.

4. SECTOR IMPACTS AND MANAGEMENT STRATEGIES FOR THE SHORT RAINS SEASON

This session addressed implications of the OND 2022 climate outlook to various sectors that included anticipated impacts, and key management strategies in different sectors. Below are the co-developed likely impacts and mitigation measures for the different sectors.

4.1 Agriculture and Food Security

Expected positive sectoral impacts

Conducive climate conditions for harvesting. There will be limited crop losses because the dry season will coincide with the harvesting period specifically in parts of central and southern Ethiopia and North Rift Kenya. Feeder roads will continue to be good and easily passable due to dry conditions, thus, improving access to food commodities. The dry conditions will also allow repairs of irrigation and water harvesting infrastructure across irrigated areas.

Expected negative sectoral impacts

The below normal rains will result in poor crop prospects, likelihood of water stress and low soil moisture. Below average harvests, leading to high market price of staple food is anticipated, which will likely result in high number of vulnerable households in need of relief and other interventions. Early onset of rainfall in Western Kenya will negatively affect the harvesting of current season crops. A likelihood of post-harvest loses, and upsurge of pests and diseases is also expected e.g banana bacterial wilt (BBW) and AAW in Uganda. There is also a high chance of occurrence of crop pests e.g FAW.

Key advisories

With advice from extension workers, farmers are encouraged to plant short-season, early maturing, and drought-tolerant crop varieties. Governments should fast-track farm inputs and fertilizer subsidies to allow farmers to take advantage of the short crop season and promote subsidies and crop insurance cover to cushion farmers. Promote conservation agriculture (minimal tillage, mulching, kitchen gardens) and water harvesting practices for crop supplementary irrigation. Famers are encouraged to monitor and control crop pests and diseases regularly and practice proper storage and use of available food stocks. Diversification to other income-generating activities, e.g., beekeeping, poultry, carpentry, etc., is also encouraged. Regularly monitor staple food market prices to inform government actions (importation, duty waiver, etc.). Encourage governments and partners to act early in response to the humanitarian crises (erosion of household coping mechanisms due to 4 consecutive failed seasons). Promote subsidies and crop insurance cover to cushion farmers from drought.

4.2 Disaster Risk Management

Expected positive sectoral impacts

Conducive climate conditions for harvesting. There will be limited crop losses because the dry season will coincide with the harvesting period specifically in Ethiopia and North Rift Kenya. Feeder roads will continue to be good and easily passable due to dry conditions, thus, improving access to food commodities. The dry conditions will also allow repairs of irrigation and water harvesting infrastructure across irrigated areas.

Expected negative sectoral impacts

Floods riverine and flash floods are likely to continue, affecting Sudan and South Sudan. Persistent drought and its impacts, including deterioration of water and pasture shortage, will likely intensify in Ethiopia, Kenya, Somalia, and Uganda. Low temperatures may cause frost and affect crops in Ethiopia. Resource-based conflict along cross-border areas due to migration by pastoralists and human-wildlife conflicts is likely to intensify in Djibouti, Ethiopia, and Kenya. Food prices are likely to increase across all the IGAD member states.

Key Advisories

- Effective dissemination of early warning information and alerts through community engagement and sensitization, outreach programs etc across all the member states
- Promote peace among communities and encourage resource sharing (All)
- Pre-positioning of medical supplies by the Ministry of Health (SSD, SD)
- Strengthen Hazard monitoring – Drought / Floods / water levels in River Nile (SSD, SDN)
- Activate contingency and response plans as well as strategies in drought affected areas

- Governments should mobilize and allocate resources and provide food and water for drought affected areas as well as cash transfers (ETH, KEN, SSD, UGA).
- IOM & gov'ts to facilitate voluntary return of displaced persons (affected by floods & drought).
- Ministry of Agriculture in drought affected countries are advised to distribute fast maturing crops.

4.3 Environment and Forestry

Expected positive sectoral impacts

Vegetation and forest regeneration are expected in Ethiopia and South Sudan. Additionally, there is a likelihood of good forage and water availability in Ethiopia and South Sudan. Rehabilitation/maintenance of tourism and forest infrastructure, e.g., roads in Uganda.

Expected negative sectoral impacts

Reduced pre-establishment and growth of trees and forests and poor regeneration and growth in natural forests in Ethiopia, Kenya, and Uganda.

Increased forest stress, pests, and diseases in Ethiopia, Kenya, and Uganda.

Increased deforestation and over-exploitation of forest resources in Kenya, South Sudan, and Uganda.

