



NILE BASIN INITIATIVE
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NILE BASIN SEASONAL HYDROLOGICAL OUTLOOK AND ADVISORY

MARCH-APRIL-MAY 2026 SEASON



1. FORWARD



Dear Partners and Stakeholders,

It is my distinct honor and privilege to present the Nile Basin Seasonal Hydrological Outlook for March–April–May (MAM) 2026 and Advisory. This Outlook reflects our collective commitment to advancing cooperative water resources management, strengthening regional resilience, and promoting evidence-based planning across the Nile Basin.

The March–April–May season is a critical rainfall period for several equatorial and downstream regions of the Basin. The MAM 2026 Outlook provides a comprehensive assessment of expected climatic conditions, anticipated hydrological responses in rivers, lakes, wetlands, and reservoirs, and their implications for water-dependent sectors including hydropower, agriculture, navigation, ecosystem management, and disaster risk reduction.

This report is the result of collaborative technical efforts among National Meteorological and Hydrological Services, regional climate centers, and our Basin-wide hydrological monitoring network. It underscores the importance of data and information sharing in enhancing early warning systems, reducing vulnerability to floods and droughts, and supporting adaptive water management strategies.

In view of projected spatial variability in rainfall and river flows across the Basin, I urge Member States, water managers, hydropower operators, disaster management agencies, and development

partners to utilize this Outlook proactively. Timely preparedness, coordinated reservoir operations, strengthened flood mitigation measures, and drought contingency planning will be essential in safeguarding lives, livelihoods, infrastructure, and ecosystems.

The Nile Basin Initiative remains steadfast in its mandate to facilitate cooperation, promote sustainable water resource management, and support climate-resilient development for the benefit of all Basin countries.

I commend Nile Basin Regional Expert Working Group (REWG) on Hydrology and partners who contributed to the development of this Hydrological Outlook and Advisory and encourage its wide dissemination and application. Your continued support and dedication are critical in building a resilient the Nile Basin.

Together, through cooperation and knowledge sharing, we can safeguard the Nile Basin's water resources for present and future generations.

Sincerely,

Dr. Eng. Nestor Niyonzima
Excutive Director
Nile Basin Initiative

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1. INTRODUCTION

The Nile River Basin is a vital lifeline for more than 300 million people across eleven riparian countries—Burundi, the Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, South Sudan, Sudan, Tanzania, and Uganda. It plays a critical role in sustaining livelihoods, agriculture, energy production, and economic development across the region. As the longest river system in the world, stretching approximately 6,650 km, the Nile holds unparalleled socio-historic, and economic significance for both upstream and downstream nations. The basin is formed by three principal river systems: the White Nile—whose headwaters flow through Lakes Victoria, Kyoga, and Albert, as well as the Baro-Akobo-Sobat and Bahr el Ghazal sub-basins; the Blue Nile; and the Tekeze–Setit–Atbara system, which originates in the Ethiopian highlands.

The hydrology of the Nile Basin is highly sensitive to climate variability, particularly changes in precipitation and evapotranspiration, which directly influence river flows, lake levels, water availability, and water quality. The basin experiences three distinct rainy seasons: the long March–April–May (MAM) and short October–November–December (OND) rains in the Nile Equatorial Lakes (NEL) region, and a single rainy season from June to September (JJAS) in the Eastern Nile region. The MAM season is therefore of particular importance, as it marks the onset of seasonal rains in the equatorial and central parts of the basin, while simultaneously signalling the end of the dry period in the Ethiopian highlands. These seasonal transitions have significant hydrological implications for river flows and lake levels, with cascading effects for both upstream and downstream countries.

To support anticipatory action in managing water-related risks, the Nile Basin Initiative (NBI) presents the Seasonal Hydrological Outlook and

Advisory for the MAM 2026 season. This outlook builds on the seasonal climate forecast released by the IGAD Climate Prediction and Applications Centre (ICPAC) during the 72nd Greater Horn of Africa Climate Outlook Forum (GHACOF 72), held on 26–27 January 2026 in Nairobi, Kenya. Following this release, NBI’s Regional Expert Working Group (REWG) on Hydrology convened on 28–29 January 2026 to assess the implications of the climate outlook for hydrological conditions across the Nile Basin.

Through expert analysis, hydrological model simulations, and stakeholder consultations, this advisory provides a comprehensive assessment of anticipated hydrological conditions during the MAM 2026 season, including expected implications on river flows, lake level variations, and potential impacts on water resources, energy generation, agriculture, and key flood-prone areas. The outlook is intended to inform decision-makers, sector agencies, and communities across the basin, enabling proactive adaptation measures to mitigate risks, optimize water resources management, and enhance resilience.

By integrating seasonal climate forecasts with hydrological modelling, NBI supports climate-smart planning and early action aimed at safeguarding lives and livelihoods, while optimizing operations for water supply, hydropower, and irrigation. The advisory also highlights areas at heightened risk of hydrological extremes and provides targeted recommendations to guide Member States and relevant institutions in implementing actions that enhance benefits, reduce disaster risks, and strengthen basin-wide resilience to climate variability.

2. TOOLS AND SYSTEM

2.1. Nile Basin Regional Hydrological Monitoring System

The Nile Basin Regional Hydrological Monitoring System is a collaborative hydrological monitoring system consisting of stations and a data management system. It was established to enhance trans-boundary cooperation among Member States. It provides real-time hydrological data and information on river, lake, rainfall, and water quality variables for water resources planning and management including flood forecasting and early warning for data-driven decisions in the basin. (<https://nile-basin.org/hydromet/about>).

2.2. Nile Basin River Flow Forecasting System (NB-FEFS)

The NB-RFFS provides river flow forecasts information at selected locations in the river network for the short-term and at seasonal time scale. The forecast supports operational decision making. The system uses the observed river and lakes levels from the Nile Basin Monitoring network as a reference for its forecasts.

