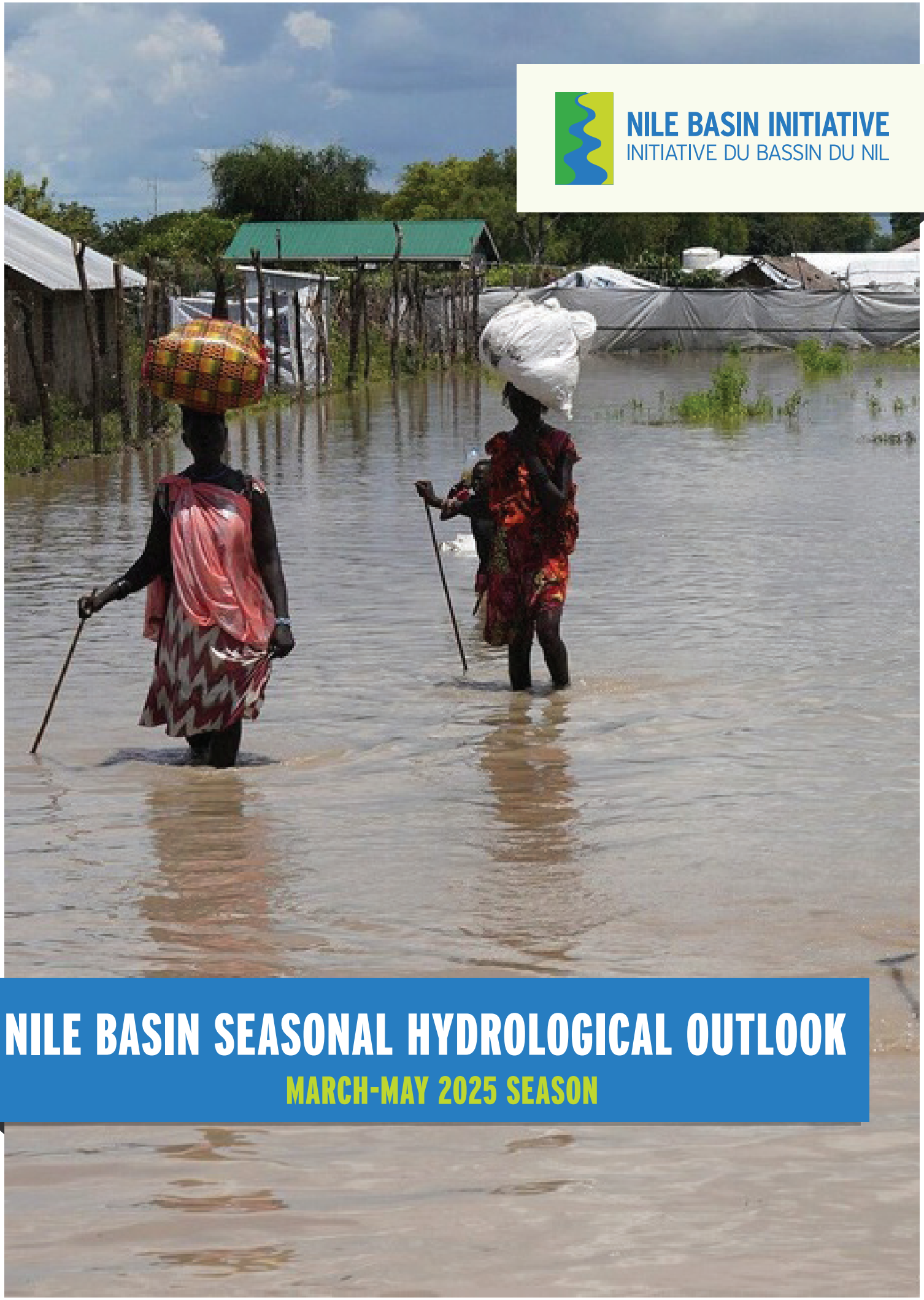

NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

NILE BASIN SEASONAL HYDROLOGICAL OUTLOOK

MARCH-MAY 2025 SEASON

1. FORWARD

Dear Partners and Stakeholders,

It is with great pleasure that I present to you the Nile Basin Hydrological Outlook for the period of March, April, and May (MAM) 2025 Season. As always, this outlook serves as a vital tool for informing Member States, water users, national planners, regulators, water resource management, agriculture, energy generation, and decision-making across the Nile Basin region.

The Nile Basin continues to face significant challenges in managing its water resources amidst growing demands, climate variability, and changing patterns of rainfall and hydrological extremes. This hydrological outlook offers a critical assessment of anticipated rainfall and streamflow conditions, enabling countries within the Basin to better prepare for the upcoming MAM season. By leveraging these insights, we aim to provide early warning information to mitigate potential risks and enhance collaboration to ensure the optimization and sustainable use of the Nile's water resources for all.

We acknowledge the importance of cooperation among the Nile Basin countries in managing these shared resources. The Nile Basin Initiative (NBI) remains committed to strengthening governance, information sharing, regional integration, fostering collective solutions, and providing the necessary data, tools and information to support resilience to climate shocks and hydrological extremes in the basin.

We encourage all stakeholders to make use of this hydrological outlook, integrating its insights into national planning processes, and continue working together with resilience toward a prosperous and sustainable future for the Nile Basin.

I would like to extend my gratitude to all the partners and Nile Basin Regional Expert Working Group (REWG) on Hydrology, who have worked diligently to prepare this Outlook. Your continued support and dedication are critical in building a resilient the Nile Basin.

Thank you and I look forward to continued collaboration in advancing our shared objectives.

Sincerely,

Dr. Florence Grace Adongo
Excutive Dirctor
Nile Basin Initiative

2. TABLE OF CONTENT

1. INTRODUCTION

The Nile River Basin is one of the most significant and vital river systems in the world, supporting over 300 million people, agriculture, and ecosystems across northeastern Africa. The basin encompasses eleven riparian countries of Burundi, Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, South Sudan, Sudan, Tanzania, and Uganda, making it the longest river system in the world, with a length of around 6,650 kilometers. The river system is of unparalleled social, historic and economic importance in the region for both upstream and downstream nations. The basin is formed by three principal streams- the White Nile- the headstreams of which flow into Lakes Victoria, Kyoga and Albert, the Blue Nile, Baro-Akobo-Sobat and the Tekeze-Setit-Atbara which flow from the highlands of Ethiopia. However, the river basin is extremely sensitive to changes in meteorological forcings such as precipitation and evapotranspiration with variations impacting both river flows and lake levels. This alternating hydrological imbalance often results in hydrological extremes, mostly flood and drought in some part of the basin with significance impacts to lives and livelihood.

There are three distinct rainy seasons in the Nile Basin. March-April-May (MAM) and October-November-December (OND) are long and short rainy seasons respectively in Nile Equatorial Lake (NEL) region. June-July-August-September (JJAS) is a rainy season characterizing the Eastern Nile covering the regions of the Ethiopian highlands. Therefore, MAM is a key season in the basin, as it signals the onset of seasonal rains in the equatorial and central parts of the basin, with significant hydrological implications for river flows and lake levels both upstream and downstream. Therefore, monitoring and forecasting the meteorological and hydrological variables of the river system and providing early warning information plays a critical role in the reduction of risks by providing timely, reliable and actionable river flow and lake level information that allows the vulnerable communities to prepare in time and optimize on the extremes.

The IGAD Climate Prediction and Applications Centre (ICPAC) released the climate outlook for March-April-May (MAM) 2025 season at the 69th Greater Horn of Africa Climate Outlook Forum (GHACOF 69) on 21st January 2025 in Addis Ababa, Ethiopia. The outlook predicts wetter -than-normal and drier than normal conditions in some parts of the basins. Based on the outlook, the Nile Basin Regional Expert Working on Hydrology – Flood Advisory - convened an expert workshop on 22nd and 23rd January 2025 in Addis Ababa Ethiopia and analyzed the implications of the ICPAC's released climate outlook on the Nile Basin hydrology and its impacts on water resources availability, irrigated agriculture and food security, energy and transport and probable disaster risk.

Therefore, this report presents an assessment of the previous outlook and analysis on the implication of MAM 2025 Climate Outlook on the Nile Basin's hydrology and anticipated impacts on lives and livelihoods, water resources, irrigated agriculture and food security, energy and transport sectors as well as disaster risk. It also provided specific recommendations and advisories to guide Member States and agencies in the planning and strategic response that enhances benefits and reduces the risk of hydrological disasters in the basin.

2. PERFORMANCE OF THE OCTOBER-DECENBER 2024 SEASON

Both the NEL and Eastern Nile regions are highly sensitive to climate variability. The OND season is a critical short rainy season in the Nile River Basin for the NEL region with significant impact on the basin's hydrology. During this time, the rivers and lakes are expected to increase in levels and volume due to the increased rainfall over the catchments and lakes. In the same period, the Eastern Nile rivers and lakes experience return to normal flow levels, as reduced rainfall in the Ethiopian highlands leads to lower runoff. However, the flow of the Main Nile is predominantly influenced by climate patterns in the Ethiopian highlands, as changes in runoff from the Equatorial Lakes are largely moderated by the Sudd marshes in northern South Sudan and southern Sudan

2.1 Climate

The OND climate outlook issued by ICPAC at the 68th GHACOF held on the 20th August 2024 in Nairobi Kenya predicted increased likelihood of drier conditions in the Eastern Nile (EN) due to the declining rainfall and wetter-than-normal condition in the Nile Equatorial Lakes region due to the predicted increased rainfall in most parts of the region (Figure 1). Warmer than normal conditions were predicted in most parts of the basin, especially the areas of Lake Tana and Tekeze Setit Atbara region. Above normal rainfall was predicted in western Kenya, northern Uganda, southeastern and upper eastern part of South Sudan Some parts of southern Ethiopia were expected to experience drier conditions, potentially exacerbating water shortages and impacting agricultural productivity. Conversely, western parts of Ethiopia were likely to receive increased rainfall.

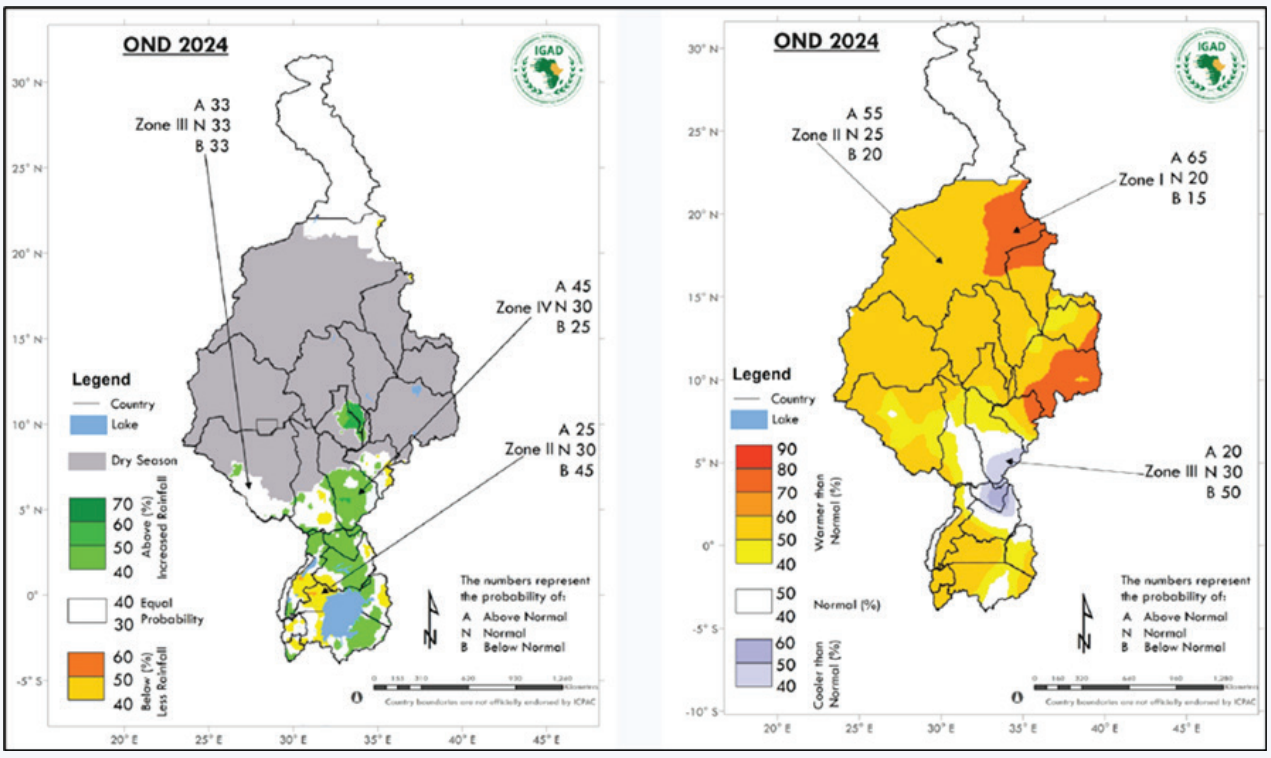

Figure 1: Nile Basin Climate conditions as were expected in October-November-December (OND) 2024

2.2 Hydrology

Following the wetter-than-normal conditions which were in most parts of the NEL, the river inflows to Lake Victoria were expected to increase and peak from the third week of November to first week of December due to the increased rainfall in the sub-basins of the region. The Figure 2 below provides the observed water level and river flow information confirming the predictions