Decreased water and forage available for wildlife and livestock, increased wildlife deaths and livestock, and increased human-wildlife conflicts in Ethiopia, Kenya, and Uganda.

Vegetation degradation and soil erosion due to trampling, especially around water points in Kenya and Uganda.

Increased fires in forests and protected areas and their associated environmental consequences, including pollution and threats to biodiversity in Ethiopia, Kenya, South Sudan, and Uganda. Over sprouting of invasive species in Kenya and Uganda.

Key Advisories

- Promote of moisture-stress (drought) resistant varieties of trees in Ethiopia, Kenya and Uganda
- Reduce on tree planting and focus on management of existing forest estates in Ethiopia, Kenya and Uganda Provide fodder and water to wildlife and livestock in Kenya and Uganda.
- Promote wildfire management practices e.g digging fire cut lines, firebreaks, early burning, Ready firefighting gears and machineries in Ethiopia, Kenya and Uganda
- Mobilisation of resources from governments and stakeholders to remedy against the expected severe dry season (provision of water and fodder, facilitation for HWC measures, firefighting equipment etc.) in Kenya and Uganda
- Implementation of invasive and alien species management strategy in Kenya and Uganda

4.4 Water Resources and Energy

Expected positive sectoral impacts

Good water availability for different users in Djibouti and availability of water for irrigation in Sudan due to expected wetter conditions. A Stable hydropower production due to good reservoir inflows. Sufficient water available until next rainy season in the Nile basin. Available water for irrigation in Sudan

Expected negative sectoral impacts

In the areas drier than usual conditions are forecasted, it is expected that enhanced water loss from water pans is due to high rates of evaporation. As a result, reduction in hydropower production, reduction of water supply, water contamination, and conflict over water access is expected. Moreover, frequent breakdown of water infrastructures such as borehole pumps due to overuse and increased water shortage for irrigation purposes.

Advisories:

- In light of the above likely negative impacts, equatorial and southern GHA countries are currently experiencing low flows, and OND is their primary rainfall season. They are advised to conserve and efficiently use available resources until the next rainfall season.
- Communities are advised to increase efforts around the maintenance of water infrastructure, including desilting and deepening of water pans and repair and periodic maintenance of water pans.
- They are also encouraged to improve the management of catchment areas. These actions could be led by their respective water committees.
- Governments are also advised to map existing water infrastructure (points) and identify strategic ones to be used only during drought.

4.5 Livestock and Rangelands

Expected positive sectoral impacts

Given wetter than normal conditions in the JJAS season, the pasture harvest in the current season could be used for the next season. Good pasture management will improve animal body conditions and milk and blood availability.

Expected negative sectoral impacts

However, warmer than average forecasted temperatures will challenge the maintenance of surface water. As a result, increased levels of flush floods might force livestock relocation. Besides, the Influx of livestock from Sudan to South Sudan might lead to conflict and a surge of diseases. In light of the below-average OND 2022 forecast, this might lead to low productivity. Consequently, increased competition between farmers, pastoralists, humans, and wildlife is expected.

Key advisories

- Enhance surveillance, treatment, and vaccination of livestock.
- Governments and extension workers are encouraged to support the distribution of animal feeds and drugs.
- Strengthen resource mobilization and advocate for accelerated destocking in drought-affected areas.
- Strengthen cross-border coordination and management.

4.6 Health and Nutrition

Expected positive sectoral impacts

Reduction of vector borne diseases such as Onchocerciasis and Malaria due to reduced vectors (black flies and mosquitos) in Sudan, South Sudan

Expected negative sectoral impacts

Considering expected below normal OND 2022, which may lead to water quality compromise, and food deficiencies, particularly in Eastern Sudan, there are high vulnerability diseases like Black flies might outbreak. In Kenya, this season continues the ongoing drought, which might lead to depressed water availability for drinking and domestic use, and an increased incidence of water-borne infection is expected. In Somalia, the OND 2022 forecast indicates the continuation of the ongoing drought. Therefore, severe water sources shortage for humans and animals are expected. Besides, outbreaks of malaria are also anticipated.

Key advisories
The advisories identified in light of the expected below-average rainfall included:

- Timely vaccination
- Based on the information, risk communication and early response need to be used immediately for early action.
- Provide relief food, create public awareness and provide medicines to address these conditions. • Increase ongoing vaccination and strengthen surveillance for yellow fever.
- Enhance social support to the communities and special attention to protect children and women from vec- tor-borne diseases.
- Strengthen interventions already in progress and deploy antimalarial drugs and diagnostics timely.
- Consider water supplying through transporting, maintaining existing and establishing new water, sanitation, and hygiene facilities.