2.3. Eastern Nile Flood Forecasting and Early Warning System

The Eastern Nile Flood Forecast and Early Warning System (EN-NEWS) is an integrated, real-time and 3-day flood forecasting and early warning at 55 locations. It provides forecasts and early warnings for riverine floods in key flood-prone areas in Lake Tana, Baro-Akobo-Sobat, Blue Nile, and Tekeze-Setit-Atbara (enffews.nilebasin.org).

2.4. Nile Basin Flash Flood Early Warning 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 Nile ba-

sin. Early warning information supports Member States for effective flash flood early warnings in flash flood prone areas with 48 hours lead time through the existing national dissemination channels. (<https://flashfloodalert.nilebasin.org/>).

2.5. Nile Basin Drought Early Warning System

The Nile Basin Drought Early Warning System (Nile DEWS) developed by ENTRO to monitor and forecast meteorological drought, hydrological drought, and agricultural drought in the Nile basin over 84 sub-basins and at various grid scales to help mitigate the drought impact across the Nile basin. It produces a monthly drought forecast bulletin and Monitor Reports (<https://dews.nilebasin.org>).

2.6. East Africa Hazards Watch

The ICPAC Water Forecast Portal is a hydrological forecasting system that delivers key hydrological variables at locations of interest. The portal was developed by the ICPAC to enhance water resources management and disaster resilience in East Africa (<https://eahazardswatch.icpac.net/mapviewer>).

2.7. WMO Global Hydrological Status and Outlook System (HydroSOS)

The HydroSOS initiative aims to strengthen country capacity across the hydrological value chain, to help produce standardized information on the current state of the water resources and provide outlooks at the sub-seasonal to seasonal scale.

3. PERFORMANCE OF OCTOBER - DECEMBER 2025

The OND season is a critical short-rain period for the Nile Equatorial Lakes (NEL) region and parts of East Africa, including Uganda, Kenya, Rwanda, Burundi, Tanzania, South Sudan and the eastern Democratic Republic of Congo. It plays an important role in replenishing water resources, sustaining agricultural production, and maintaining river baseflows as the basin transitions into the dry season.

3.1 Climate

Based on regional observations and satellite-derived rainfall estimates to compliment ground observation, the OND 2025 rainfall across the NEL region was generally near-normal to above-normal. However, the following patterns were observed:

- Above-normal rainfall was recorded over parts of western Uganda, western Kenya, Rwanda, and northwestern Tanzania, with several locations experiencing cumulative seasonal totals exceeding the long-term mean by 10–25%.

- Near-normal rainfall dominated much of the central NEL region, including portions of eastern and central Uganda and western Kenya, some parts of South Sudan, western Tanzania with totals within $\pm 10\%$ of the climatological average.
- Below-normal rainfall was observed in localized areas of northern Burundi, Tanzania and parts of the eastern Democratic Republic of Congo, where seasonal totals fell 10–20% below the long-term mean.

Ground observations and satellite derived data confirmed most of the predictions in several areas with spatial and temporal variations. The spatial deviations of ground observations and satellite derived indicated increased anomaly in November especially in Eastern Nile regions in Ethiopian highlands and parts of Sudan, western Kenya, eastern South Sudan and Uganda (Figure 1).

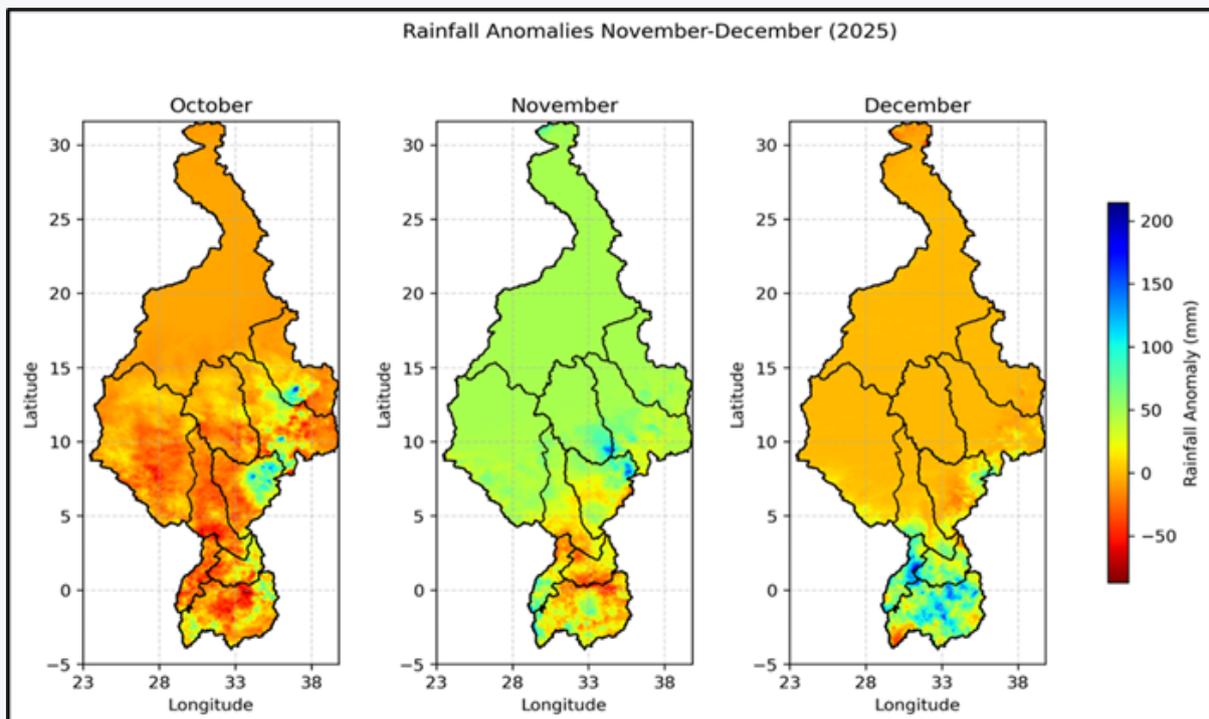


Figure 1: October-November-December 2025 rainfall anomaly

3.2 Hydrology

The performance of OND 2025 was complex and varied spatially across the Nile Basin. Regions that were expected to receive above-normal rainfall recorded high river flows and heightened flood risk. In contrast, areas within the Nile Equatorial Lakes sub-basin, along with some downstream and rainfall-deficit zones, exhibited dampened hydrological responses, characterized by reduced tributary contributions and limited lake recharge. Warmer atmospheric conditions increased evapotranspiration rates, potentially reducing the net water yield from rainfall. This dynamic underscored the basin's sensitivity to climate variability and reinforced the need for integrated monitoring systems and advanced predictive hydrological tools across transboundary catchments. Enhancing the accuracy of these systems is essential for improving the reliability of hydrological information and supporting sound water-resources management decisions. This heterogeneity means contributions to river flows, lake levels, and reservoir recharge varied significantly by location rather than producing