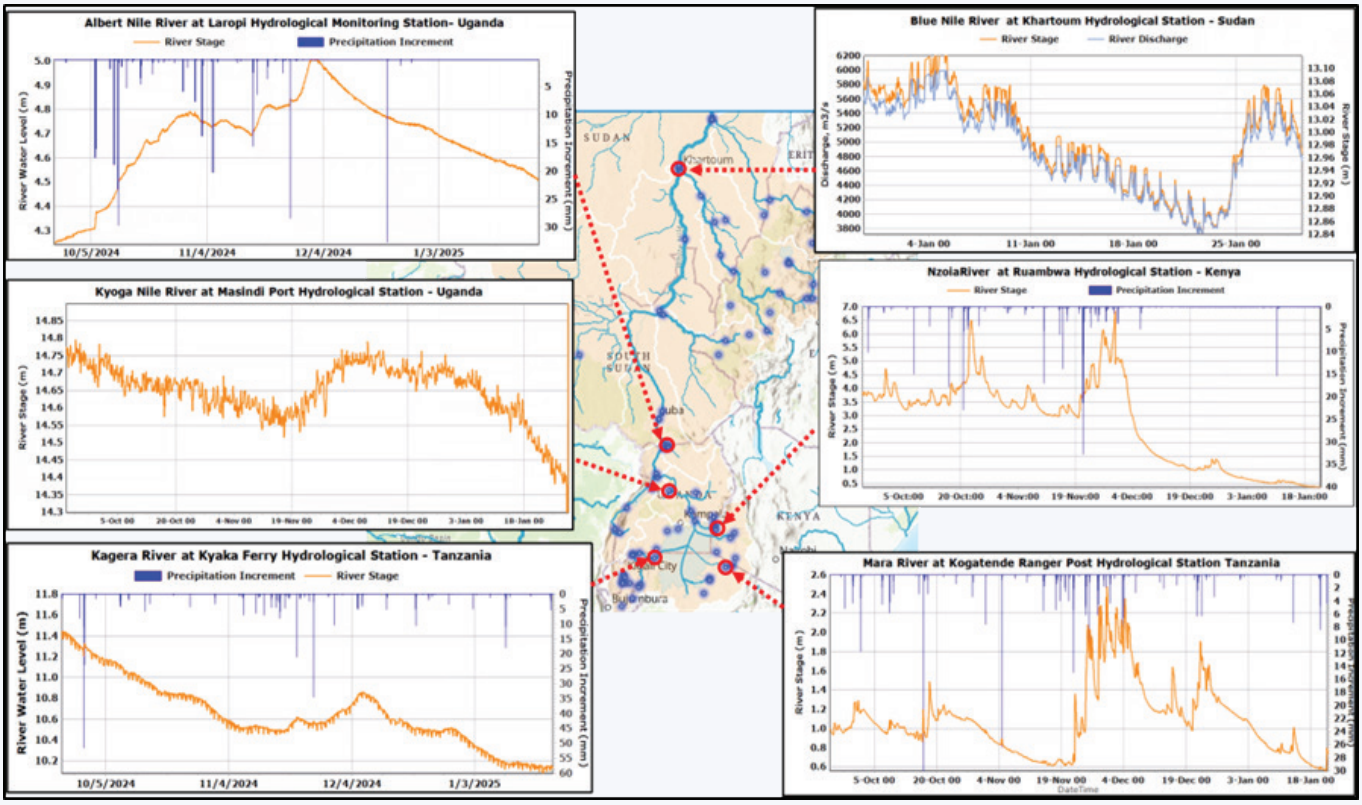

Figure 2: Observed River level and flow during the OND 2024 season

Also, the combined river inflow and direct rainfall over the lake were expected to increase in the lake levels in the NEL region with the peaks in December 2045 sustained to early January 2025. The observations from the Nile Basin Regional Monitoring Stations indicated that the NEL lakes peaked differently in December 2024 but did not exceed the previous levels with decline commencing in December 2024 through January 2025. Comparing the levels of Lake Victoria with the observed historical record indicates that OND 2024 remains the second highest record after OND 2020 lake levels for OND season (Figure 3) with the historic maximum of 13.72m recorded in MAM 2024

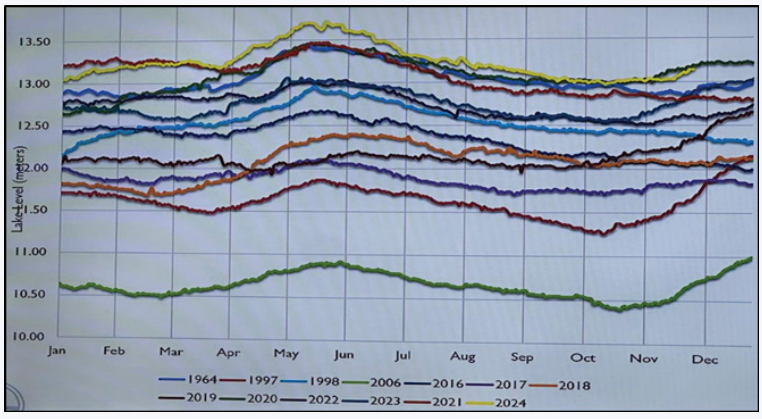

Figure 3: Observed levels of Lake Victoria in MAM and OND 2024

Comparing the predicted and observed maximum lake levels reveals convergence for Lake Victoria and Lake Kyoga. However, significant deviation was observed for Lake Albert with a deviation of about 4m, an aspect that could be attributed to volume-area-elevation curve in the model (Figure 4).

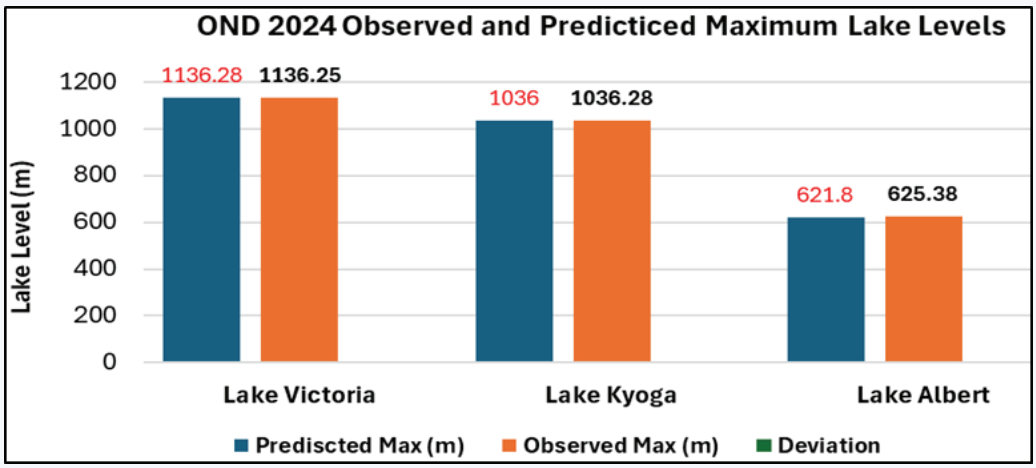

Figure 4: Comparing the observed and predicted lake levels for Lake Victoria, Albert and Kyoga

2.2.1 Nile Basin Flash Flood Forecasting System

The Nile Basin Flash Flood Early Warning System (NB-FFEWS) is a web-based system that provides near real time and forecast information on the occurrence of flash flood to enhance preparedness and resilience of communities within the basin(https://flashfloodalert.nilebasin.org/).Early warning information from the NB-FFEWS supports the National Meteorological and Hydrological Services in the Nile Basin Member States for effective flash flood early warnings in flash flood prone areas (Figure 5 and Figure 6). This improves disaster management efficiency at local, national and regional levels hence reducing the risk of Flash flood related disasters. The early warning information is disseminated daily via email with 48 hours lead time through the existing National dissemination channels.

During the OND season, flash floods occurred less frequently and with lower severity than forecasted and observed during the MAM 2024 season. In October, flash flood events were forecasted in the Baro Akobo Sobat Sub basin on October 28th in the areas of Meti Chafi - Gambela Region, Gado, Sidama and Afarara in Ethiopia (Table 1). In the 22nd- to 25th of November, flash flood events were forecasted in the NEL region in the areas of Bunda, Mara region, Nyamadoke, Mwanza, Bugulula, Geita, Biharamulo, Kagera in the Lake Victoria basin part in Tanzania, more events forecasted in Karenga - Nothern Uganda, Okutoi Amuria - Eastern Uganda, Amalera, Katakwi, Eastern Uganda, Agama, Agule, Soroti- Eastern Uganda, Obekai, Pallisa - Eastern Uganda, Emaribule, Alebtong, Nothern Uganda. Similarly, flash flood events during the same week were forecasted in Juba, Central Equatoria, Didinga and Larim - Eastern Equatoria in Bahr el Jebel in South Sudan. In Kenya, during the same week, flash flood events were forecasted and occurred in the areas of Bahati and Kaplegetet, Soin Ward, Nakuru in Nakuru, Shabaltarangwa Olposimoru and Olposimoru ward in Narok.

Therefore, it is recommended that early warning information from the NB- FFEWS is disseminated timely and effectively through existing national channels to save lives and property since flash floods occur very fast, leaving catastrophic impacts.

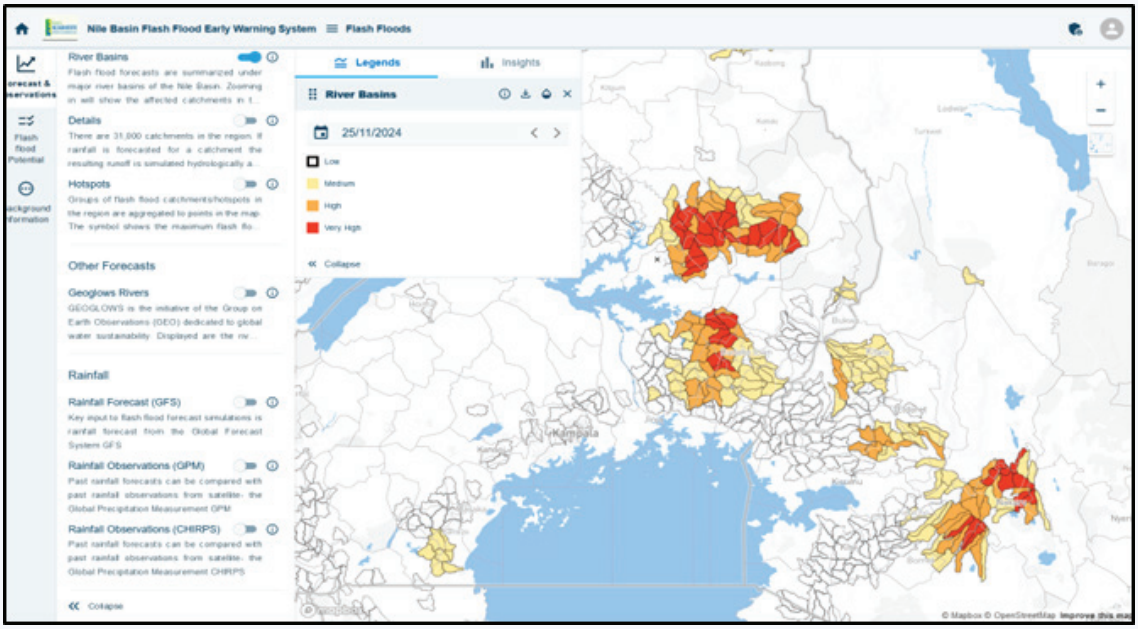

Figure 5: Screen shot from the Nile Basin Flash Flood early warning system with locations of forecastedw flash floods on 25-26 November 2024.

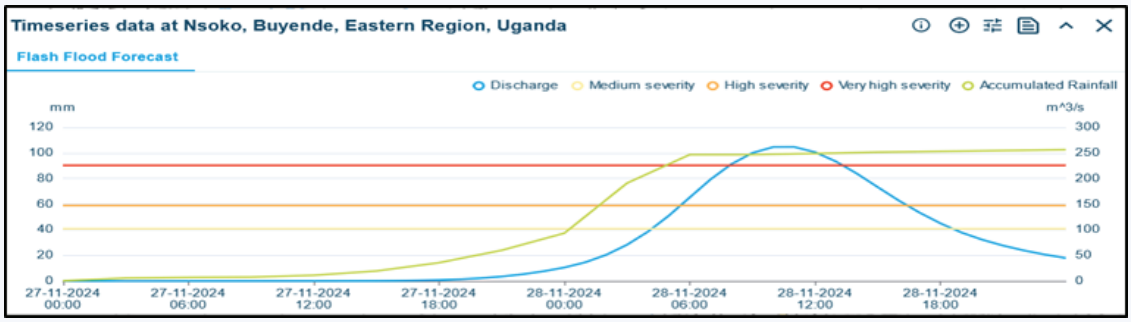

Figure 6: Hydrograph showing time and magnitude of predicted flash flood on morning of 28th November 2024 at Nsoko, Buyende, Eastern Uganda.

Table 1: Observed flash flood locations during the OND 2024 Season

Date of Flash-Flood	Location of Flash Flood Occurrence	Subbasin	Country
19/10/2024	Shabaltarangwa Olposimoru, Narok	Lake Victoria	Kenya
19/10/2024	Leisuswon, Tinet ward, Kuresoi- Nakuru	Lake Victoria	Kenya
28/10/2024	Meti Chafi - Gambela Region	BAS	Ethiopia
28/10/2024	Gado, Sidama	BAS	Ethiopia
28/10/2024	Afarara, Sidama	BAS	Ethiopia
22/11/2024	Bunda, Mara region	Lake Victoria	Tanzania
22/11/2024	Mulo Buswaga Lubero North Kivu	Lake Albert	DRC
23/11/2024	Jupayanga , Pakwach, North West Uganda	Lake Albert	Uganda
23/11/2024	Tidwer Nebbi North West Uganda	Lake Albert	Uganda
23/11/2024	Torit, Eastern Equatoria	Bahr el Jebel	South Sudan
24/11/2024	Various locations	NEL region	Uganda
24/11/2024	Gambella	BAS	Ethiopia
25/11/2024	Karenga - Nothern Uganda	NEL region	Uganda
25/11/2024	Juba, Central Equatoria	Bahr el Jebel	South Sudan
25/11/2024	Didinga &Larim - Eastern Equatoria	Bahr el Jebel	South Sudan
25/11/2024	Okutoi Amuria - Eastern Uganda	Kyoga Basin	Uganda
25/11/2024	Amalera, Katakwi, Eastern Uganda	Kyoga Basin	Uganda
25/11/2024	Agama, Agule, Soroti- Eastern Ug	Kyoga Basin	Uganda
25/11/2024	Obekai, Pallisa - Eastern Uganda	Kyoga Basin	Uganda
25/11/2024	Namutumba Eastern reagion	Kyoga Basin	Uganda
25/11/2024	Emaribule, Alebtong, Nothern Uganda	Kyoga Basin	Uganda
25/11/2024	Nyamadoke, Mwanza	Lake Victoria	Tanzania
25/11/2024	Bugulula, Geita	Lake Victoria	Tanzania
25/11/2024	Biharamulo, Kagera	Lake Victoria	Tanzania

3.0 MARCH- MAY 2025 OUTLOOK

The 69th GHACOF statement released by ICPAC on 21st January 2025, indicated a wetter-than-normal conditions is expected over north-eastern Uganda, western Kenya while a drier than normal conditions would be expected over Rwanda, Burundi, western Uganda, north-western Tanzania while the rest of the Nile basin, near normal conditions are expected.

3.1 Climate Outlook

MAM is a major rainy season for the Nile Equatorial countries of Burundi, DR Congo, Kenya, Rwanda, Tanzania and Uganda. Wetter-than-normal conditions are predicted over the equatorial and southern Greater Horn of Africa (GHA) covering western Kenya, eastern Uganda, around Lake Victoria, south-eastern Ethiopia and eastern and northeastern part of South Sudan (Figure 7). In similar period, a drier-than-normal conditions will be expected over northeastern Ethiopia, western Uganda, most parts of Rwanda and Burundi, western South Sudan, Sudan and Egypt. The temperature forecasts as shown in enhanced temperature above the seasonal average over most of the Nile basin, with the downstream sub basins of the Main Nile, Blue and White Nile and the Tekeze-Atbara-Setit having the highest probability.

In March wetter-than-normal conditions were expected over most parts of the equatorial & southern GHA, except for SW South Sudan & central Ethiopia. In April, a wetter-than-normal conditions over most parts of the equatorial and southern GHA, except for south-western of South Sudan & central Ethiopia while in May, a drier-than-normal conditions is anticipated in parts of southern Ethiopia, Kenya, Somalia, western South Sudan, Uganda, Rwanda, Burundi.