4.7 CLIMATE CHANGE SECTOR

Countries have tried to address climate change impacts, aiming to keep the global temperature below 1.5c. However, with current actions and efforts, warming up might soon pass the 2c threshold. Accelerated transitions in energy, land, ocean and urban heating are observed. There are ample shreds of evidence of climate change both globally and locally. This has been manifested in increased temperature and rainfall extremes: change in seasons in terms of onset and seasonal rainfall amount. The consequences of climate change are already with us, for instance, loss of lives because of climate related disasters has been experienced. East Africa is one of the most vulnerable regions in the world, with the most vulnerable sectors being, agriculture, fisheries, housing, and energy sectors. There have been efforts regarding adaptation from the ministry of environment, agriculture to curb impacts and improve mitigation which needs to be further built upon.

Key advisories:

- Moving away from rain-fed agriculture and adopting irrigation technologies
- Planting drought-resistant crops

- Harnessing groundwater resources
- Harvesting biogas and renewable energy
- Leveraging public-private partnerships
- Developing IGAD climate change strategy

4.8 MEDIA SECTOR OND 2022 IMPACTS AND ADVISORIES

Mrs. Lilian from UNMA reported the media sector implications and management strategies for anticipated impact based on OND 2022 season forecast. The media and communication co-production sessions were represented by Ethiopia, Kenya, Tanzania, Uganda, and Somalia. The JJAS verification and the forecast guide communication practices were discussed, and the media group recommended using different languages to disseminate. The use electronic and print media, social media, national television, NOCF, coproduction workshops, direct briefing, and talk shows have been adopted by most countries.

Because of a 5-season consecutive drought with likely negative impacts, the following advisories were developed by the media sector participants.

- Further intervention needed for better dissemination of early warning information.
- Organizing educative radio or television community programs.
- Increasing engagements with policymakers, users, and other stakeholders.
- Countering false weather reports especially those shared on social media
- Regional officer's Engagements for weather dissemination
- Provision of more regulated and adequate information: scientists should be ready for radio or televised

5. REVIEW OF PAST RESPONSE TO DROUGHT AND LESSONS LEARNED TO INFORM CURRENT RESPONSE: PANEL DISCUSSION ON EARLY ACTION

The panel discussion began with a presentation by Col. Charles Owino, of the Kenya National Disaster Operations Centre (NDOC). He mentioned that severe droughts have been experienced since 2011. He mentioned that there are several strategies established to build resilience of vulnerable communities. Multi-billion projects have also been designed and implemented. He also highlighted the importance of quality data and information dissemination to build resilience.

Mr. Chan Lam provided an overview, of the Agricultural Climate Resilience Enhancement Initiative (ACREI) project as well as the lessons learned in the implementation of the project. He mentioned that the project is one of the joint regional activities, funded by Adaptation Fund (AF), and implemented by WMO, FAO and the IGAD Climate Prediction and Applications Center – ICPAC. The main objective is to improve adaptive capacity and resilience of targeted farmers, agro-pastoral and pastoral communities to current climate variability and change. Some of the key issues he highlighted were the integration of indigenous technical knowledge (ITK) in weather and climate information production and use of radio in communicating climate information.

Mr. Abdi Fidar provided a presentation the IGAD Regional Focus of the Global Report on Food Crisis 2022. He mentioned that the objective of the report is to provide a baseline on the number of people in need of food aid, food security /crises and provide an advisory on effective policy need. The report highlights the alarming high

levels of acute food insecurity in 2021 in the region, where about 42 million people were estimated to be in Crisis or worse (IPC Phase 3 or above), exceeding the previous three-year high in 2020 by nearly 33 percent.

Dr. Tesfaye Beshah gave a presentation on the IGAD Drought Disaster Resilience and Sustainability Initiative (IDDRSI). He mentioned that during a meeting held in September 2011 in Nairobi, it was noted that 70% of IGAD was made up of arid and semi-arid land. IDDRSI is a holistic, comprehensive, and regional plan of IGAD Member States aimed at enhancing the resilience of communities to the effects of recurrent drought and related environmental degradation. The implementation of IDDRSI involves the concerted action of all IGAD countries, development partners and other stakeholders in the region; and is guided by a common regional strategy within a framework of international cooperation under the overall coordination of the IGAD Secretariat.