a uniform hydrological response. However, lake levels and river flows in the equatorial sub-basins remained near-normal to slightly above normal, supporting stable baseflows and enhanced water availability for agriculture and water supply. Streamflow responses in some upstream headwaters were moderate, reflecting the short duration of the OND rains and the basin's rapid runoff response. In the Eastern Nile region including the Sudan and highlands of Ethiopia, reductions in river flows and lake levels were observed.

The variability in the OND rainfall, especially reduced rains in parts of Uganda and western Kenya, likely limited contributions from tributaries feeding the White Nile and Lake Victoria, Lake Kyoga and Lake Alber (Figure 2). In Lake Victoria, the forecasted water levels were slightly higher than the observed lake water levels with mean deviation of about 0.42m (Figure 3). In contrast, forecasted water levels for Lake Kyoga was lower than the observed (Figure 4).

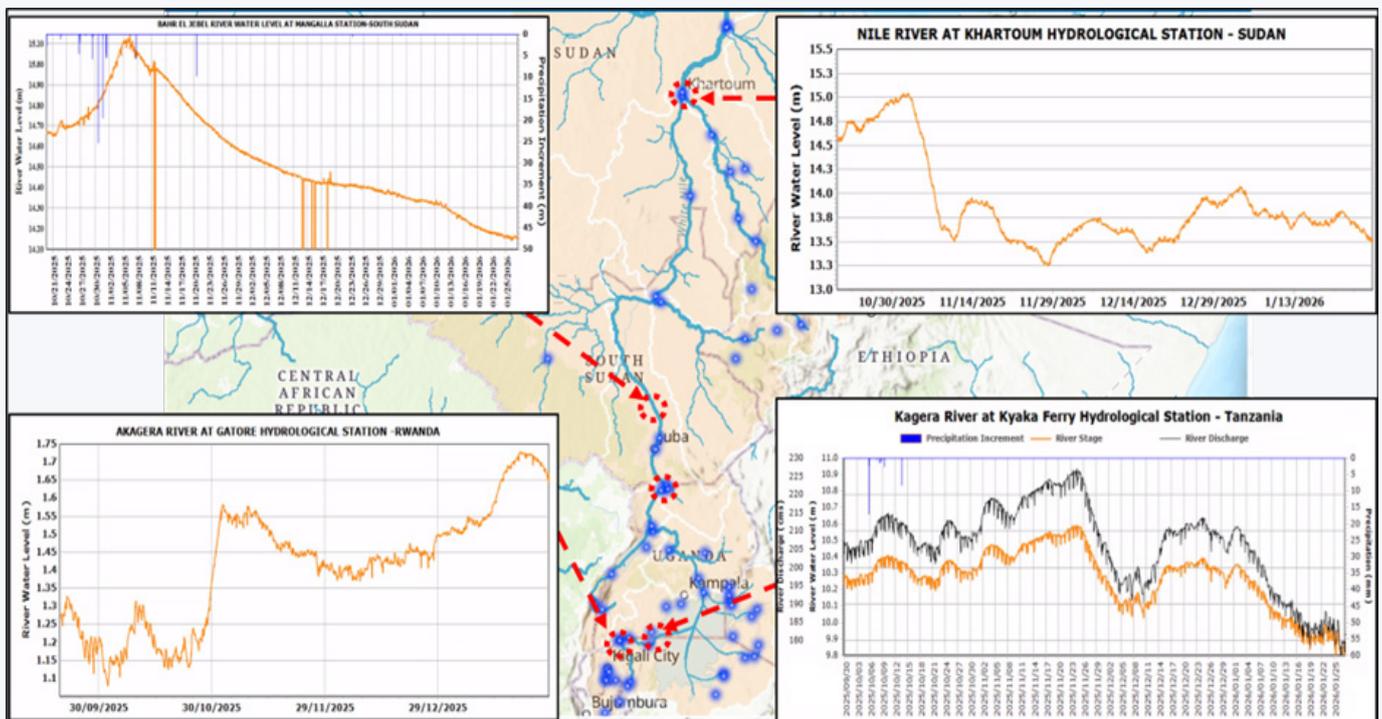


Figure 2: Observed River levels and flows during OND 2025 season in the Nile Basin.