In May drier-than-normal conditions are anticipated in parts of southern Ethiopia, Kenya, Somalia, western South Sudan, Uganda, Rwanda, Burundi.

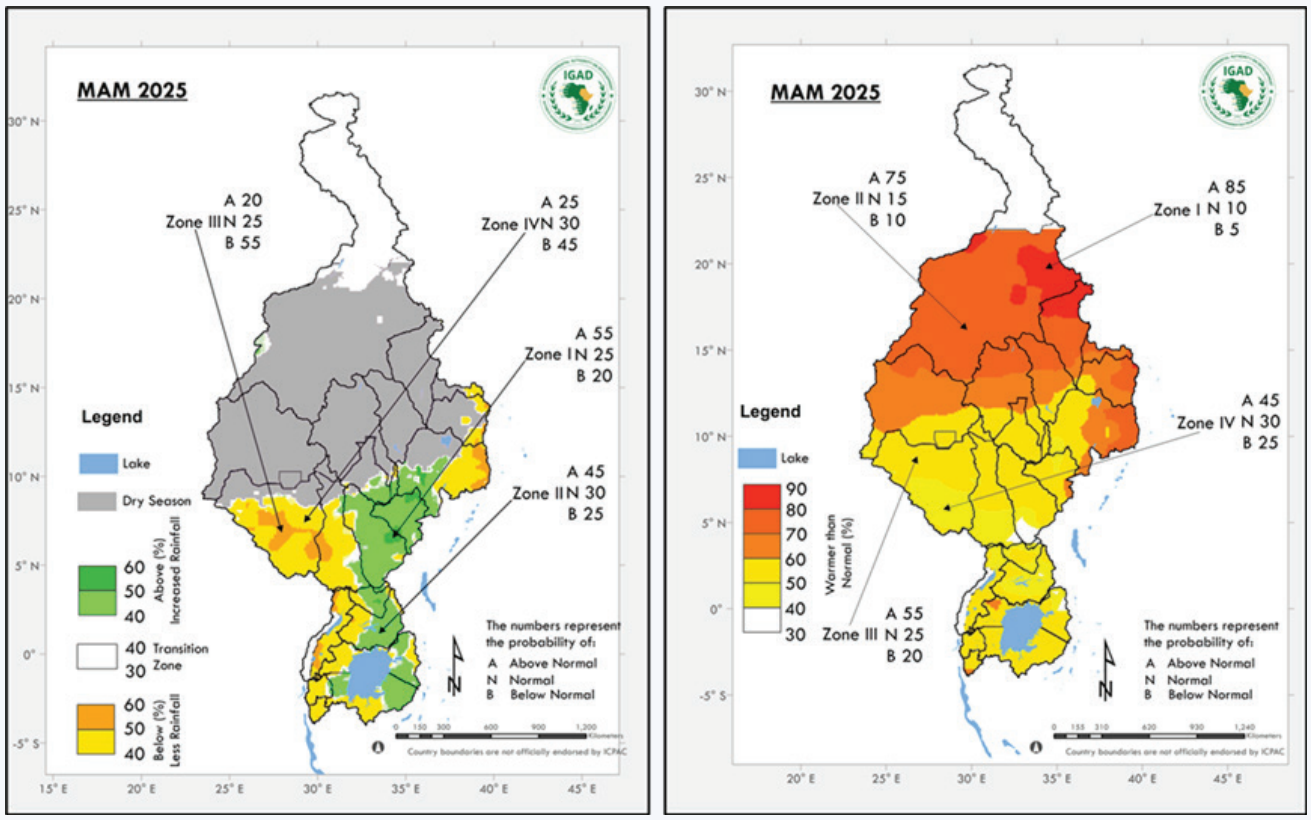

Figure 7: Nile Basin Climate Outlook for MAM 2025- Rainfall and Temperature.

Lake Victoria, Victoria Nile, Baro-Akobo-Sobat and some parts of Upper and Lower White Nile sub basins are forecasted to receive near to above normal rainfall with monthly variations are predicted in which a drier than normal conditions expected in March while wetter than normal conditions expected in April and May. Also noted that Rainfall over Lake Victoria is also projected to be higher than rainfall over the Lake Victoria Sub-basin (Figure 8) hence more influence on the lake levels.

Lake Albert and Semilik sub basins are expected to receive near normal to below normal rainfall in the MAM season with only April expected to be near normal conditions. While the MAM is not the main rainy season, the Bahr el Ghazaal and Bahr el Jebel are expected to receive below normal rainfall (Figure 9). No significant rainfall is expected for the rest of the Nile sub basins; Bahr el Ghazel, Blue Nile, Tekeza Atbara and Main Nile, in the MAM season.

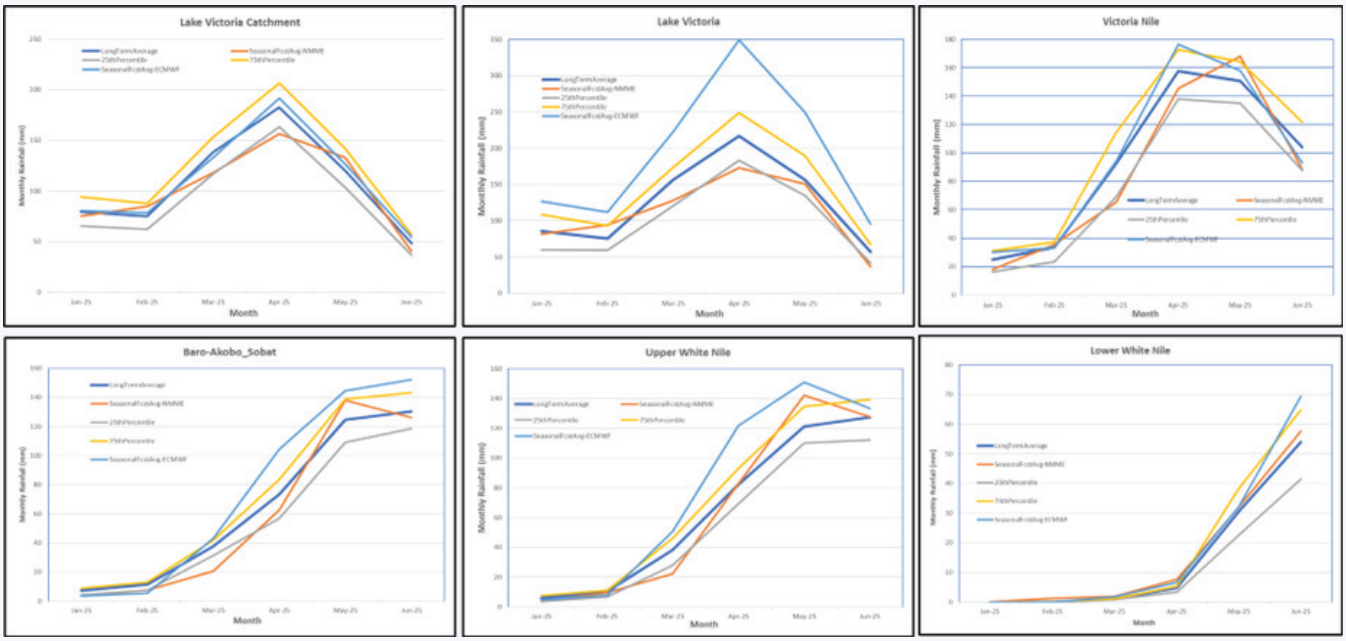

Figure 8: Sub-basins with Near to-above normal rainfall in MAM 2025

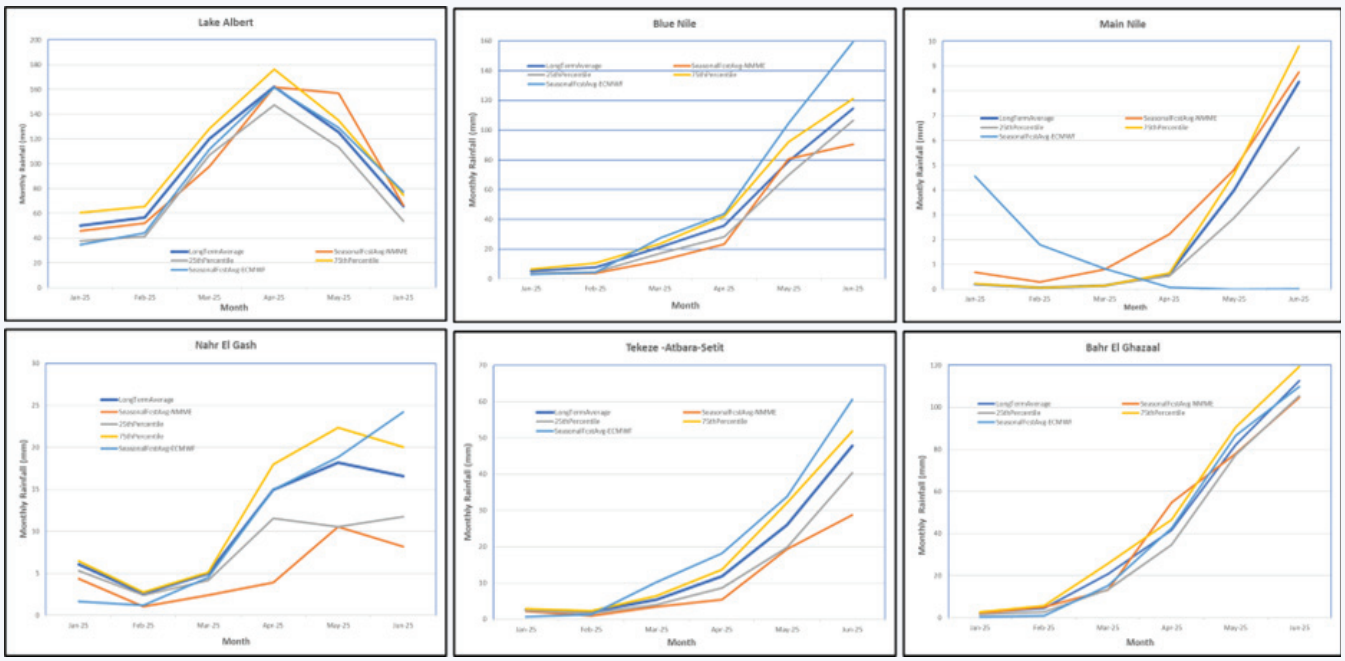

Figure 9: Sub-basins with Near to-below normal rainfall in MAM 2025

3.2 HYDROLOGICAL OUTLOOK

The climate outlook has significant implications for river hydrology, influencing various aspects of river flow, lake levels, water availability, and ecosystem health. Here are several key ways in which projected climate outlook is most likely to impact the hydrology of the Nile Nile River Basin

3.2.1 Impacts on river water levels and flows

The rivers flowing into the Lake Victoria and Lake Kyoga area are expected to register near to above normal flows in response to the expected above normal rainfall. Therefore, incidences of flooding are expected along the lower reaches of rivers such as Ruvubu in Burundi, Akagera in Rwanda, Mara, Ruvuvu and Kagera in Tanzania and Nyando, Nzoia, Mara, Nyando, Gucha-Migori in western Kenya. Sustained high flows are also still expected in the Bahr el Jebel as due to above normal rainfall experienced over Lake Victoria and Kyoga and Albert catchments in OND 2024 season. In contrast the flow of the Blue Nile and Tekeze Atabara are expected to be on a continuous decline due to the drie condition expected in MAM. However, the area of Belg eastern highlands of Abay, Tana, Tekeze and BaroAkobo basins receive a small amount of rainfall hence help the farmers to prepare the land for the JJAS rainy season.

3.2.2 Impacts on the Lakes

The impact of river flows and rainfall on lakes and reservoir levels and discharge is a key component of the hydrological dynamics of the Nile River Basin. These factors play a crucial role in maintaining or altering the water balance in the lake, influencing its storage, outflows, and ecosystem. Leveraging on the Uganda Electricity Generating Company Limited's ODSS system, Lake Victoria level is forecasted to peak at 1136.35m above mean sea level in the last week of May 2025 (Figure 10) with estimated safe release or discharge of about 1,760 cms. The immediate impact on Lake Kyoga and Albert were still unknown, however, minimal impact is expected compared to MAM 2025

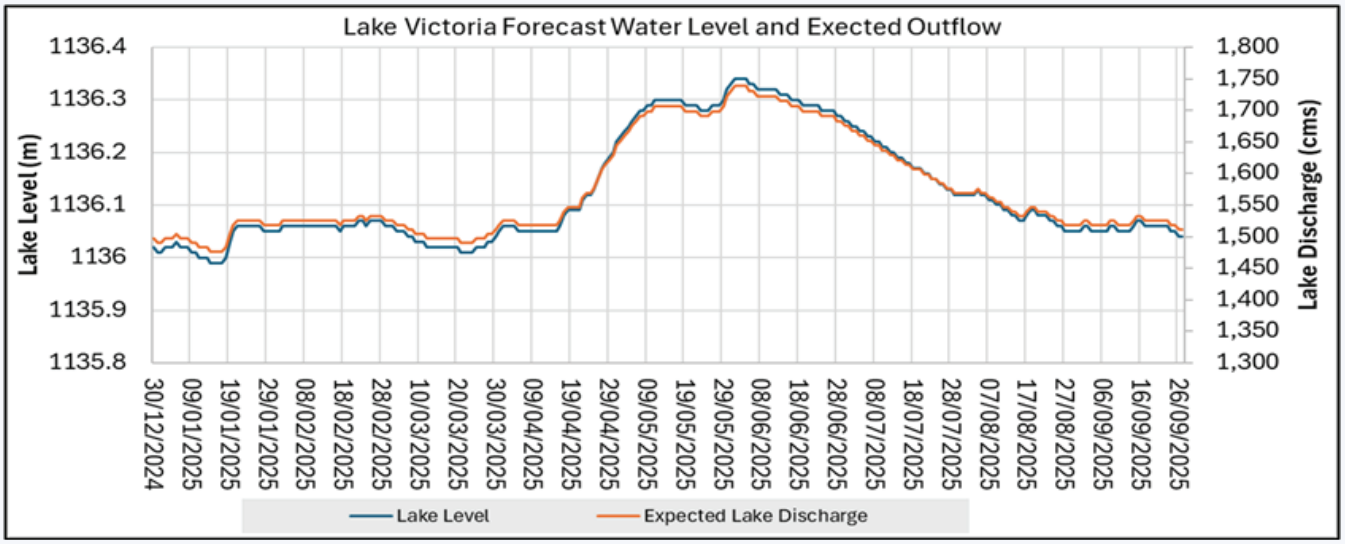

Figure 10: Predicted levels and discharge for Lake Victoria for MAM 2025 Season

In the EN sub-basins, water levels in lakes, dams and reservoirs are of enhanced storage with steady decline from the experience of the JJAS season when the storage was of full capacity. The drawdown on the lakes and reservoir levels are expected to continue through MAM 2025 with recovery expected to start in JJAS 2025

4.0 COUNTRY OUTLOOK AND IMPLICATIONS

The Nile River Basin is transboundary in nature with eleven riparian states sharing the same water resources supporting lives and livelihoods to over 300 million people in the basin. This section provides a summary of current situations and implications of the projected climate and hydrological outlook in the Nile Basin Member States for the MAM 2025 Seasonal.