Dr. George Otieno shared the Roadmap to Anticipatory Action. The roadmap is set to build resilience of the humanitarian efforts to manage risks, support early warning and promote impact-based forecast, through a coordinated roadmap. The roadmap also promotes the development of a contingency fund for risk management. Among the challenges affecting anticipatory action are the lack of reliable data on vulnerability and weak coordination mechanism.

Dr Linda Ogallo provided a summary of the outcomes State of IGAD Climate Security Technical Workshop. The workshop was attended by 60 participants from the defense, climate change and internal security, as well IGAD Specialized institutions and partners. The workshop established 4 working groups to discuss climate security risks, stakeholders and forums, priorities, and recommendations. Among the recommendations identified during the workshop include.

- Strengthening collection and harmonization of data climate security research
- Improving common understanding of climate security in the region
- and frameworks for assessing related risks
- Capacity building at regional, national, and subnational levels
- Creating a technical hub of climate security expert
- Integration of climate security into National analytical and planning mechanisms

6. RELEASE OF FORUM STATEMENT AND CLOSING OF THE FORUM

During the closing of the session, Dr. Guleid Artan, Director of ICPAC and Dr. David Gikungu, Kenya Meteorological Department and WMO Permanent Representative (PR) of Kenya with World Meteorological Organization (WMO), who released the official statement and thereafter officially closed the meeting. In his closing remarks, Dr. Artan pointed the importance of the OND rainy in the equatorial parts of the Greater Horn of Africa where it contributes up to 70% of the annual total rainfall, particularly in eastern Kenya. He also highlighted that the prospect of a fifth consecutive failed rainy season will be devastating for the millions of people who are already living through the longest drought in 40 years. Last month, IGAD, WFP, and FAO raised the alarm on the number of people suffering from acute food insecurity in 2022 in the Greater Horn of Africa. This number stands at over 50 million. Dr. David Gikungu closed the meeting by congratulating ICPAC for successful organization of GHACOF62 and the participants for the successful deliberations.

The statement for the GHACOF62 is provided in **Annex I**.

ANNEXES

Annex I: Statement for the GHACOF62

Statement from the 62nd Greater Horn of Africa Climate Outlook Forum (GHACOF62)
23-25 August 2022; Mombasa, Kenya

1. Consolidated Objective Climate Outlook for October to December 2022 Rainfall Season

October to December (OND) constitutes an important rainfall season, particularly in the equatorial parts of the Greater Horn of Africa (GHA), where the OND rainfall contributes 20-70% of the annual total rainfall. Analysis of global climate model predictions from 8 Global Producing Centres (GPCs) customized for GHA indicates increased chances for drier conditions during October to December 2022 across the Greater Horn of Africa (Figure 1). In particular, elevated chance of drier than average rainfall is expected to continue over the drought affected regions of Ethiopia, Kenya, and Somalia. Raised probability for drier than average rainfall is also expected over parts of Eritrea and most parts of Uganda and Tanzania. Although predicted signals are less significant, there is a chance for wetter than average conditions over parts of Djibouti, eastern Afar region of Ethiopia, and central to north- eastern South Sudan. The consolidated objective temperature forecast (Figure 2) from 8 Global Producing Centres(GPCs) indicates an increased likelihood of warmer than average surface temperatures across the GHA. Probabilities of warmer than average temperatures are most enhanced over Djibouti, northern Somalia, parts of eastern and southern Kenya and central to north-eastern Tanzania. Cooler than normal conditions are expected over northern Ethiopia and north-western Eritrea.

A Standardized Precipitation Index (SPI) analysis of observed and predicted precipitation for 3, 6, and 12 months indicates long-term rainfall deficits in many parts of equatorial and southern regions (Figure 3). Notably, observeddeficits projected to the end of December 2022 indicate a 12-month SPI representative of moderate to severe multi- season drought conditions in the region, particularly over Uganda, Kenya, Ethiopia, Somalia, and southern South Sudan. As a result of the above average rainfall experienced in the northern parts of GHA in summer, moderately wet conditions are indicated over northern Ethiopia, Djibouti and parts of South Sudan.

The predicted start of the October to December 2022 season, based on 5 Global Climate Model forecasts that provide daily outputs, is provided in Figure 4. The analysis indicates higher chances of delayed onset dates across much ofthe eastern parts of the region including southern Ethiopia, central and southern Somalia, eastern Kenya, much of Burundi, and Tanzania. On the other hand, parts of northern Somalia, western Kenya, Uganda, eastern South Sudan, Rwanda, and northern Tanzania are indicated to experience a normal to early onset.