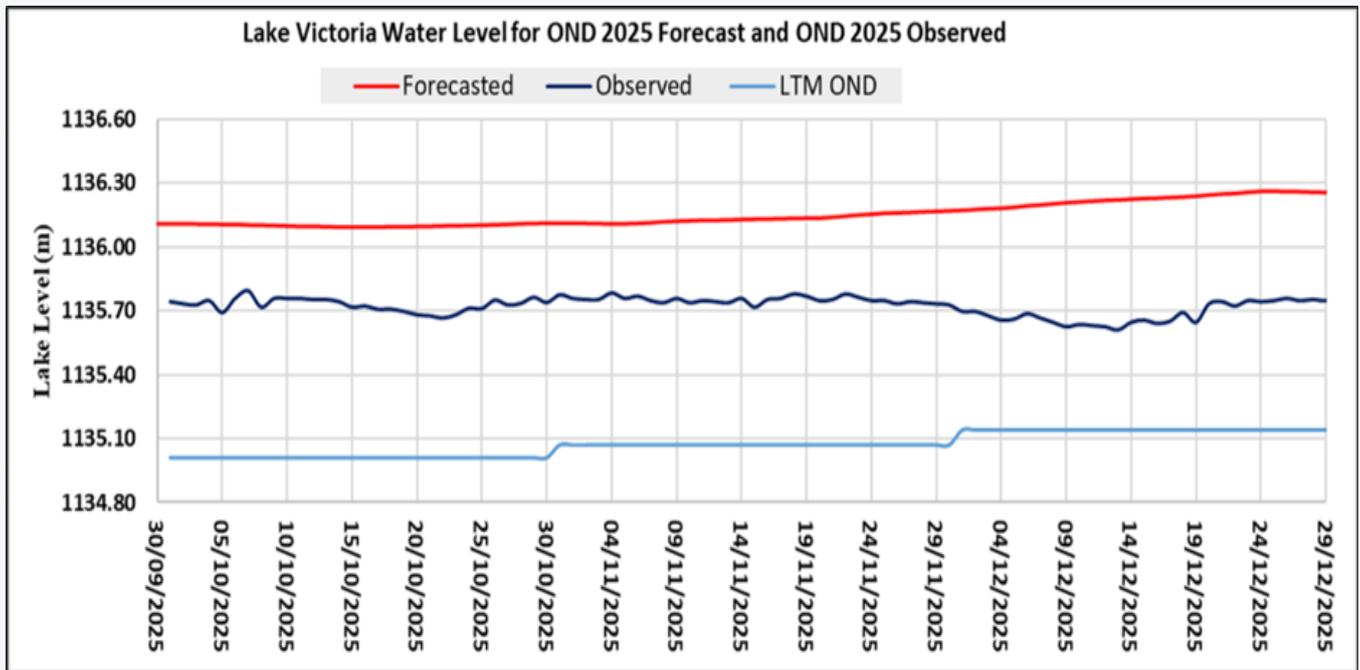


Figure 3: Comparison of Lake Victoria observed and forecasted water levels for OND 2025 Season.

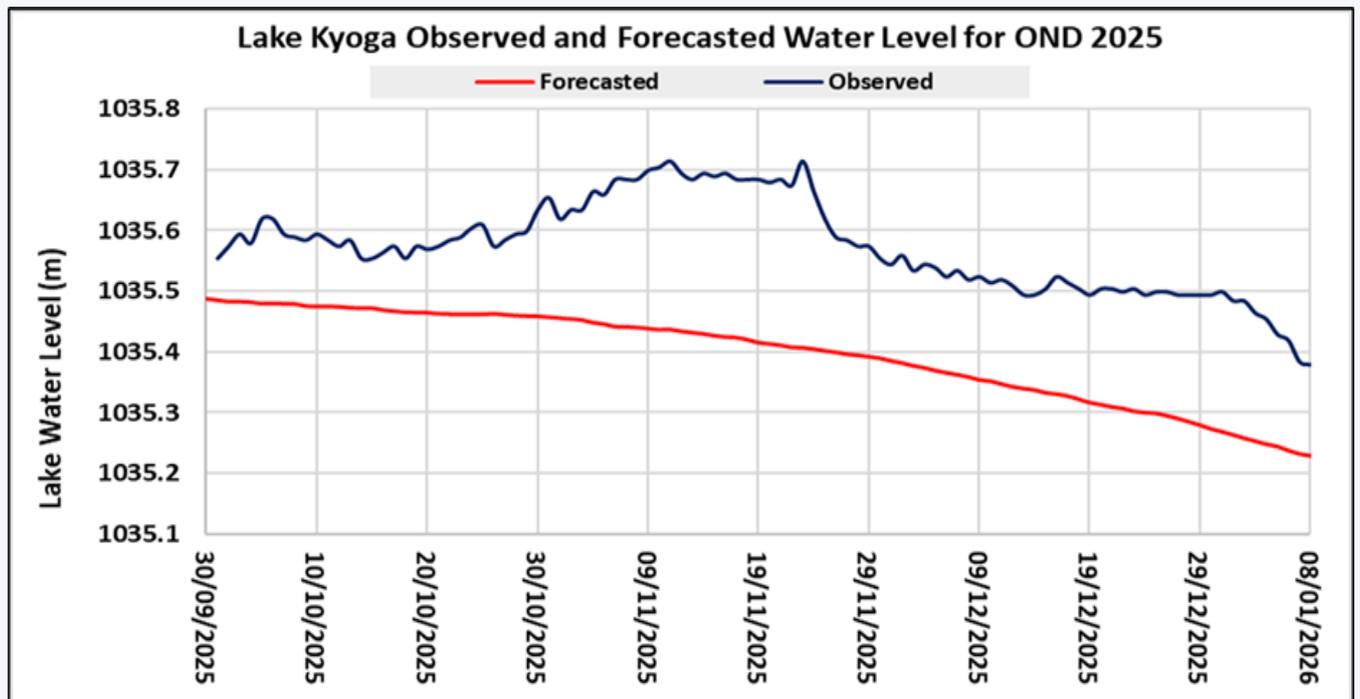


Figure 4: Comparison of Lake Kyoga observed and forecasted water levels for OND 2025 Season.

3.2.1 Observed Flood Occurrence OND 2025

a) Flash Flood Occurrence

Based on forecasts from the NB FFEWS, flash floods were predicted on 16 December 2025 in Kayanza–Kabarore, Burundi, placing approximately 105,100 at high risk.

Figure 5 presents the Flash Flood Forecast and Early Warning for Burundi, while the accompanying table summarizes the forecast for the country’s administrative units, indicating the number of impacted locations and the populations at risk in the affected areas.