4.1 Burundi

Burundi has a surface area of 27,834 km2 of which about 48% is within the Nile Basin hence constituting 0.4 percent of the basin drainage area (Figure 11). The annual rainfall varies between 850mm and 1,600mm with an average mean rainfall of 1,100mm. The low-land areas of Burundi are sometimes affected by floods during heavy rains. The flood prone areas include the shorelines of Lake Tanganyika, Rweru and Cohoha and some parts of the small streams and rivers such as Ruvyironza, Rusizi and Ruvubu rivers.

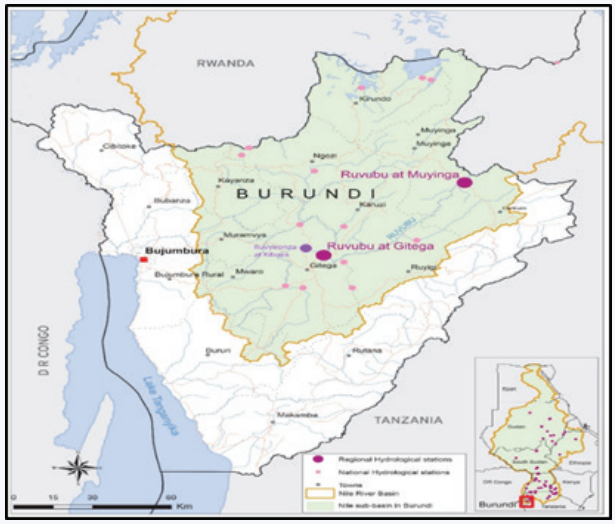

Figure 11: Burundi Nile Basin

4.1.1 Performance of the October -December 2024 Season and Impacts

OND is one of the two rainy seasons in Burundi. Above normal categorized was expected in most parts of Burundi and the observations also indicated that except the north-east which was in deficit as also expected. There was agreement between the forecast and observation as indicated in Figure 12es. Given below normal to near normal condition expected in OND 2024 season, the following key points and actions are necessary for consideration.

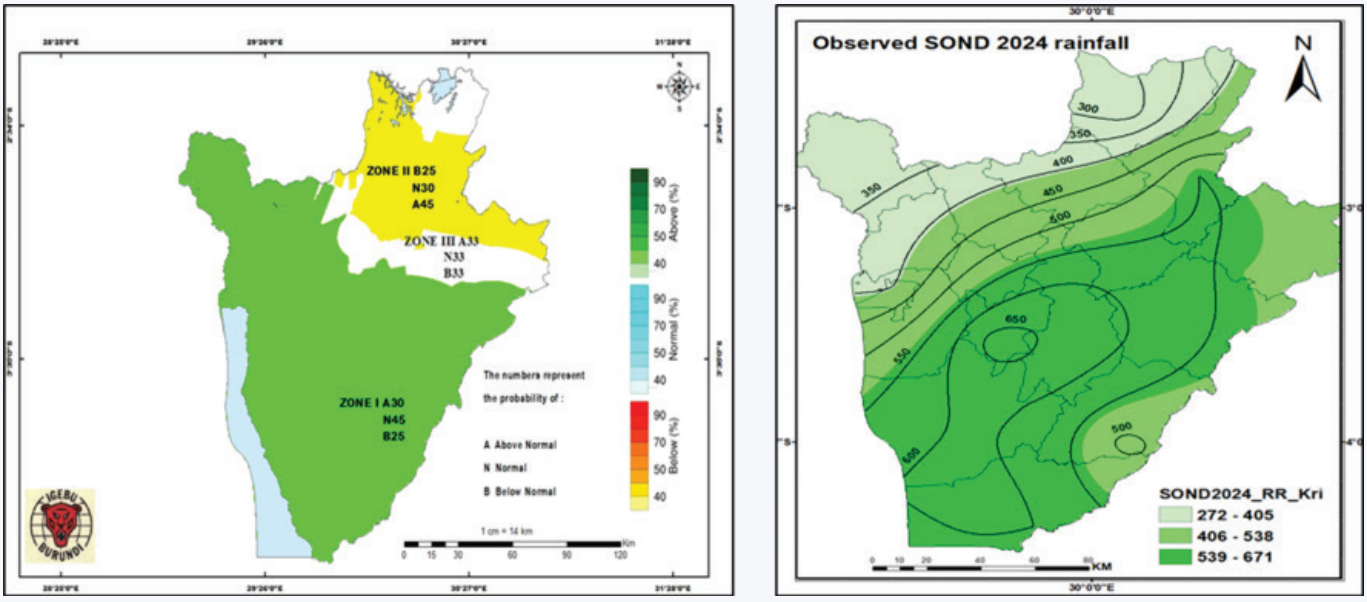

Figure 12: Forecasted vs Observed rainfall in Burundi for OND 2024

During the period of OND, it was expected that the levels of river and lakes were expected to increase due to the above normal rainfall that was expected

The situation is best explained by the observed flows in Ruvubu River which drains water from Burundi to the Nile Kagera with highest flow of 180cm3/s as recorded 28th December 2024 at Gitega hydrological station in Burundi (Figure 13).

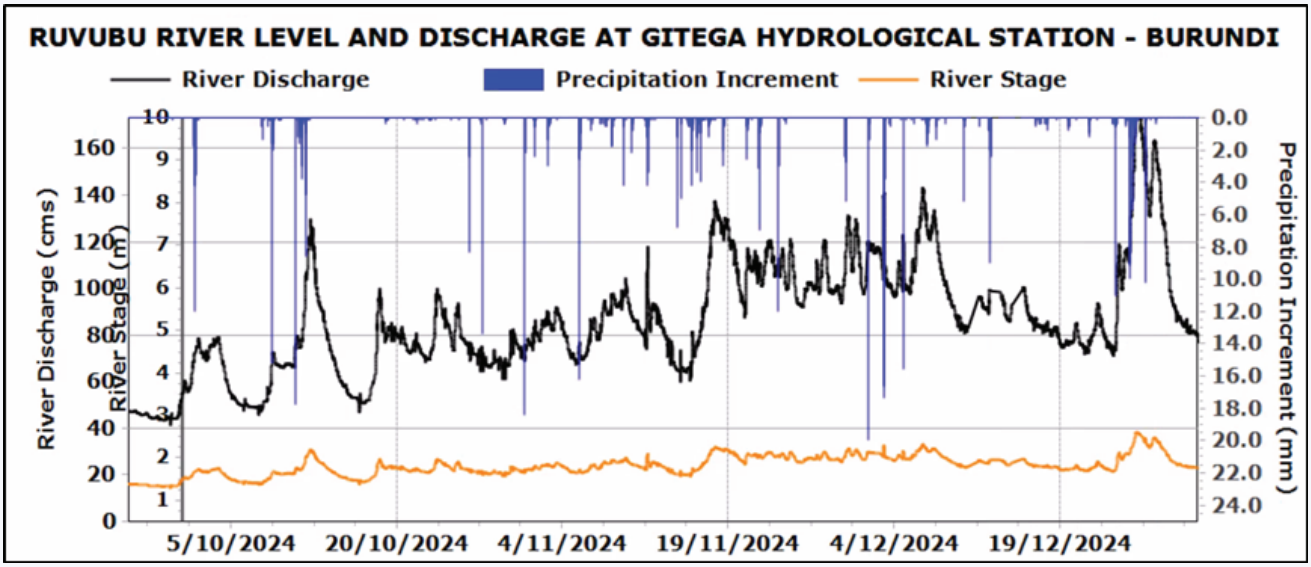

Figure 13:Observed River level and discharge for Ruvubu River at Gitega regional hydrological station in Burundi MAM 2025

Both positive and negative impacts were observed in different sectors. In Agriculture, good rainy conditions were observed, and so good crops production is prospected. The short rain season and high river flows ensured adequate water resources availability for competing uses such as irrigation, domestic water supply and ecosystem services. It was also observed a stable hydropower production in the Energy sector. However, the floods also occurred in similar periods in the areas of Gatumba, Nyaburumbi and Rusumo which caused the displacement of hundreds and tens of people.

4.1.2 March -May 2025 Outlook and Implications

The seasonal forecast for March to May (MAM) 2025 published by the Geographical Institute of Burundi (IGEBU) indicated that for the period from March to May 2025 commonly called IMPESHI will be characterized by normal rainfall with a tendency towards excess in the regions of Mugamba, Buyenzi, part of Mirwa, Bututsi and Imbo in Burundi. However, the areas of Kirimiro, Moso, Bweru, Bugesera and Buyogoma are projected to experience normal rainfall with a tendency towards deficit. The implications of the near to above normal and near to below normal include:

i. Agriculture - water stress for soil in areas with dry conditions, low production crops and so the food price could increase.

ii. Due to the rainfall of the previous season, this situation will not have any impact on the availability of water in reservoirs and dams. On the other hand, there would be no serious flooding in the rivers that were normally observed during this period.

iii. No impact expected on infrastructure and transport

iv. Possibility of hunger in some regions.

The key recommendation for Burundi is to raise awareness among farmers so that they can prepare their fields early and cultivate short-lived plants and those that are resistant to low rainfall. There is a need to enhance monitoring and identify the most highly affected areas for targeted interventions.

4.2 DR Congo

The Democratic Republic of the Congo is a country in Central Africa with a land surface area of 2.3 million km2. The Country is drained mainly by Congo river. About 1% of the country drains to the Nile River Basin constituting about 0.7% of the Nile basin area. Despite the small part of the Nile Basin, the impact of the climate and hydrology is still considerable as it shares borders with five other NBI Member States (Burundi, Rwanda, South Sudan, Uganda, and Tanzania). The shared water resources of Lake Albert, Lake Edward between DR Congo and Uganda are vital for both countries and support lives and livelihood of several communities. The Lake Edward monitored from Ugandan side at Katwe Hydrological Station indicated that lake levels increased from 2.2m in the beginning of October 2024 to about 2.44m by end of December 2024 representing minimal increment (Figure 14).

However, limited data and information were available to generate meaningful analysis and information on the outlook of the Nile DR Congo.

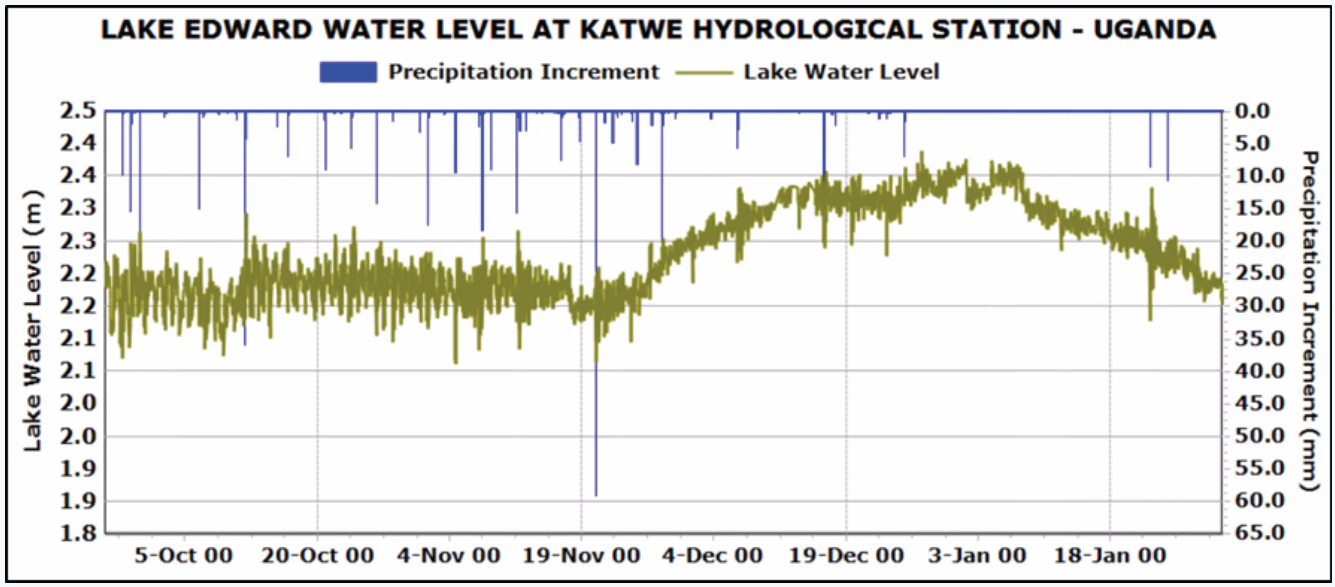

Figure 14: Lake Edward observed water level at Katwe hydrological Station in Uganda

4.3 Ethiopia

Ethiopia is a landlocked country located in the Horn of Africa region of East Africa with a land surface area of about 1.1 million square kilometres of which about 33% is within the Nile Basin constituting about 12% of the basin area. The Blue Nile known as Abbay, Baro Akobo, Mereb and Tekeze are the main rivers draining to the Nile River (Figure 15). Abbay is the source of the Blue Nile. It accounts for 20% of Ethiopia's land area, for about 50% of its total average annual flows which emanate from the Ethiopian highlands

The rivers of the Abbay basin contribute on average about 62 percent of Nile River flows. Together with the contribution of Baro Akobo and Tekeze rivers, Ethiopia accounts for at least 85% of the flows to the Nile River.

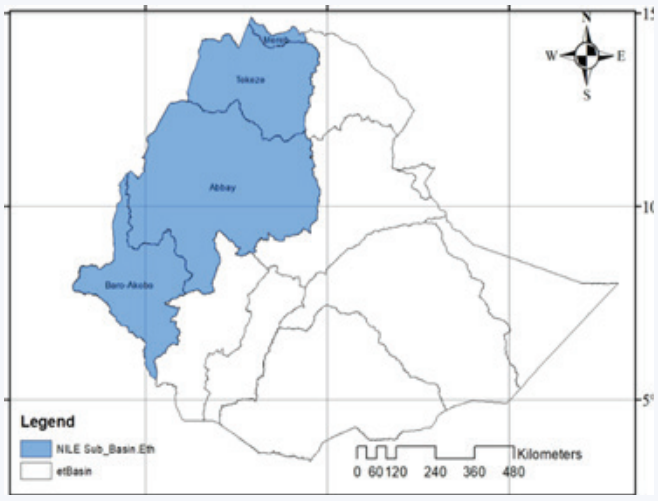

Figure 15: Nile Basin -Ethiopia Map

4.3.1 Performance of the OND 224 Seasonal and Impacts

OND is the dry season for Ethiopia hence no rainfall was expected except in the October and November where the areas of the Baro, Abay, Tekeze and Mereb basins which receive extended rain from the JJAS rainy season. However, starting from December most of the country becomes dry. It is harvesting time for farmers. Figure 16 shows the observed rainfall for October, November and December 2024.