The World Meteorological Organisation (WMO) and the major global climate centres have noted that cooler than normal Sea Surface Temperatures (SSTs) over the equatorial central Pacific Ocean are likely to persist over the coming months. Global models further indicate that the Indian Ocean Dipole (IOD), which is known to have significant effects during the short (October to December - OND) rains is also expected to persist at negative IOD levels through the majority of OND 2022. This season's configuration of the ENSO and IOD is expected to interact withregional circulation patterns in a way that typically depresses seasonal rainfall in the region. Their effects also are

modulated by topography and large inland water bodies. Updates on the ENSO and IOD conditions will be provided regularly by WMO and the major climate centres.

The outlook is relevant for seasonal timescales and covers relatively large areas. Local and month-to-month variations might occur as the season progresses. Spells of heavy rain and above normal rainfall may occur in areas with an increased likelihood of below normal seasonal totals and vice versa. ICPAC will provide regional updates on a regular basis, while the National Meteorological and Hydrological Services (NMHSs) will provide detailed national and sub-national climate updates.

2. The Climate Outlook Forum

The 62nd Greater Horn of Africa Climate Outlook Forum (GHACOF62) was convened from 23rd to 25th August 2022by the IGAD Climate Prediction and Applications Centre (ICPAC) in collaboration with the National Meteorological and Hydrological Services (NMHSs) of IGAD Member States, World Meteorological Organization (WMO), and other partners to document and share the climate impacts across the region and formulate responses to the regional climateoutlook for the October to December 2022 rainfall season over the GHA region. The GHA region comprises Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, South Sudan, Sudan, Tanzania and Uganda. The forum reviewed the state of the global climate system including the El Niño Southern Oscillation (ENSO) conditions, IOD, and SSTsover the Pacific and Indian Oceans, and considered their impacts on the GHA during October to December 2022 rainfall season. Climate information users from sectors such as disaster risk management, agriculture and food security, livestock, health, environment, media, conflict, and water resources as well as non-governmental organisations anddevelopment partners actively participated in the formulation of mitigation strategies for the potential impacts of theobjective climate forecast in their respective sectors.

3. Methodology

Guidance and valuable forecast information on factors expected to influence the upcoming season were drawn from awide range of sources. Predictions from dynamical seasonal climate models, including those of the WorldMeteorological Organisation's Global Producing Centres (WMO GPCs-LRF) formed the primary forecast inputs.

The objective seasonal forecast was developed during pre-COF62, a one-week climate capacity building workshop held from 15th to 19th August 2022. During the workshop, UK Met Office, ICPAC, and NMHS experts examined the prevailing and predicted SSTs over the Pacific, Indian, and Atlantic Oceans as well as other global, regional, and local climate factors that affect the rainfall evolution during OND season. These factors were assessed using dynamical and statistical models. The regional consolidated objective forecast is produced by recalibrating outputs from 8 global state- of-the-art seasonal prediction systems (WMO GPCs-LRF and other models) using linear regression, Canonical Correlation Analysis (CCA), and logistic regression techniques. Regional scientists and national forecasters from 10ICPAC Member States used ICPAC's FCDO-funded High-Performance Computing (HPC) cluster through remoteconnection to co-develop regional and national-level climate outlooks. Climate prediction products were used by sectoral experts and climate providers to co-assess expected impacts, draft mitigation strategies, and co-produce advisories. The sectoral meetings were held from 23rd – 24th August 2022 preceding GHACOF62.

The current capability of seasonal to inter-annual climate forecasting allows for the prediction of departures from mean conditions on a regional domain, with consideration of scales of processes that contribute to regional and sub- regional climatic conditions. Forecast probability distributions are

established objectively to indicate the likelihood of above-, near-, or below-normal rainfall for each zone. Above-normal rainfall is defined as within the wettest third of recorded rainfall amounts in each zone; near-normal is defined as the middle third of the recorded rainfall amounts; below-normal rainfall is defined as occurring within the driest third of the rainfall amounts. Climatologyhere refers to weather conditions, averaged over a 30-year period (1991-2020). Probability distributions for temperature are also established.

The rainfall and temperature outlooks for October to December 2022 for various zones within the GHA region aregiven in Figure 1 and Figure 2, respectively. Figure 3 provides Standardized Precipitation Index for 3-, 6, and 12- month time scale. Figure 4 shows the expected rainfall onset dates.