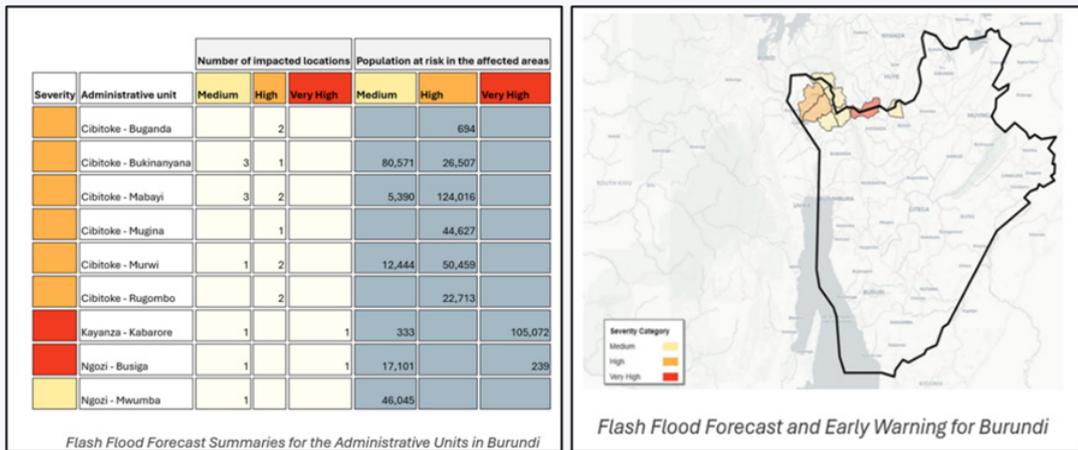


Figure 5: Flash Flood Forecast and Early Warning for Burundi.

b) Riverine Flood Occurrence in the Eastern Nile

The EN-FFEWS, from 20 September to 21 October 2025, has been substantiated with evidence on the ground (Figure 6 and Figure 7). The flooding problem that occurred in Khartoum during the OND season, which

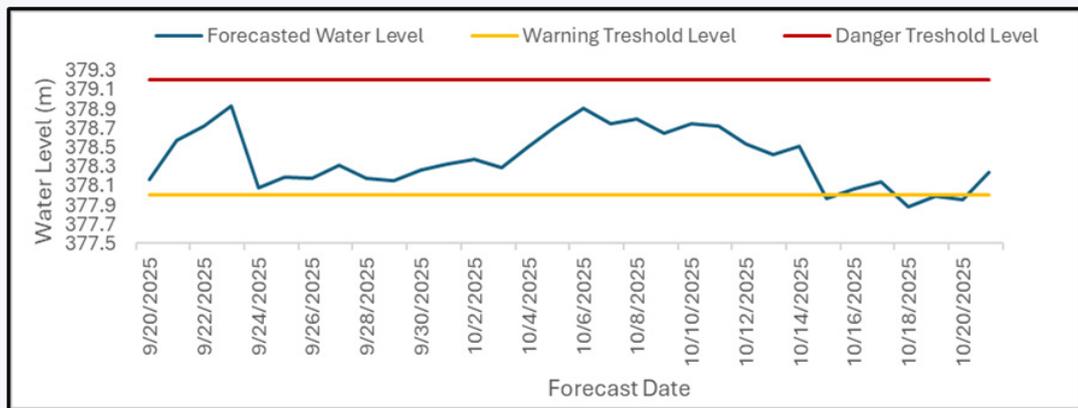


Figure 6: Flood level forecasted at Khartoum by the Eastern Nile Flood Forecasting and Early Warning System (EN-FFEWS).



Figure 7: Khartoum flooding: source (Sudan Tribune, 01 October, 2025).

In overall, the OND 2025 season performed near-normal to above-normal rainfall across much of the Nile Equatorial Lakes region. This enhanced water storage conditions ahead of the dry season but simultaneously increased flood risk in vulnerable low-lying areas. The resulting hydrological state

provides an enhanced storage and moisture condition through January and February. However, sustained monitoring of river discharges and lake levels remains critical to track evolving conditions and support timely water-resources management.

4. MARCH-APRIL-MAY 2026 OUTLOOK

The MAM season plays a critical role in both the Nile Equatorial Lakes (NEL) and the Eastern Nile (EN) region with varying hydrological significance across these two major sub-basins. In the Eastern Nile region, particularly the Ethiopian Highlands, MAM marks the end of the dry season and the beginning of the rainy season.

4.1 Climate Outlook

The climate outlook for MAM 2026 at the 72nd Greater Horn of Africa Climate Outlook by ICPAC projected a 45 % probability of above-normal rain-

fall compared to the long-term mean over much of the Greater Horn of Africa, a region that includes large parts of the Nile Basin. Areas expected to experience above-average rainfall include central and western Kenya, Uganda, Rwanda, Burundi, Tanzania, Ethiopia, South Sudan, northern Somalia, and Djibouti, much of which contributes to Nile Basin hydrology through tributaries and equatorial lake catchments (Figure 8).

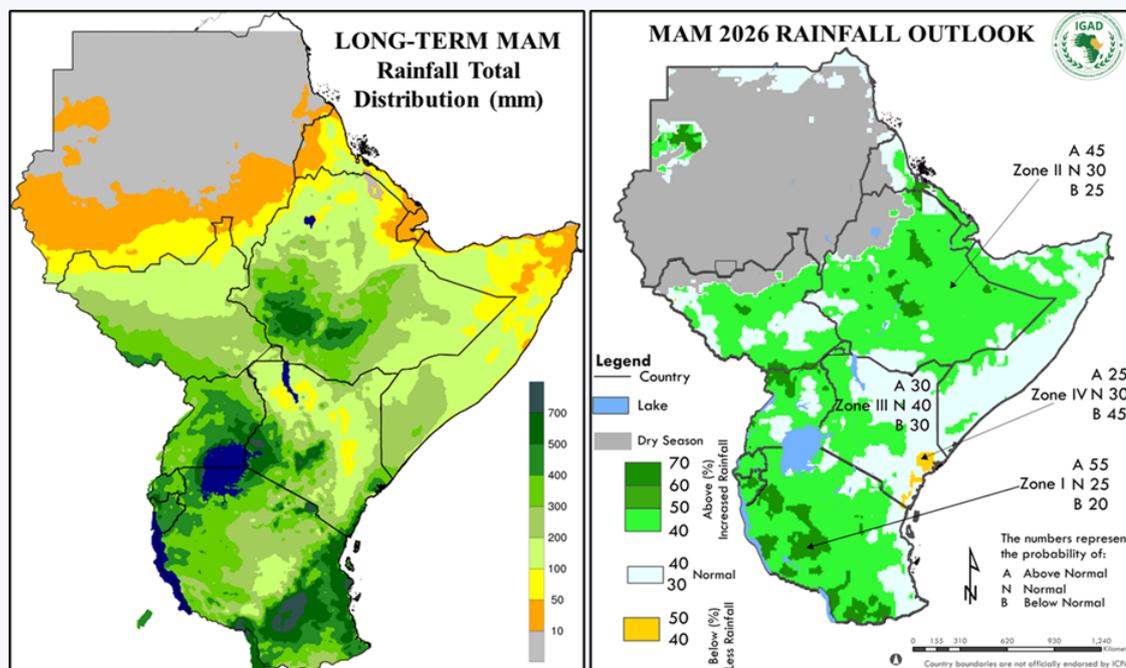


Figure 8: Climate map of MAM 2026 with long-term rainfall for Horn of Africa.