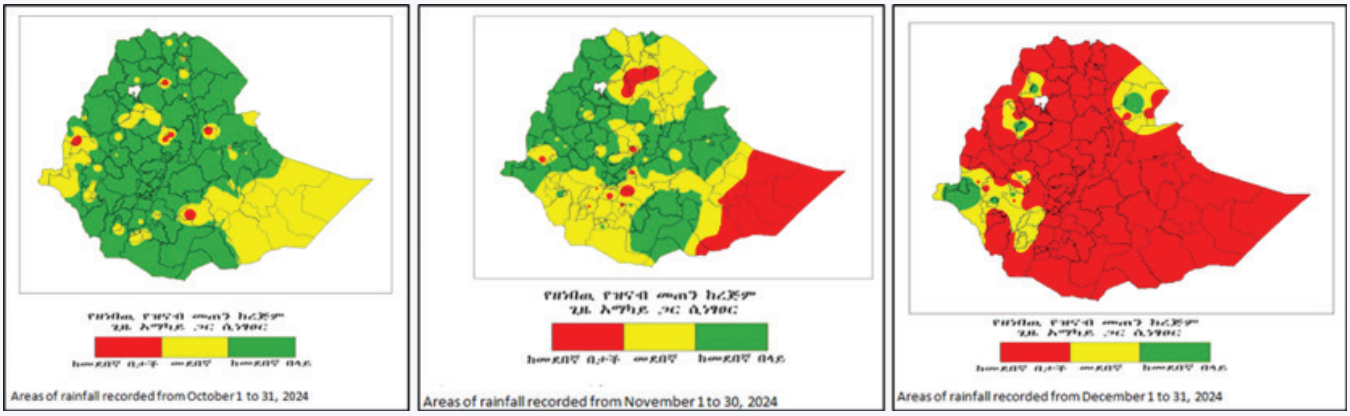

Figure 17: Recorded rainfall in OND 2024 in Ethiopia (Source: EMI)

In Lake Tana sub basin and Baro Akobo basin, the Rib River overflowed in the South Gondar Zone, damaging farmland and livestock. In Gambella, floods displaced over 28,000 people and disrupted education and healthcare services. (Source: UN OCHA Reports). Loss of lives and livelihoods experienced during the October period due to significant rain around the Lake Tana sub basin with recorded flooding on one of the tributaries and on Baro river.

All major dams and reservoirs recorded good inflow and storage during the JJAS 2024 season. However, most storage has been on a steady drawdown during the OND 2024 season but with sustained storage in all the reservoirs and dams adequate to last till the next rainy season.

4.3.2 March-May 2025 Outlook and Implications

MAM is a short rainy period for the eastern and central part of Abay, Tekeze basins and Baro Akobo Basin. The rainfall supports early crop planting in Belg-dependent areas. It helps to recharge water bodies and groundwater reserves in areas receiving rain. It also helps for relief for pastoralist areas as pastures regenerate. Flash floods risk may occur in areas prone to heavy early rains. It needs a follow-up climate update provided by the regional and national organizations. The anticipated implications include.

i. The season is dry, and it would be good for harvesting crops and other agricultural products. On some part of the country there was small rainfall recorded it helps for the let farming.

ii. Attained adequate storage during the JJAS season in all the dams and reservoirs for the use of hydropower, irrigation and water supply and good groundwater recharge. However, efficient usage must be adhered to in all the sectors.

iii. With sufficient storage in JJSAS in most hydropower reservoirs, an adequate amount of hydropower generation is almost guaranteed for MAM 2025 season.

iv. Expected decreased river flows and drying of seasonal water sources, reliance shifts to reservoirs and groundwater recharged during the rainy season hence efficient management of water resources needed for irrigation and drinking water.

v. Residual moisture supports some grazing for livestock, but fodder scarcity may begin to emerge hence the need supplement.

4.4 KENYA

Kenya is located in the Horn of Africa region of East Africa with a land surface area of about 583,370 square kilometer with about 8% in the Nile River Basin representing 1.5% of the basin drainage area as part of the Lake Victoria basin in Kenya (Figure 17). The major rivers in Kenya draining into Lake Victoria are Nzoia, Mara, Nyando, Sondu-Miriu and Gucha-Migori. Lake Victoria serves as a primary source of food and income for many people living along its shores due to its vast fisheries, it provides vital transportation routes between various towns along the shoreline as well as Kenya and neighboring countries. The lake also plays a significant role in regulating the local climate, making it a crucial part of the Kenyan economy and ecosystem.

Figure 17: Nile Basin-Kenya

4.4.1 Performance of the OND 2024 Season and Impacts

The Kenya Meteorological Department (KMD) climate outlook for October-November-December (OND) 2024 indicated a likelihood of above average rainfall in the Lake Victoria basin. It was observed that many parts of the western Kenya received moderate to heavy rainfall in the months of October, November and December 2025.

Increased river flows within the Lake Victoria basin was observed as anticipated with flooding of adjacent low-lying areas whereas the lake level was also expected to remain high. The observed river trends for the season are shown in Figure 18, Nzoia, Yala, Nyando, Sondu-Miriu and Gucha-Migori regional monitoring stations recorded increased flow which surpassed the flood alarm thresholds on various days in the months of November and early December.

About 3,500 people were displaced due to the overflow at lower reaches of Nzoia, Nyando, Yala, Sondu and the shoreline streams

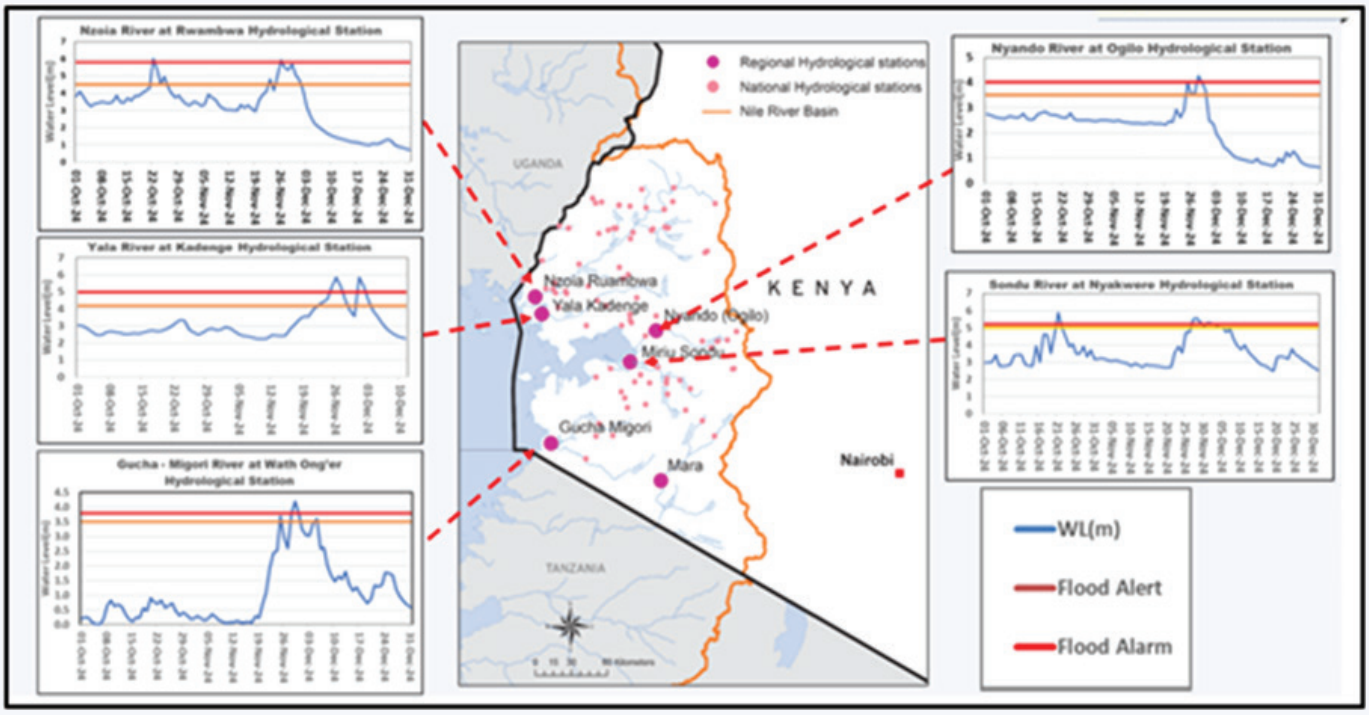

Figure 18: Observed River levels compared to flood levels in Nile Kenya

4.4.2 March - May 2025 Outlook and Implications

The Kenya Meteorological Department (KMD) forecast for MAM 2025 season indicates a near average to above average rainfall over the Lake Victoria basin (Figure 19). The affected Counties include Siaya, Kisumu, Homa Bay, Migori, Busia, Narok, Bomet, Kisii, Nyamira, Kericho, Nandi, Kakamega, Vihiga, Elgeyo Marakwet, Uasin Gishu, Trans Nzoia and Bungoma. The onset of the rains will be in February 2025 and is expected to continue throughout the MAM season. Warmer than average temperatures are expected over the basin.

As such, rivers within the Lake Victoria basin (Nzoia, Yala, Nyando, Sondu, Gucha Migori, Mara and the shoreline streams) are expected to have increased flows leading to flooding of adjacent low-lying areas. The most vulnerable areas include lower Nyando downstream of Ahero town; shoreline streams such as Nyamasaria, Luanda and Ombeyi; Lower Sondu at Nyakwere; Lower Gucha Migori at Nyatike; Lower Yala downstream of Nyadorera market and the Yala Swamp; and Lower Nzoia around Rwambwa and Budalangi among others. Flash floods are expected within the urban areas and towns while the river mouths and lake shoreline areas will remain inundated

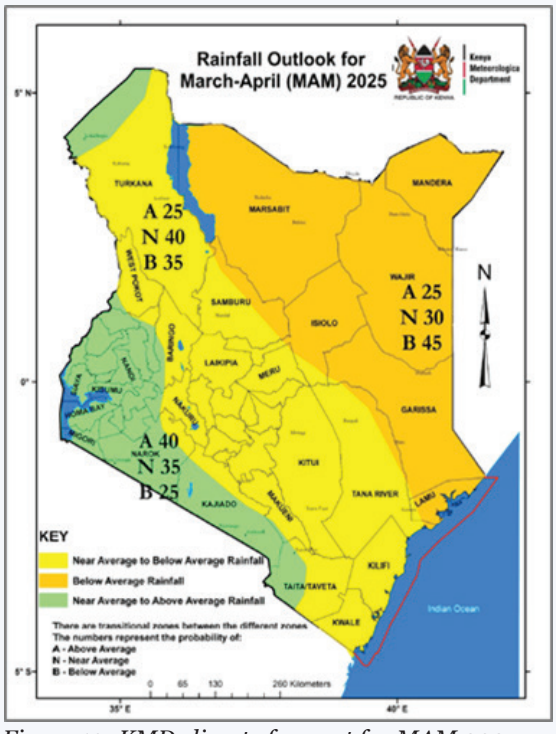

Figure 19: KMD climate forecast for MAM 2025

Both positive and negative impacts are expected in Agriculture, Water Resources, Infrastructure and transport, Energy, Health and Tourism sectors.

i. The MAM is the main planting season within the Lake Victoria basin in Kenya. Farming activities include both cash crops like tea, sugarcane and coffee as well as subsistence crops like maize, beans, sweet potatoes etc. With the anticipated wetter-than-normal-conditions, better crop yields are expected. Good pasture is also expected during this period. However, there is a likelihood of crop destruction or inundation by the flood waters.

ii. Sustained available water resources for competing uses are anticipated as well as enhanced groundwater recharge. The flood waters may contaminate the open water sources and wells thereby compromising the potability with increased likelihood of water born diseases.

iii. The anticipated flooding in some areas will have negative impact on infrastructure and transport in the following ways: (i) Many parts of the basin will be inaccessible due to destruction of roads and also overtopping or destruction of Bridges;(ii) Monitoring stations could be destroyed by the floods; (iii) destruction and inundation of irrigation infrastructure (Ahero and Lower Gucha Migori) (iv) Submerging and destruction of Water Supply intakes.

iv. Lives and livelihoods -Displacement of population by floods within the flood prone areas of the basin is expected.

v. Many schools within the flood plains of Nyando, Sondu, Gucha Migori and Nzoia may be affected by the floods thus interfering with the term calendar.

vi. Optimum Hydroelectric Power generation at Sondu Miriu, Gogo and other small hydroelectric power plants within the basin.

vii. Maasai Mara and Ruma Game reserves may be

inaccessible due to floods in the period of MAM hence reduced revenue flow from tourism.

Recommendations and Advisories

The following strategies and advisories were recommended:

i. Prompt Flood Early Warning and Advisories to the Vulnerable Communities in the downstream reaches of Nyando, Yala, Nzoia, Sondu-Miriu and Gucha Migori.

ii. Maintain and rehabilitate the hydrological monitoring network for continuous flow monitoring for updates.

iii. Implement the Disaster Response Plan at the County and National levels.

iv. Counties to unclog and clear drainage systems before the onset of the rain.

v. Repair the dykes at Lower Nzoia and Nyando before the onset of the rains

4.5 RWANDA

Rwanda is in the most upstream part of the Nile Basin with a land surface area of about 26,338 km2 with about 76% in the Nile River Basin representing 0.6% of the Nile Basin drainage area. The Rwandan's hydrographic system is split into two basins divided by the Congo-Nile ridge, with water systems to the west of the ridge flowing into the Congo Basin, whereas those to the east of the ridge discharging into the Nile Basin (Figure 20). The country is increasingly experiencing the impacts of climate change. Rainfall has become increasingly intense, and the variability is predicted to increase by 5% to 10%

Changes in temperature and precipitation and their distributions are the key drivers of climate and weather-related disasters that negatively affect Rwandans. Droughts, floods, and landslides have resulted in infrastructure damage, loss of lives and property, and increased soil erosion and water pollution

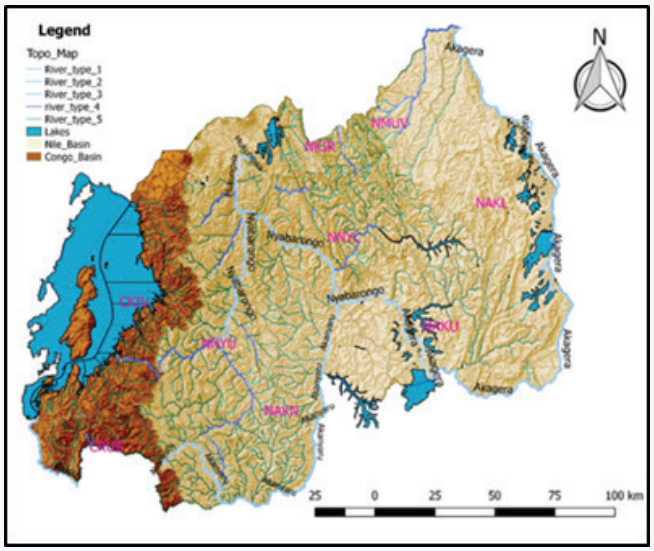

Figure 20: Main hydrographic basins of Rwanda

4.5.1 Performance of the October - December 2024 Season and Impacts

The Climate Outlook for the September to December 2024 season indicated higher chances of Normal rainfall (within the Long Term Average) across the country. However, this season recorded the normal rainfall amount, especially in few parts of Western and Northern Provinces while many parts of the country received the below normal rainfall amount (Figure 21).