4. Rainfall Outlook for October to December 2022

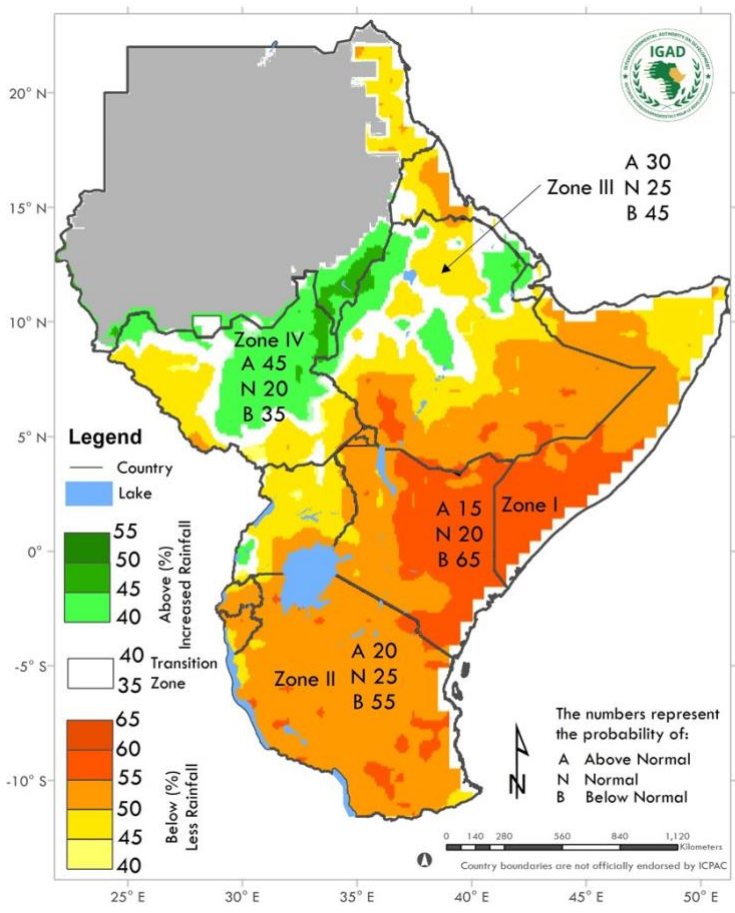

Figure 1. The rainfall outlook for various zones within the GHA region.

Zone I: In this zone (dark orange) the below normal rainfall (drier) category has the most enhanced probability. The probability varies with location and can be read from the legend. For the most widespread dark orange shade (65%) the probabilities for the normal and above normal categories areprovided.

Zone II: In this zone (orange), the below normal rainfall (drier) category has the highest probability (55%). The probabilities for the other categories are provided.

Zone III: In this zone (all yellow) the below normal rainfall (drier) category has the highest probability (45%). The probabilities of the near normal and above normal categories are 30% and 25% respectively.

Zone IV: In this zone (light green) the probabilities for the above normal categories is the highest (45%). Probabilities for the normal and below normal categories are provided.

5. Temperature Outlook for October to December 2022

The temperature outlook for various zones within the GHA region is given in Figure 2 below.

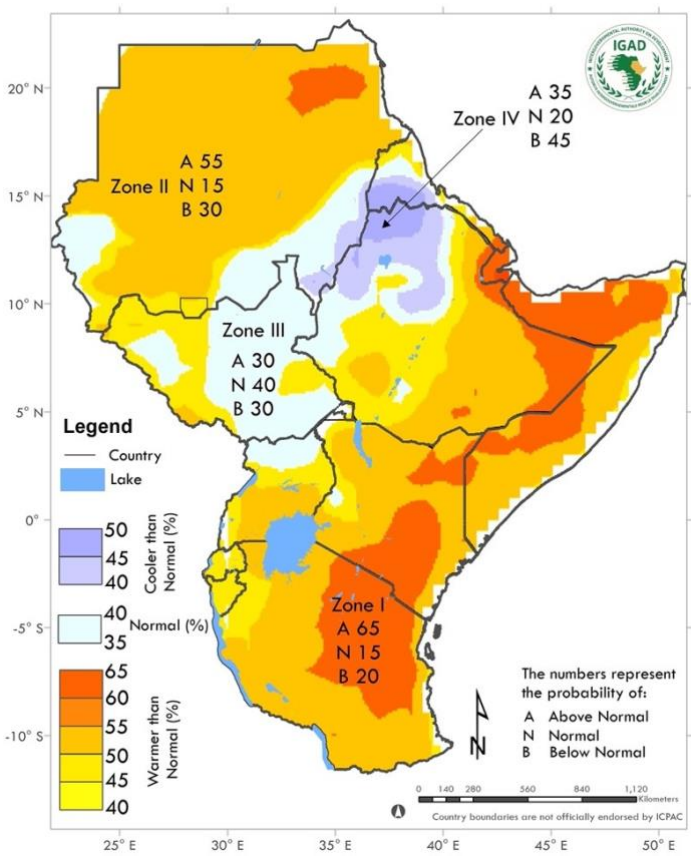

Figure 2: Probabilistic temperature outlook for various zones within the GHA region.