4.1.1 Above Normal Conditions

Increased likelihood 40-50% of above normal conditions is projected over most parts of Ethiopia, South Sudan, Uganda, Rwanda, Burundi, Tanzania, central to western Kenya, and northern areas of Somalia (Zone I and II). The chance of getting 400 mm or more during MAM is higher than historical values over southwestern Ethiopia, eastern Uganda, western Kenya, Rwanda, Burundi, parts of Tanzania (Figure 9). The predicted probability

of exceeding 200 mm is higher than historical over parts of South Sudan, central Ethiopia and Tanzania.

4.1.2 Near Normal Conditions

Above About 50% probability of near-normal rainfall is forecast across parts of the basin, such as western and eastern South Sudan, north-eastern and south-western Kenya, most parts of Somalia, and isolated areas within Uganda and Ethiopia.

4.1.3 Drier than Normal Conditions

Some parts of the basin are projected to experience drier-than-normal conditions during this period, which may affect water availability and ecosystems in marginal rainfall zones. This drier than normal conditions will most likely enhance water losses through evaporation and evapotranspiration. Near

Normal conditions expected over parts of western and eastern South Sudan, northern, eastern and south-western Kenya, most parts of Somalia, coastal Tanzania and isolated areas in Uganda and Ethiopia (Zone III). Drier-than-Normal Conditions Likely over coastal Kenya (Zone IV).

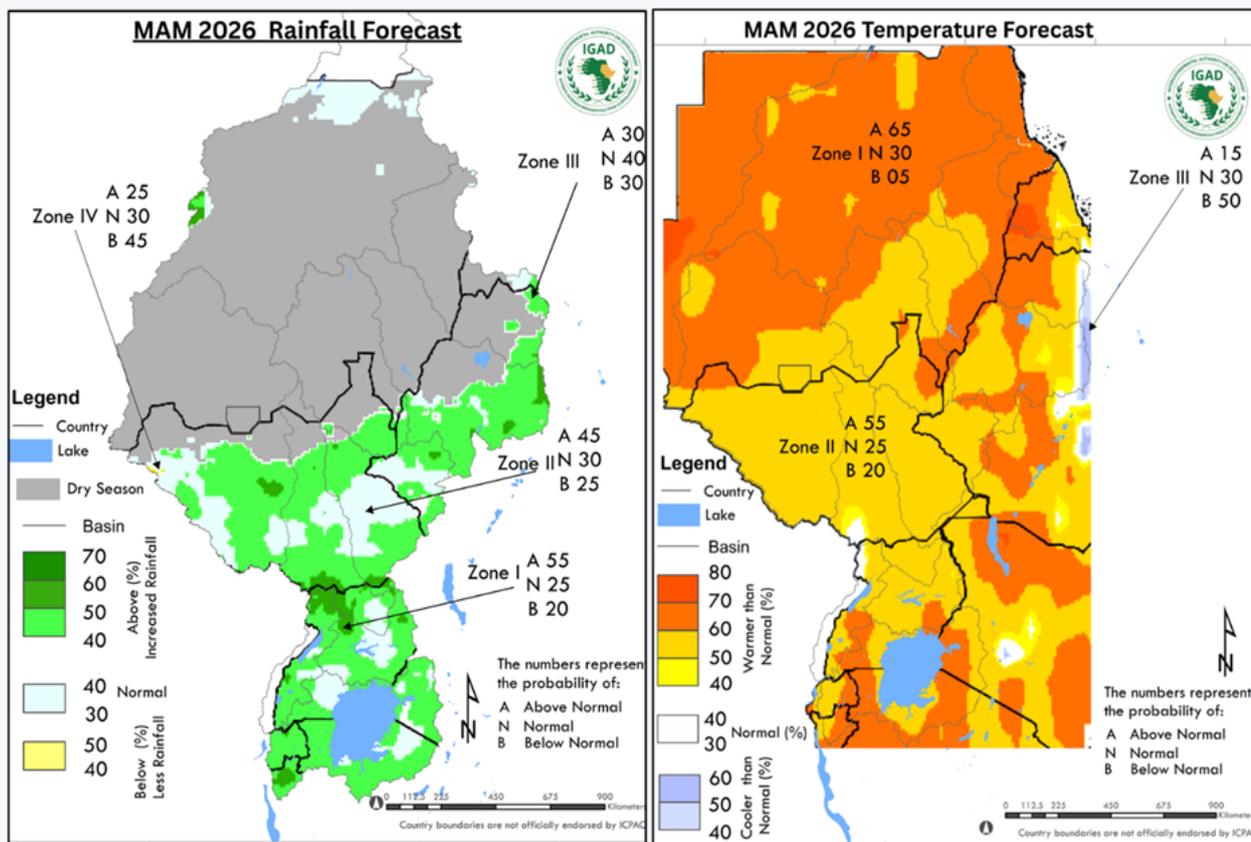


Figure 9: Climate Outlook for MAM 2026- Rainfall and Temperature .

Probabilities for warmer than average temperatures are most enhanced over Sudan, Djibouti, Tanzania and few places in Ethiopia and Kenya while cooler than average conditions are expected over parts of central to northern Ethiopia.