Incidences of flash floods were observed at small rivers and gullies due to high rainfall intensity in some areas of North-West of Rwanda. The reported impacts confirm the performance of the OND hydrological outlook (Figure 22).

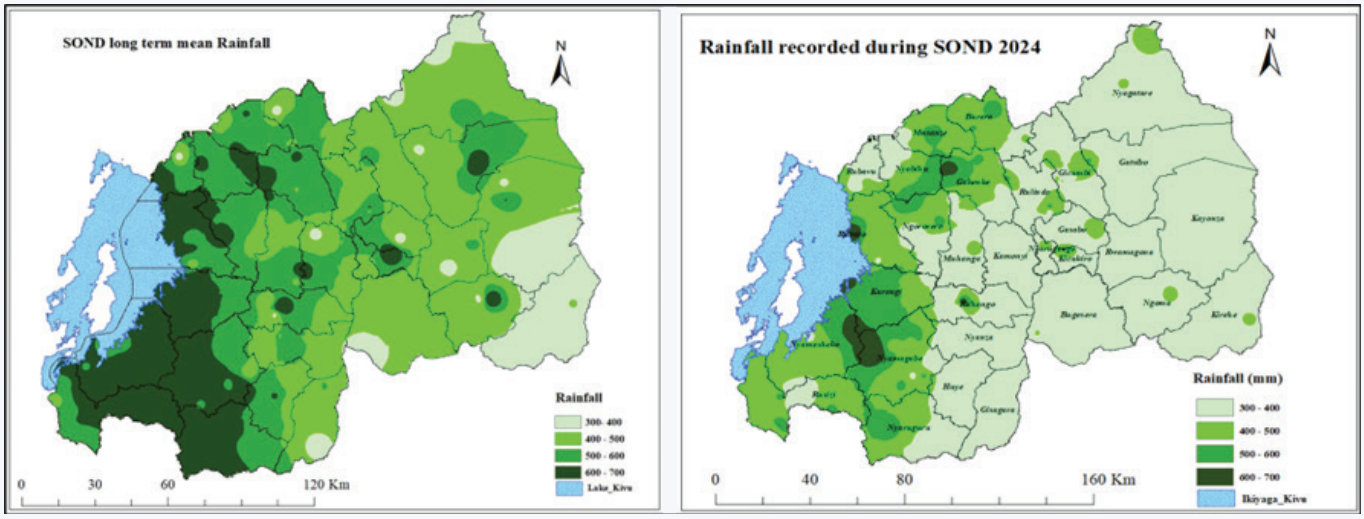

Figure 21: Long Term Average for SOND Vs Observed rainfall

Event	Floods	Heavy rain	Landslides	Total
Number of Incident	14	55	17	86
Deaths	1	1	0	2
Injured	0	10	0	10
Houses Destroyed	0	1	1	2
Houses Damaged	5	60	8	73
Damages in crops (Ha)	57.5	28	4	89.5
Lost Cattle	1	0	0	1
Other Livestock	3	0	0	3
Roads Section	0	0	5	5
Bridges	6	8	3	17

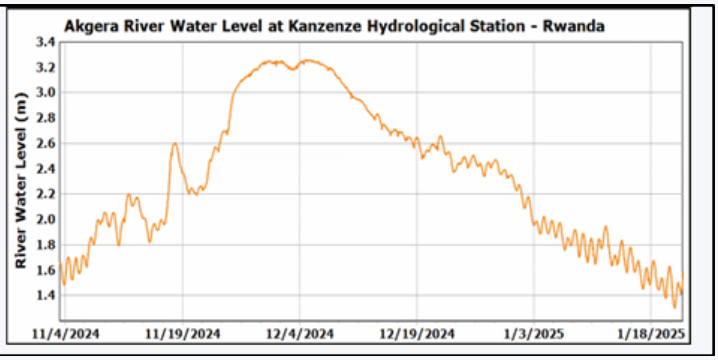

Figure 22: Reported impacts of hydrological disasters and observed Akegera River levels in OND 2024

4.5.2 March - May 2025 Season Outlook and Implications

MAM season is considered the main rainy season in Rwanda. The seasonal forecast for March to May (MAM) 2025 published by the Rwanda Meteorology Agency (Meteo-Rwanda) indicated that the forecasted rains will range between 250-550mm which is slightly below the Long Term Mean rainfall ranging between 250-650mm (Figure 23). However, as MAM in the main rainy season; river flows and water level are expected to increase which may lead to riverine and flash floods in various areas, especially in Western part of Rwanda.

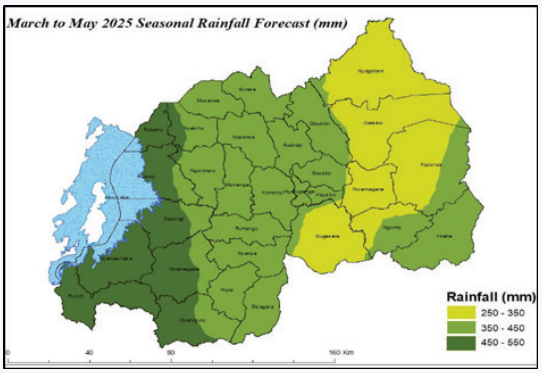

Figure 23: MAM seasonal rainfall forecast for Rwanda

Anticipated Impacts with Locational examples.

i. Damage of crops due to flooding in the croplands.

ii. River floods, water quality deterioration, sedimentation in rivers and dams.

iii. Public and private infrastructure damages and close of traffic

iv. Loss of lives and household displacement especially in flood prone areas.

v. High sedimentation may affect the functionality of hydropower plants water treatment plants.

The following strategies are recommended to reduce the risk of flood related disasters, especially in the Western part of Rwanda:

i. Rwanda Water Resources Board (RWB) should continue monitoring and forecasting river flows for improved early warning information to the vulnerable communities.

ii. Monitoring the status of drainage system performance and improving them to provide safe evacuation of high runoff during heavy rain.

iii. Increase awareness of flood preparedness and mitigation in the communities living around flood hotspots.

iv. Relocate households and properties located in the flood risk zones.

v. Maintain river buffer zones and avoid encroaching them

4.6 SOUTH SUDAN

South Sudan is in the mid-stream part of the Nile Basin covering an area of about 644,329 km2 with about 98% in the Nile River Basin representing 20% of the basin drainage area. The country drainage system consists of four basins namely, White Nile, Bahr El Jebel, Sobat and Bahr El Ghazal (Figure 24). The Sudd wetland, located within Bahr-El Jebel and Bahr El Ghazel basins, is a regionally important hydrological feature in addition to the Machar Marshes in Sobat Sub basin. The country received annual rainfall of 500mm to 1800mm.

Most rivers in South Sudan are transboundary in nature shared with neighbouring countries of Uganda, Sudan, Ethiopia and Kenya. These rivers are monitored by an eighth hydrometric station of which seven are either manual and/or automatic and one is manual. Five hydrological stations have been upgraded into fully functional regional stations under the NBI-Hydromet Project. Additionally, twenty (20) flood emergency gauge stations have been established under the Regional Climate Resilience Program, South Sudan Project to enhance the monitoring and generation of flood early warning information during the 2024 flood season.

The five regional hydrological stations monitor the river flow information at the following locations. The inflow from Uganda to South Sudan is through Bahr El Jebel and is gauged at Nimule and the outflow of River Aswa is gauges at Aswa Bridge on Juba-Nimule Highway while inflow from Ethiopia through Sobat River is gauged at Ankdiar hydrological station. Flow from Bahr-El-Ghazal basin to the Sudd region is gauged at Wau hydrological station. The outflow from South Sudan to Sudan is gauged at Malakal hydrological station.

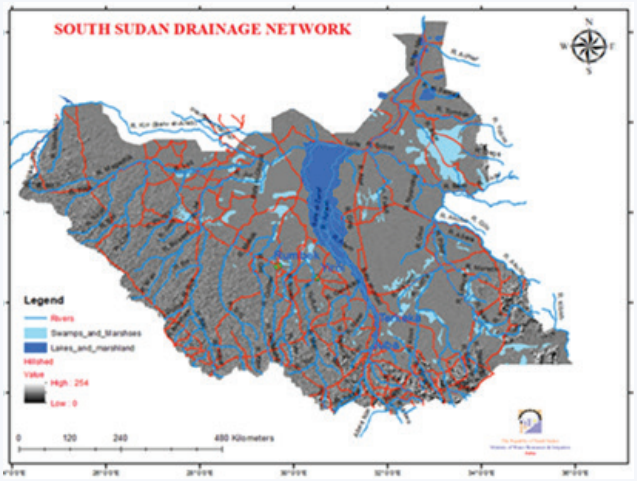

Figure 24: Drainage network in South Sudan

4.6.1 Performance of the October -December 2024 Season and Impacts

Although normal to below normal rainfall was registered for OND, the cumulative impact of JJAS were greatly felt. The OND 2024 was marked as the period in which Bahr el Jebel River water level reached its maximum level in most of the monitoring stations with the measured value at Mangala hydrological station registering a seasonal increase of 1.2m water level above long the term average, (Figure 25). This rise in water level was attributed to the influence on the upstream discharge from Lake Victoria, Kyoga and Albert as a result of above normal rainfall registered in MAM 2024 with normal to below normal rainfall in OND 2024 in South Sudan. It was in this period that for the first time the government of the Republic of South Sudan and partners jointly prepared flood preparedness and response plan for 2024 flood season as was expected.

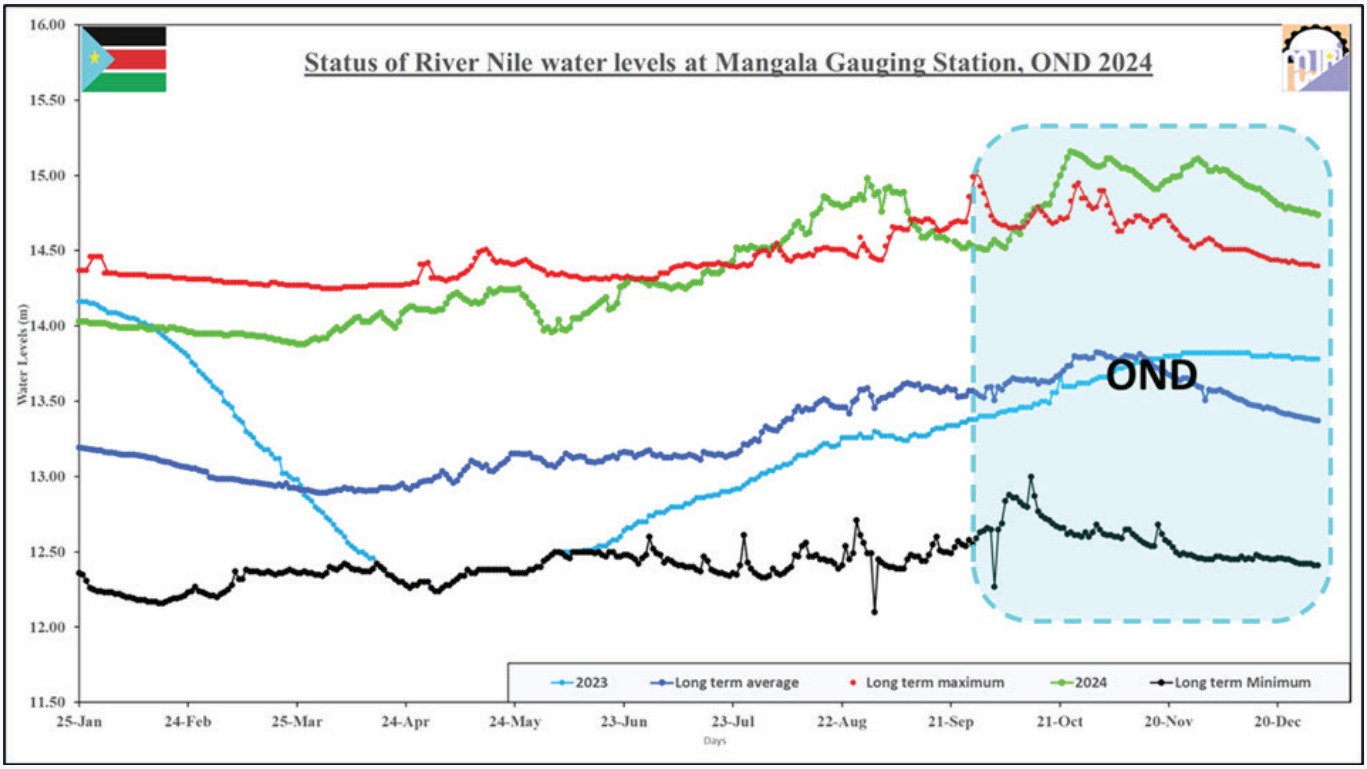

Figure 25: Observed water level in Bahr el Jebel River at Mangalla hydrological station

Daily flow measurements conducted at Mangala station in OND 2024 indicated that the flow increased from 2,490 in the beginning of the season reaching a maximum of about 3000 in the last week of October (Figure 26).