Zone I: In this zone (dark orange), the above normal mean temperature (i.e., warmer) category is mostlikely at 65% (the probabilities of the other categories are also provided).

Zones II: In this zone (orange) also, the above normal mean temperature category has the highest probability(at 55%).

Zones III: In this zone (light cyan), the normal mean temperature category has the highest probability (at 40%), while above and below normal temperature categories have equal probabilities (30%).

Zones IV: In this zone (blue), the below normal mean temperature (i.e., cooler) category is most likely at 45%.

Note: The numbers for each zone indicate the probabilities of rainfall/temperature in each of the three categories, above-, near-, and below-normal. The top number (A) indicates the probability of rainfall occurring in the above-normal category; the middle number (N) is for near-normal and the bottom number
(B) for below-normal category. For example, in Zone I in Figure 1, there is 15% probability of rainfall occurring in the above-normal category; 20% probability of rainfall occurring in the near-normal category;

and 65% probability of rainfall occurring in the below-normal category. It is emphasised that boundaries between zones should be considered as transition areas.

6. Precipitation-based Drought Outlook based on Standardized Precipitation Index (SPI)

The SPI is a measure of how dry or wet a region is and is use to characterise meteorological droughts. Figure3 shows the SPI values for 3, 6 and 12 months.

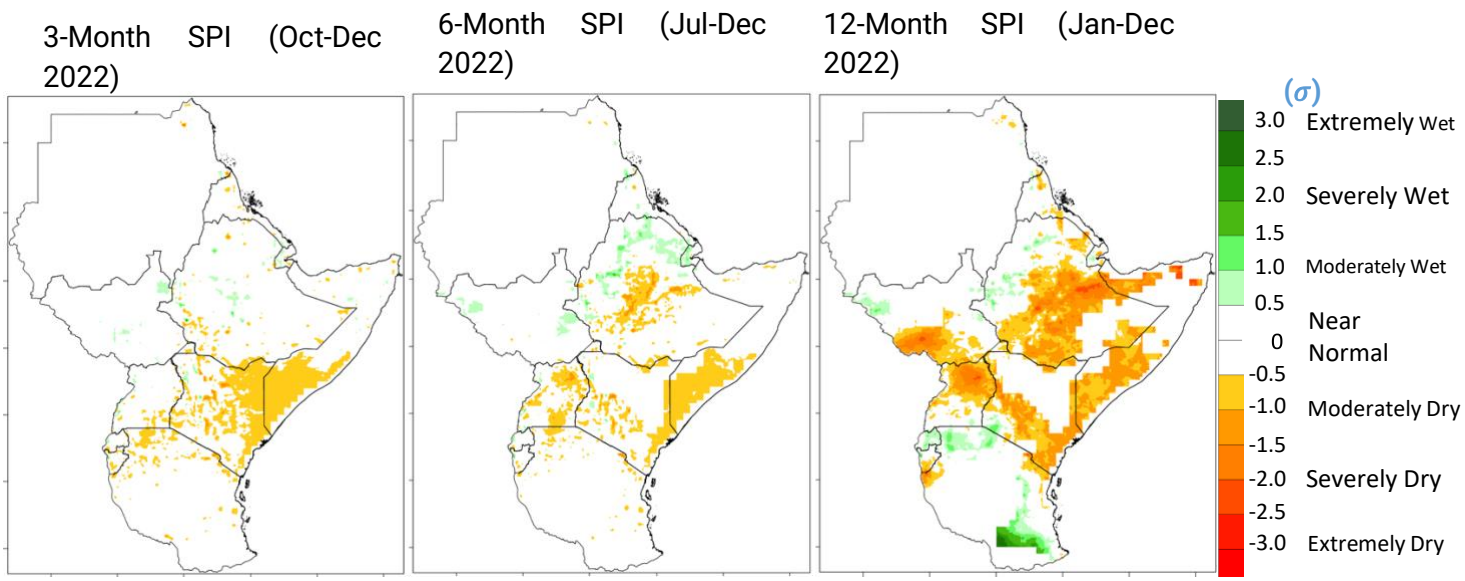

Figure 3: Standardized Precipitation Index (SPI) indicating the extent of ongoing drought conditions over the Greater Horn of Africa based on observation and predicted rainfall for time periods ending on 31 December 2022.The magnitude of the SPI is indicative of the degree of dryness, with values between –1.0 to –1.49 indicating moderate droughts while those below -1.5 indicating severe to extreme droughts.