4.2 Hydrological Outlook

The MAM season is hydrologically crucial for the Nile Basin as it supports the long-rain contributions to major rivers and equatorial lakes (e.g., Lake Victoria, sources of the White Nile). Enhanced rainfall across tributary regions (e.g., in western Kenya, Uganda, Ethiopia, South Sudan) augur well for river flows into the White Nile, Blue Nile, and other sub-basins, potentially boosting lake levels and reservoir inflows. Increased rainfall improves water security but also raises flood risk in low-lying and flood-prone areas.

4.2.1 Impacts on river levels and flows

Moderate to greater probability ($\approx 45 - 70$ %) of above-normal conditions over much of the Greater Horn of Africa — including parts of Uganda, Kenya, Ethiopia, South Sudan, and Tanzania, which contribute directly to Nile headwaters. Some areas may experience near-normal or below-normal rainfall, illustrating spatial variability within the basin.

In the NEL region Ber el Jebel River at Nimule is expected to be on the increase from the current 2,400 cubic meter per second to about 3,300 cubic meter

per second at the end of May. This is most driven by the high lake levels and anticipated above normal local rainfall hence the rainy season from June is most likely increase the already high levels (Figure 10). Nzoia River in western Kenya is expected to be

above the Long-term Mean (LTM) with a peak flow of about 500 cubic meter per second signifies likelihood of flowing in the lower reaches of the river. In Main Nile high flows still expected as shown by the forecast for Dongola and Marowe.

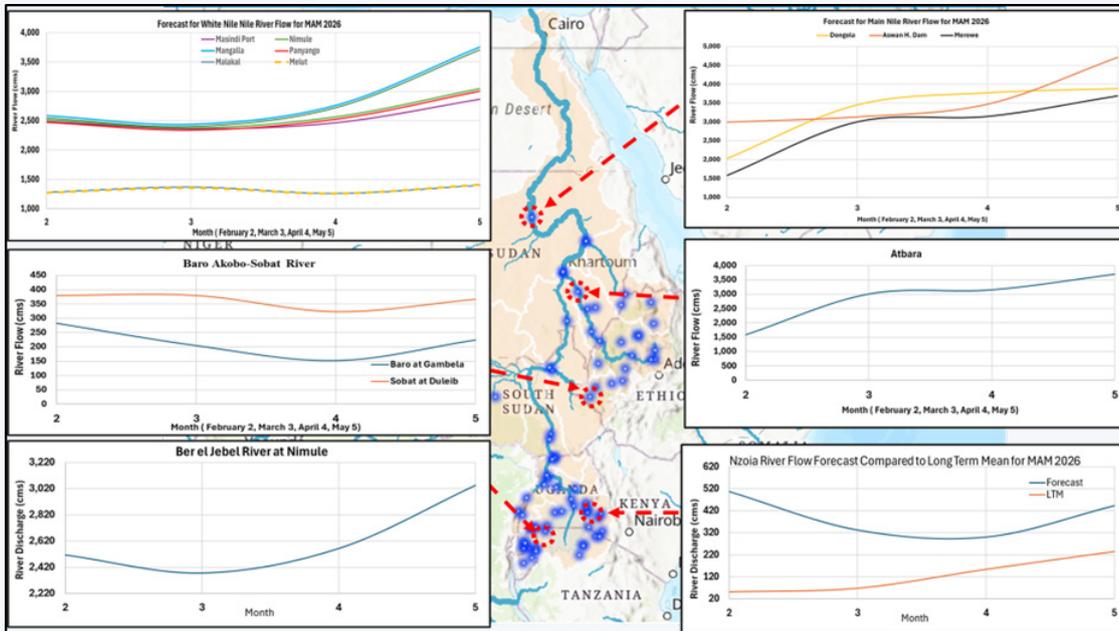


Figure 10: Expected River flow conditions in selected monitoring stations in Nile for the for MAM 2026 season.

4.2.2 Impacts on the Lakes Levels and Reservoirs

Where rains are above average, water levels in lakes like Victoria, Kyoga, and Albert will continue in a declining trends and start to rise towards the start of April hence supporting hydropower and wa-

ter supply and maintains base flow conditions for downstream river reaches, Lake Tana is expected to be on the decline throughout of the period of MAM (Figure 11). The simulated outflows from the reservoirs will vary depending on the operation rules. (please qualify the figure below -illustrate)