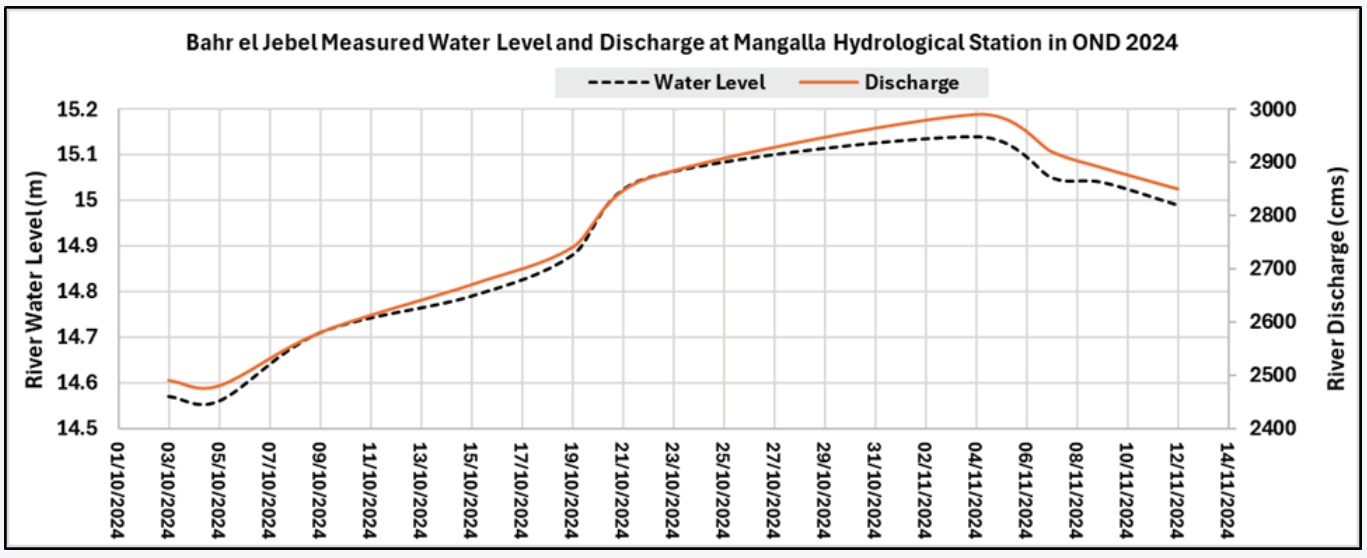

Figure 26: Daily discharge measurement on Bahr el Jebel River at Mangalla hydrological station

The impacts of the OND 2024 season include widespread flooding that affected about 1.4 million people, displacing over 379,000 people with cholera outbreak in at least three states and inaccessible roads (Figure 27). On the positive note however, increased fishing activities and ease of navigation of larger barges were reported

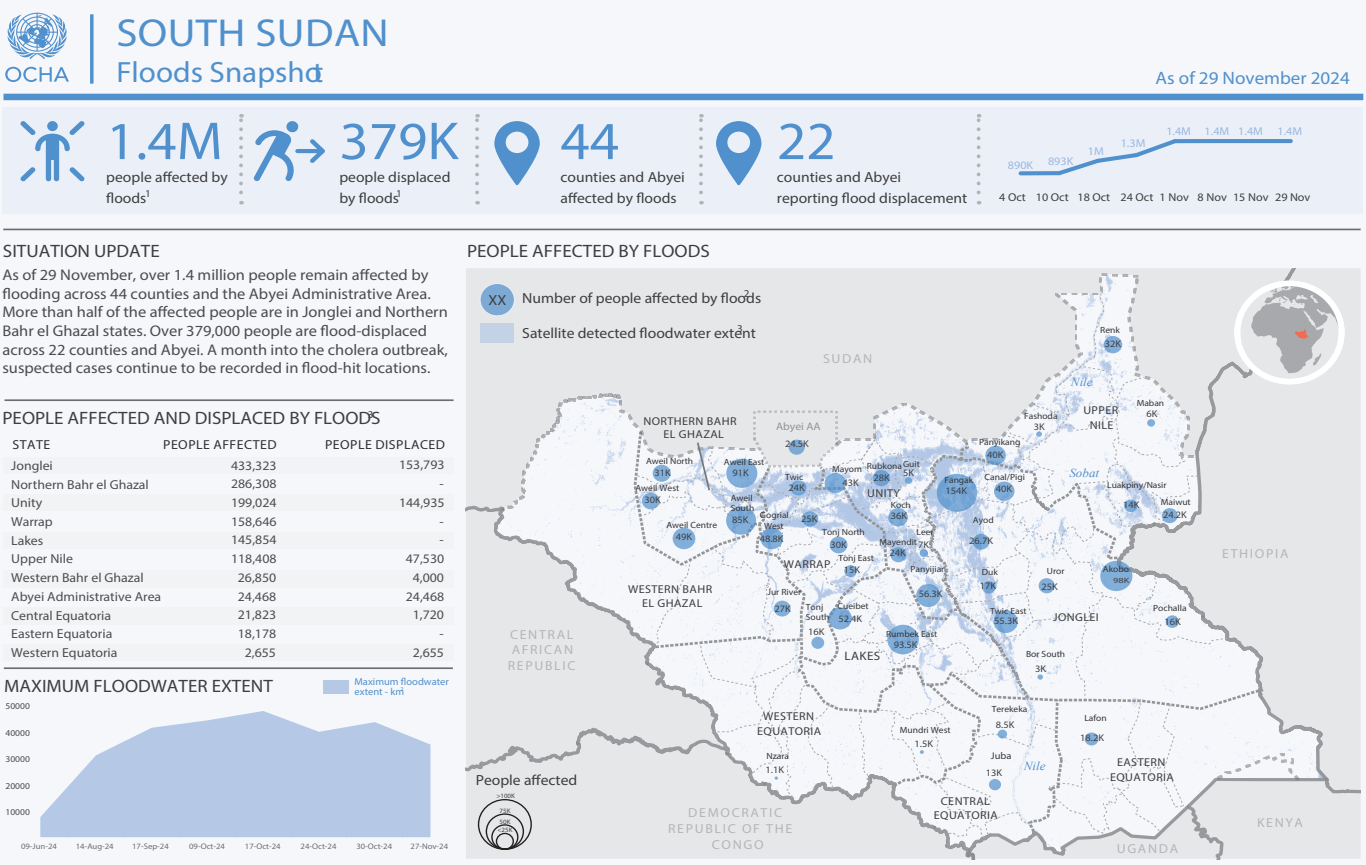

Figure 27: Summary report on the impact of OND flooding in South Sudan (Source-OCHA 2024).

The Ministry of Water Resources and Irrigation (MWRI) implemented the OND 2024 forecast by issuing daily water levels updates shared, primarily via emails, with over 200 hundred users which include humanitarian partners, academia, researchers, climate scientists, other government institutes and the wider public. These updates were reshared via whatsapp, radios and facebook to the whole flood stakeholders in the country

4.6.2 March - May 2025 Outlook and Implications

The MAM 2025 seasonal forecast shows parts of the southeast of the country are expected to receive normal to above normal rainfall while temperatures are forecasted to be hotter than usual. Generally, MAM is not the main rainy season and currently the status of water levels in most rivers are declining. Nonetheless, the high-water levels in the NEL region may also elevate water levels in the Nile section of South Sudan during MAM 2025. However, the anticipated impacts include;

i. Cholera outbreak in Upper Nile, Bentiu and Central Equatoria state

ii. Inaccessible roads in Warrap, Upper Nile, Jonglei and Unity States

iii. More Inundated farm and pasture lands will be reclaimed

iv. Reduced river depth and flows may affect navigation from juba to Bor and Upper Nile and resources availability to other competing users

v. Reduce fishing and navigation activities of bigger barges due to lowering of flood waters

vi. High temperatures may cause heat waves leading to the closure of schools and other learning institutes.

Recommendations and Advisories for MAM 2024

i. Enhanced collaboration among National Mete-

orological and Hydrological Services (NMHSs), disaster management authorities, media houses and partners in generation and/or dissemination of flood early warning information in the country for early preparedness for action plan.

ii. Continuous monitoring of water levels and reviewing forecasts given that the flow in South Sudan is driven by activities in upstream NEL region, mostly Uganda.

iii. Rehabilitation and maintenance of dykes for flood protection

iv. Maintenance of drainage channels and desilting of rainwater harvesting structures, commonly known as "hafirs" to increase their capacities to receive more rainwater in MAM.

v. Develop national mechanism to downsize this information on river flow and rainfall to reach affected communities for appropriate actions that reduce their risk to disaster.

4.7 SUDAN

The Nile Basin, expanding approximately 1.32 million square kilometers within Sudan, accounts for nearly 70% of the country's land area and 43% of the entire Nile Basin drainage area. This region includes the Blue Nile, White Nile, and Atbara River. The Blue Nile and White Nile merge at Khartoum, forming the Nile River, which flows for 1,755 kilometers until it reaches the High Aswan Dam in Egypt. The Nile network in Sudan is marked by seasonal variations and significant contributions from tributaries, particularly the Sobat, Dinder, and Rahad rivers.

Figure 28: Nile Basin in Sudan

The Nile serves as Sudan's agricultural lifeline, supplying vital irrigation water for crops such as cotton, wheat, and sorghum. Irrigated agriculture along the Nile is more dependable and profitable compared to rainfed agriculture, which is becoming increasingly unreliable due to climate change. Hydropower, generated by several dams including the Merowe Dam, is a major source of electricity, with the Nile's flow being essential for consistent power generation. Additionally, the Nile replenishes groundwater aquifers, such as the Nubian Sandstone Aquifer. Moreover, the Nile serves as a vital transportation artery, enabling the movement of goods and people. Its navigable stretches between Khartoum and Juba are crucial for trade and connectivity

4.7.1 Performance of October-December 2024 Season Impacts

Hydrologically the OND season in Sudan depends on the conditions in the Ethiopian highlands and the Lakes Plateau, as this period marks the transition from the rainy season to the dry season. The OND 2024 Outlook forecasted that the inflows from all tributaries of the Nile within Sudan, including the Blue Nile, Atbara River, and White Nile, experienced above-average inflows. This forecast closely corresponded with the actual hydrological observations in the country, despite the inflow into the Roseires reservoir being more than twice the average particularly in November and December 2024, an increase might be attributed to enhanced releases from (GERD).

Although the White Nile inflows were not extreme, in December 2024, White Nile State faced catastrophic flooding, resulting in significant humanitarian and infrastructural damage. The crisis was worsened by a cholera outbreak, and flood related diseases. From the preliminary reports; approx-

imately 28,000 individuals were displaced, with around 3,000 homes destroyed and another 6000 damaged in Al Jazirah Aba Island (roughly 270 kilometers south of Khartoum) and El Jebelein locality neighboring South Sudan (Figure 29). The floods devastated large areas of agricultural land, destroying crops and threatening food security. The loss of livestock compounded the economic hardships faced by local communities.

Figure 29: White Nile State flooding damages

The Jebel Aulia (JA) dam has not been operational and remained inaccessible due to the on-going conflict and insecurity. Therefore, to monitor the Jebel Aulia reservoir (upstream and downstream) levels and identify the causes of flooding, Sentinel-2 (S2) and Landsat-9 (LC09) satellite images were analyzed (NDWI) for the period Aug 2024 to Jan 2025, allowing for the calculation of the reservoir area and mapping water extent. These calculations were then projected onto the area elevation tables and bathymetric survey profiles of the JA Reservoir (in Hypack) to determine the water levels. Additionally, satellite altimetry data from four locations within the reservoir, along with data from the Khartoum regional hydrological station were used for further verification, showing a good agreement in trends, (Figure 30). Based on the monitored upstream and downstream levels of the JA Reservoir, it was evident that the dam was managed by inexperienced personnel, and the primary cause of the flooding was the gate closure by the RSF in mid-December 2024, which resulted in unprecedented water levels and catastrophic flooding.

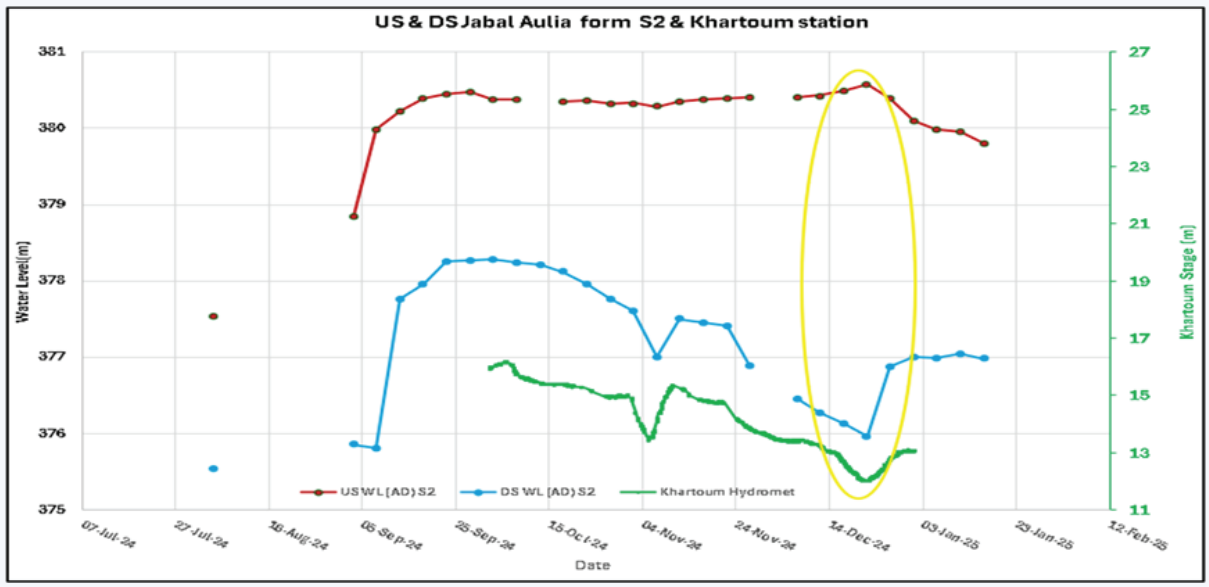

Figure 30: Jebel Aulia Upstream and Downstream and Khartoum water levels

4.7.2 March - May Outlook 2025 Season and Implications

The seasonal forecast for March to May 2025 in Sudan, as provided by the IGAD Climate Prediction and Applications Centre (ICPAC), indicates a higher likelihood of below-normal rainfall across most parts of the Greater Horn of Africa, including Sudan and warmer-than-normal conditions across most parts of the country. This forecast is crucial for planning agricultural activities, water resource management, and preparing for potential drought conditions

Anticipated Impacts

The March to May 2025 hydrological outlook for Sudan indicates several significant implications across various sectors;

i. Below-normal rainfall is expected with low river flows this negatively impact crop yields (Irrigated).

ii. Lower-than-average rainfall could result in decreased inflows to reservoirs, affecting water storage and supply for both agricultural and domestic use.

iii. Groundwater Recharge will be reduced, impacting on long-term water availability.

iv. Lower river water levels could impact navigation particularly in the White Nile.

v. Lower water levels in rivers and reservoirs may reduce the capacity for hydropower generation (Merowe Dam), leading to potential power shortages and increased reliance on alternative energy sources which are very costly.

Recommendations

i. Enhance data collection and monitoring systems. Expand Real-Time Monitoring by increasing the number of telemetry stations to provide more comprehensive real-time data on water levels and discharges.

ii. Strengthening forecasting and early warning systems

iii. Improve Institutional coordination and regional collaboration, and stakeholder engagement.

iv. Improve communication and public awareness to the most vulnerable communities

v. Concerted efforts should be made to ensure that JA dam is operational. This includes dialogue with RSF.

4.8 TANZANIA

Tanzania is in the upstream part of the Nile Basin covering an area of about 945,100 km2 with about 12% in the Nile River Basin representing 2.7% of the Nile Basin drainage area. The Nile Lake Victoria Basin supports about 6 million people in the and is divided into five (5) catchments such as Kagera, Mara, Simiyu, Magogo-Moame, and Isanga (Figure 31). Within the mentioned catchments main rivers include Kagera, Simiyu, Mbarageti, Grumeti, Duma, Mara, Ngono, Magogo-Moame, Isanga and Mori.

Figure 31: The five catchments in the Nile basin- Tanzania

4.8.1 Performance of October-December 2024 Season

In the season of October to December 2024, the basin received near to normal rainfall conditions as forecasted by the Tanzania Meteorological Agency (TMA).