7. Probability Forecasts of the Start of OND 2022 Season and the Expected Average Onset Dates

The average start dates of October to December 2022 season and their probability outlook are provided in Figure

4. The forecast was processed using daily rainfall forecasts from 5 Global Climate Models (ECMWF, Météo-France, CMCC-Italy, DWD-Germany, ECCC-Canada) obtained from the C3S Climate Data Store.

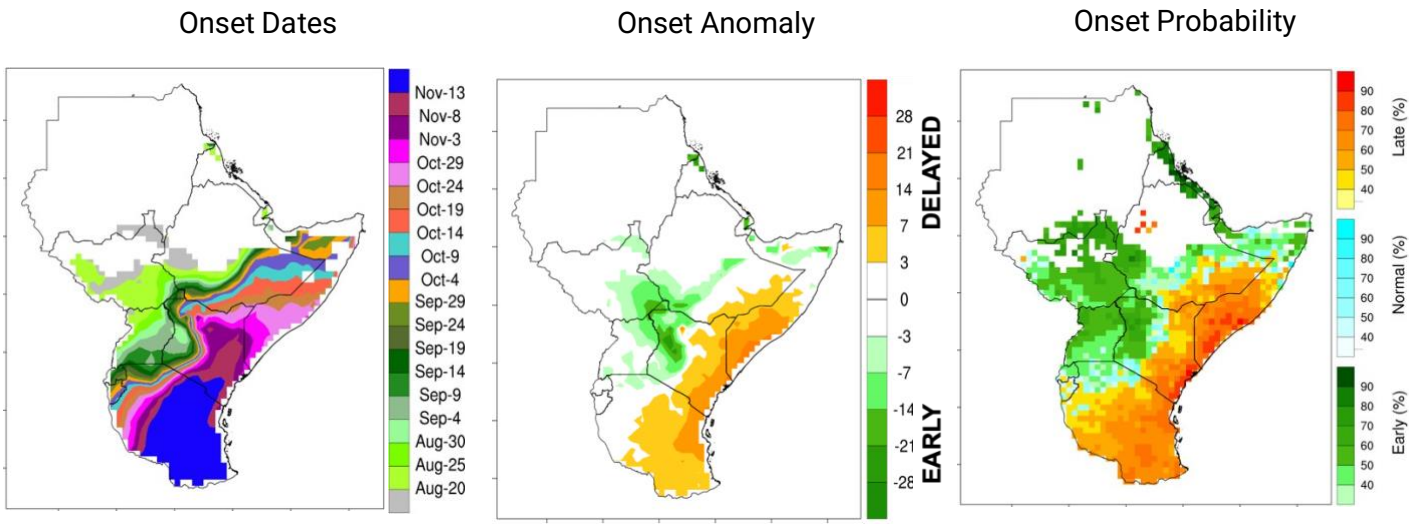

Figure 4: The map on the left indicates the expected rainfall onset dates from model ensemble mean values. The middle map shows the onset date anomaly (days), and the map on the right indicates the probabilities of the start of the rainfall season in each of the three categories, early-, normal-, and late.

Contributors

GHACOF 62 was organized jointly by the IGAD Climate Prediction and Applications Centre (ICPAC) and National Meteorological and Hydrological Services (NMHSs) of the Greater Horn of Africa (GHA). The forum was supported by the ClimSA and CONFER projects funded by the European Union, the SCII project funded by the Swedish government, and by the AICCRA project funded by the World Bank. Contributors to the regional climateoutlook included representatives of NMHSs from GHA countries (Institut Géographique du Burundi, Météorologie Nationale de Djibouti, Ethiopia Meteorological Institute; Kenya Meteorological Department, Rwanda Meteorological Agency, South Sudan Meteorological Service, Sudan Meteorological Authority, Somalia Meteorological Service, Tanzania Meteorological Agency, and Uganda National Meteorological Authority) and climate scientists as well as other experts from national, regional, and international institutions and organizations (ICPAC, UK Met Office, and WMO Global Producing Centres).

List of Participants

Physical

Online