The information from both regional and national monitoring stations OND 2024 indicated that river

inflows were lower compared to the inflows recorded in OND 2023. This was attributed to the fact that in 2023 the basin received el nino rainfall. However, the levels of Lake Victoria remained above the recorded values of OND 2023 (Figure 32).

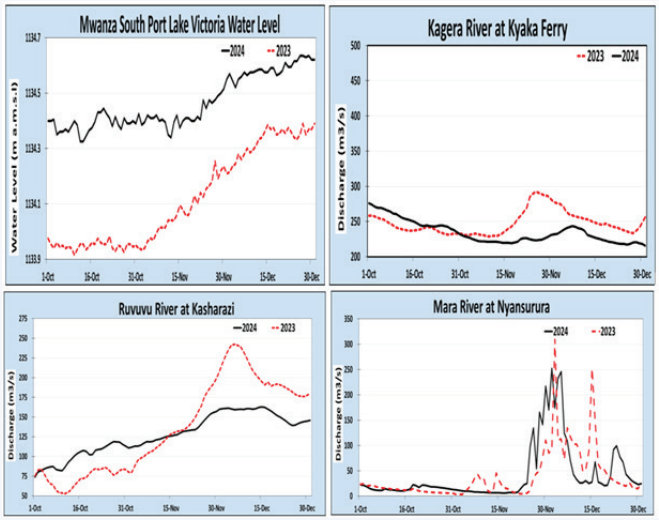

Figure 32: Trend of rivers inflows and Lake Victoria water levels for OND 2024

Severe flooding that hit Geita Town on November 5, 2024, following intense rainfall leaving major transit areas like the Main and Small bus Terminal submerged and disrupting daily activities in which about 15 people including four children narrowly escaped death (Figure 33). The downpour, that lasted for approximately four hours, led to widespread flooding in low-lying areas. Flooding also occurred in Tarime district when Mori River – a tributary of Mara River- burst its banks and overflowed into flood plain causing significant damages to crops and property and displacing tens and loss of 9 lives

4.8.2 March - May 2025 Outlook and Implications

The March to May 2025 seasonal forecast indicates normal to below normal rainfall in the North Coastal and North part of the Country such as (Kagera, Geita, Mwanza, Shinyanga and West part of Mara and Simiyu Regions). However, many areas in the Northeast and East part of Mara and Simiyu Regions would be expected to receive Normal to above Normal rainfall. The above normal condition is most likely to increase river flows and flooding in the flood prone areas of the basin such as Mara, Duma and Simiyu River regions. Therefore, the following strategies are proposed:

i. Continuous monitoring and forecasting of climate variables by TMA and river flow and lake levels to refine and update information to guide various decisions in this part of the basin.

ii. Create community awareness for harvesting rainwater and efficient utilization of the available water resources for below normal rainfall.

iii. Increase awareness creation to the vulnerable communities that are most likely to be impacted by water level rise, because the levels of the lake are still higher compared to last year (2023).

Figure 33: Flooding effect in Geita Town

4.9 UGANDA

Uganda is a landlocked country located within Eastern Africa and an upstream part of the Nile Basin covering an area of about 235,880 km2 with about 98% in the Nile River Basin representing 7.4% of the Nile Basin drainage area. The country plays host to four Nile sub-basin, namely, Bahr El Jebel, Victoria Nile, Lake Victoria and Lake Albert. Uganda is subdivided into eight major drainage basins: Lake Victoria, Lake Albert, Lake Kyoga, Lake Edward, Victoria Nile, Albert Nile, Aswa and Kidepo (Figure 34)

Figure 34: Major drainage basins of Uganda

4.9.2 October -December 2024 Season Outlook and Implications

During this season, the Lake Victoria and Kyoga basin received near to above normal rainfall as forecasted in September 2024. Whereas shoreline flooding in Lake Kyoga was controlled, areas around Mt Elgon experienced unprecedented flooding and landslides which led to loss of lives and property (Figure 35). On the other hand, Lake Albert Basin was forecasted to receive below normal rainfall, but recorded higher than forecasted, resulting in flash floods events in the Rwenzori region and the Semliki floodplain.

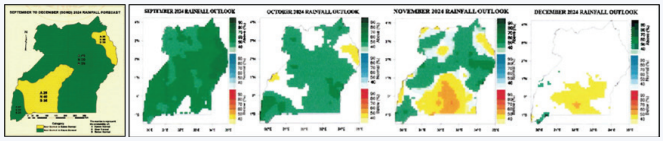

Figure 35: Forecast for OND with monthly variations (Source-UMA)

Lake Victoria, Kyoga and Albert water levels rose in response to enhanced rainfall over Lake Victoria and inflows from the surrounding catchment areas. In particular, the highest ever Lake Albert levels were registered a maximum outflow of 3,200 m3/s registered at Laropi station before the border with South Sudan in November 2024. Figure 36 below illustrates the variation of Lake levels for Victoria, Kyoga and Albert during an extended flood period of flood years since August 2000 to date, when levels have remained relatively very high.

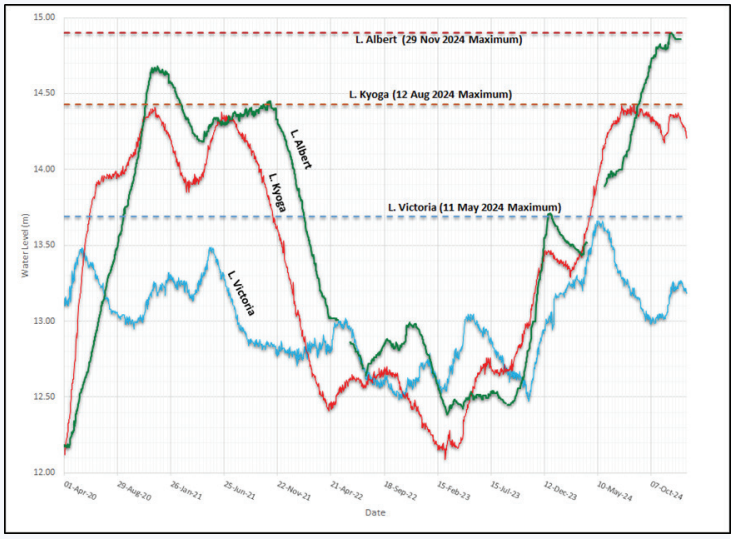

Figure 35: Observed historical lake levels in NEL region

This was consistent with previous years' hydrological regime of the three lakes with Lake Victoria peaking in May, while Lake Albert peaked in December. Shoreline flooding inevitably necessitated regulation of Lake Victoria to accommodate elevated releases. The effect of enhanced releases from Lake Victoria impacted South Sudan with a lead-time of about 3 to 5 months.

More than 113 people were reported missing, and at least 15 people died, while an estimated 500 persons have been displaced after a landslide that occurred in November 2024 triggered by heavy rainfall in multiple villages in the Bulambuli district in the Mt. Elgon region in Eastern Uganda (Figure 37).

Figure 37: Effects of Landslide in Bulambula, Uganda

4.9.2 March - May 2025 Outlook and Implications

The eastern part of Uganda, Lake Kyoga basin and lake Victoria portion of the basin in Kenya and Tanzania are forecasted to receive near normal to above normal rainfall. The Lake Victoria basin catchment drained by river Kagera, however, is expected to receive below normal rainfall. Higher levels of Lake Victoria and Albert are expected to be sustained during this period while Lake Kyoga water levels will rise and may increase beyond the maximum recorded in December 2020. The extent of flooded shoreline around Lake Kyoga is expected to expand and submerge more villages and infrastructure.

4.9.3 Lake Level Forecasts

The Operational Decision Support System for Hydropower (ODSS-HP) tool operated by the Uganda Electricity Generation Company Limited (UEGCL) to optimize hydropower production from the dam cascade along the Nile. The system is utilized to forecast the Lake Victoria water levels based on agreed curve releases and alternative regulated discharges from the power plants at Jinja. The toll utilizes 9 months inflow forecasts and is an upgrade to the Nile DSS with reference to the Mombasa Datum (Figure 38). There are however considerable constraints imposed by the cascade system of power for release beyond 2,400 m3/s. Hence simulation of lake levels for release magnitudes between 1,850 – 2,400 m3/s for the period November 2024 to May 2025 indicate a maximum rise in water levels of 0.4 m. Therefore, careful planning and management of hydropower generation and release magnitudes from Lake Victoria is required during this season. Further development of the UEGCL toll is ongoing to enhance the proficiency of its forecasting capabilities to including Lakes Kyoga, Albert and the Sudd in South Sudan)

and evaluate the impacts of alternative regulation policies.

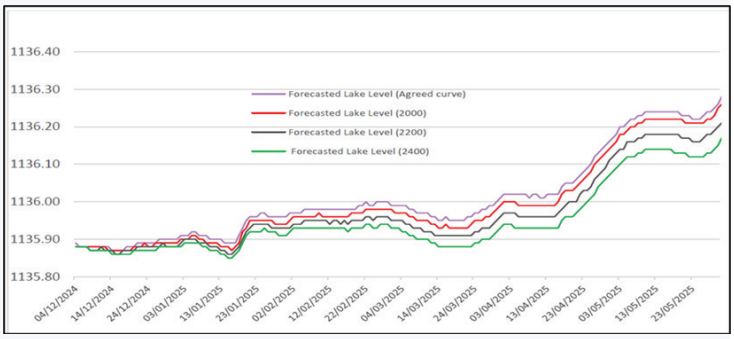

Figure 38: Forecasted Lake Victoria water level MAM 2025.

5.0 BASIN WIDE IMPLICATION AND ADVISORY

5.1 High Likelihood of Wetter-than-normal Conditions

Wetter than normal conditions can have significant impacts in areas of the basin, which are critical for water supply, agriculture, and hydropower and energy production. The following sub-basin of the Nile River Basin are expected to experience wetter-than-normal condition due to the near-to-above normal rainfall forecasted in MAM Season:

5.1.1 Lake Victoria Sub-Basin

1. Nzoia, Nyando, Mara and Gucha Migiro rivers are expected to have above normal streamflow hence the probability of the river overtopping their banks causing flooding in the lower reaches remains higher than normal.

2. Kagera and Mara Rivers are also expected to have elevated flows during the period with flooding and enhance erosion and siltation within and floodplain as the immediate consequences.

3. Due to precipitation over the lake and expected increased inflow from rivers, the Lake Victoria levels are expected to be on the increase peaking in the last and the first week of May and June respectively to a maximum of 1,136.35m, lower than the highest level of MAM 2024 (1136.46m) hence representing medium risk of lakeshore flooding.

5.1 2 Victoria Nile Sub-Basin

1. Increased precipitation in the sub-basin and over the lake combined increased inflow from Lake Victoria, Lake Kyoga level are expected to rise

2. Increased discharge from Lake Victoria is expected due to the increased levels of the lake with a maximum discharge of about 1,830 cubic meters per second in the last week of May and first week of June 2025 hence increased inflow to Lake Kyoga with unregulated discharge automatically resulting in increased inflow to Lake Albert.

5.1.3 Baro-Akobo-Sobat Sub-Basin

The regions of Gambella and Akobo are also expected to experience near above normal rainfall hence higher likelihood of flooding during the MAM period. The common flooding locations

5.2 Recommendations and Advisories for a likelihood of Wetter-than-normal Conditions

The following recommendations and advisories are issued to enhance preparation and prepare for such conditions

i. Strengthen flood monitoring systems to predict potential flood events.

ii. In areas with high risk of flooding, it is crucial to strengthen or upgrade flood defense infrastructure, such as levees, dams, and embankments, to prevent river overflow and mitigate damage.

iii. Review flood evacuation plans for vulnerable communities, ensuring that residents are informed and can act quickly when needed.

iv. Clear drainage in urban centres to ensure efficient flood evacuation

v. Create awareness on flood risk and enhance communication channels to the vulnerable population. This includes working with disasters, continuing monitoring the situation and reviewing forecast information.

vi. Ensure communication & coordination with the disaster response team for early warning

vii. Continuous monitoring water levels in rivers and reservoirs

viii. Dam and reservoir operators are advised to enhance safe releases before March to ensure increased storage for inflow.

ix. Be on the lookout for the occurrence of landslides and flash floods for early warning information. Leverage on the information from both Nile Basin Flash Flood Early Warning Information and the Eastern Nile Flood Forecasting System for appropriate action by the vulnerable communities to reduce their risk of disasters.

x. Update response measures based on the updated monthly forecast and strengthen coordination mechanisms between sectors at national level while carrying out scenario planning at country and sub basin level

5.3 Increased Likelihood of Drier than Normal Conditions

The MAM climate outlook indicates a heightened probability of drier-than-average conditions across in the sub-basins of Albert Nile, Same areas of Blue Nile, Tekeze-Atbara and Bahr El Ghazel region. However, some of the areas were already susceptible to drought, further exacerbating the potential for water scarcity and negatively impacting agriculture, food security, and livelihoods. The affected areas may experience reduced rainfall, which can strain water resources and increase the risk of drought, making it imperative for governments.

5.3.1 Recommendations and Advisories for a likelihood of Drier-than-normal Conditions

Therefore, the following recommendations and advisories are provided to guide planning and actions for preparedness.

i. Use water-saving technologies: Implement low-flow faucets, drip irrigation systems, and water-efficient appliances to reduce water consumption.

ii. Adopt rainwater harvesting technologies to capture and store rainwater for later use, especially for outdoor irrigation.

iii. Switch to drought-resistant crops that are more resilient to water scarcity, such as certain varieties of millet, sorghum, and other drought-tolerant grains.

iv. Adopt water-efficient irrigation strategies such as deficit irrigation as opposed to traditional irrigation methods (e.g., flood irrigation) to more efficient techniques such as drip or sprinkler irrigation systems.

v. Adopt soil moisture management through mulching and soil moisture conservation practices to retain water and protect crops from extreme conditions.

vi. Raise awareness about water conservation, sustainable practices, and preparedness for dry conditions through public education.

vii. Ensure coordination with local governments to create plans for managing water resources and preparing for potential droughts, including setting up emergency water distribution systems.

viii. Continuing monitoring and drought early warning systems activated by ensuring use of meteorological data to predict droughts and provide timely warnings by the mandated agencies to communities and farmers.

ix. Governments to ensure proper regulations on water allocation, prioritizing human needs, agricultural needs, municipal usage, and environmental conservation.

x. Provision of drought relief and financial support such as grants and loans to farmers and communities impacted by drought, helping them transition to more resilient practices.

xi. Provide sustainability incentives for businesses and households to adopt water-efficient technologies and sustainable practices.

6.0 ACKNOWLEDGMENT

The regional expert on flood advisory forum and the Nile Basin Regional Hydrological Monitoring System is supported by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) with funding from the Federal Ministry of Economic Cooperation (BMZ) under the project "Support to transboundary cooperation in the Nile Basin". NBI wishes to acknowledge the invaluable contribution and support from the regional expert members and with special gratitude to the IGAD Climate Prediction and Applications Centre (ICPAC), Lake Victoria Basin Commission (LVBC), Rusumo Power Company Ltd (RCL) and Uganda Electricity Generating Company Ltd (UEGCL).

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