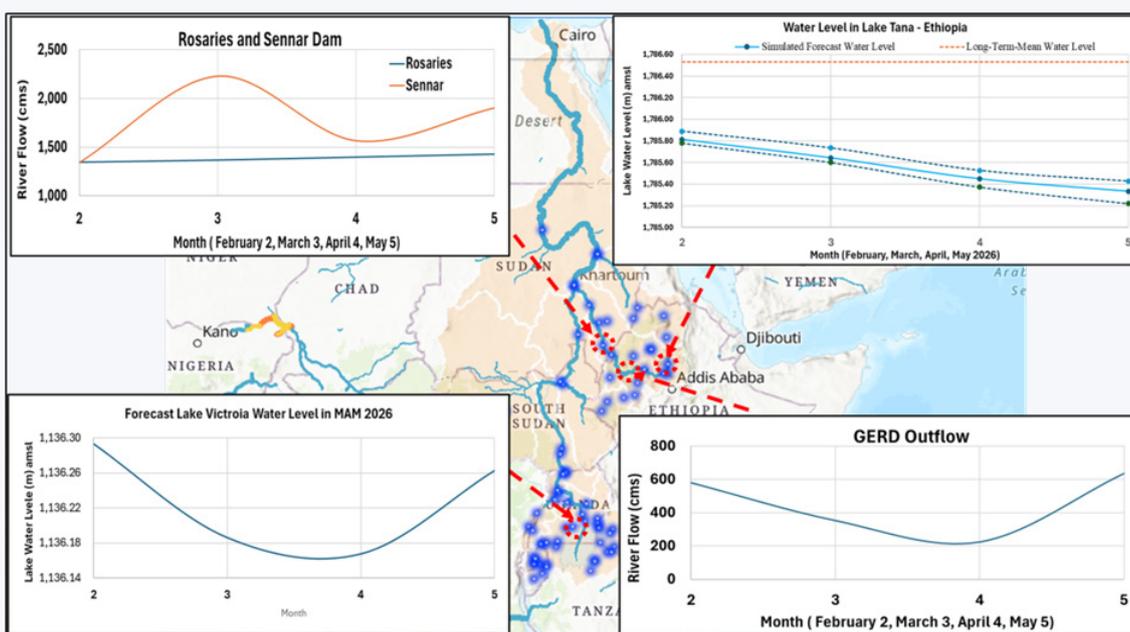


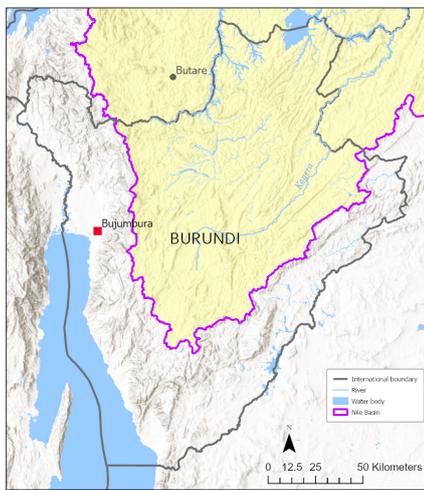
Figure 11: Expected lake levels and reservoir outflow conditions in selected lakes and reservoirs in Nile for the MAM 2026 season.

5. COUNTRY OUTLOOK AND IMPLICATIONS

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 2026 Seasonal.

5.1 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 12). The annual rainfall varies between 850mm and 1,600 mm with an average mean rainfall of



1,100 mm. The low-land areas of Burundi are sometimes affected by floods during heavy rains. The flood prone areas include the shore-

lines of Lake Tanganyika, Rweru and Cyhoha and some parts of the small streams and rivers such as Ruvyironza, Rusizi and Ruvubu.

5.1.1 Performance of the OND 2025 Season and Impacts

Burundi, the season from June to August is naturally dry and rivers and lake water levels in many parts of the country usually remain relatively low and on the decline due to no or low rainfall and enhanced evaporation hence the declining trends. Therefore, it was predicted in May 2025 that the rivers and lakes levels would decrease June to August 2025. This prediction was confirmed by ground observations and data as show on Ruvubu River characterizing the situation in most of the hydrological stations in the country (Figure 13) hence one of the driest season in a decade. However, from September rivers and lake levels start to increase marking due to the onset of September-December (SOND) rainfall season.

Figure 12: Map of Burundi showing Nile Sub Basin

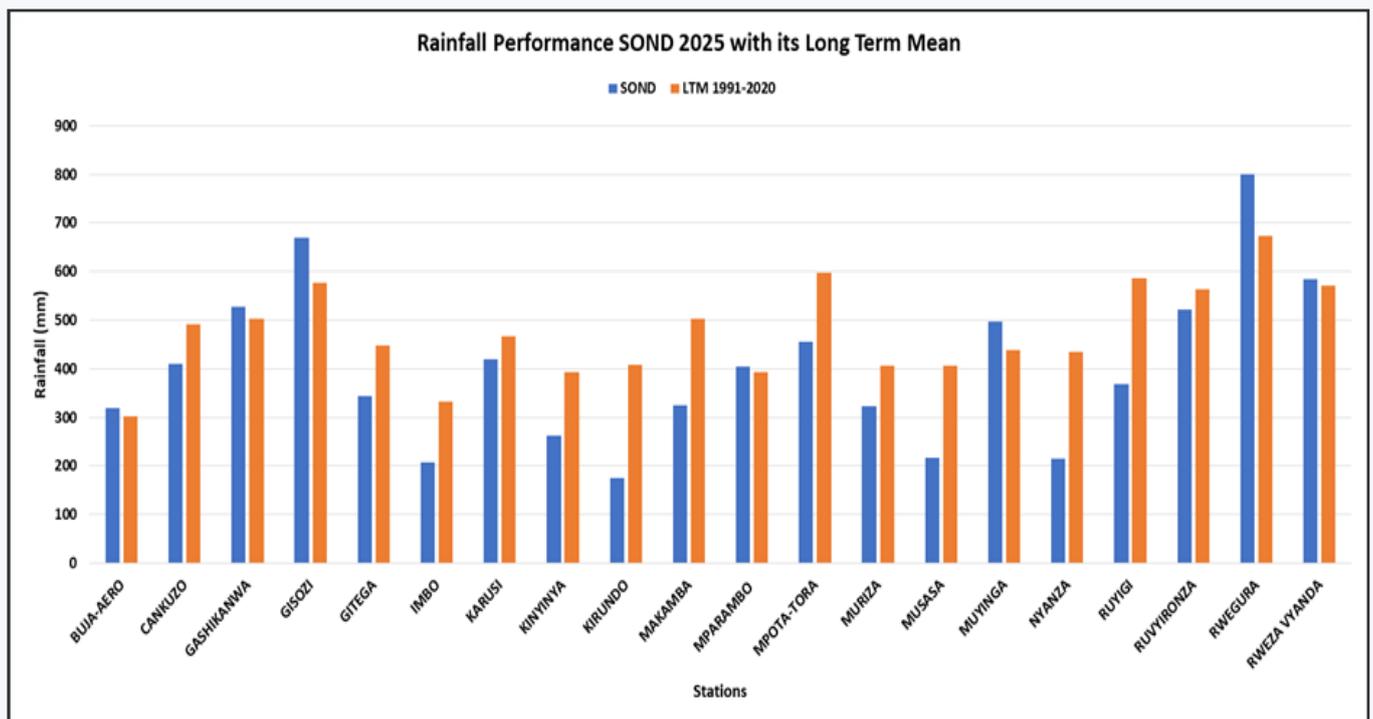


Figure 13: Performance of SOND Rainfall in parts of Burundi

Therefore, it was predicted in August 2025 that the rivers and lakes levels would increase October to

December 2025. This prediction was confirmed by ground observations and data as shown on Ruvubu

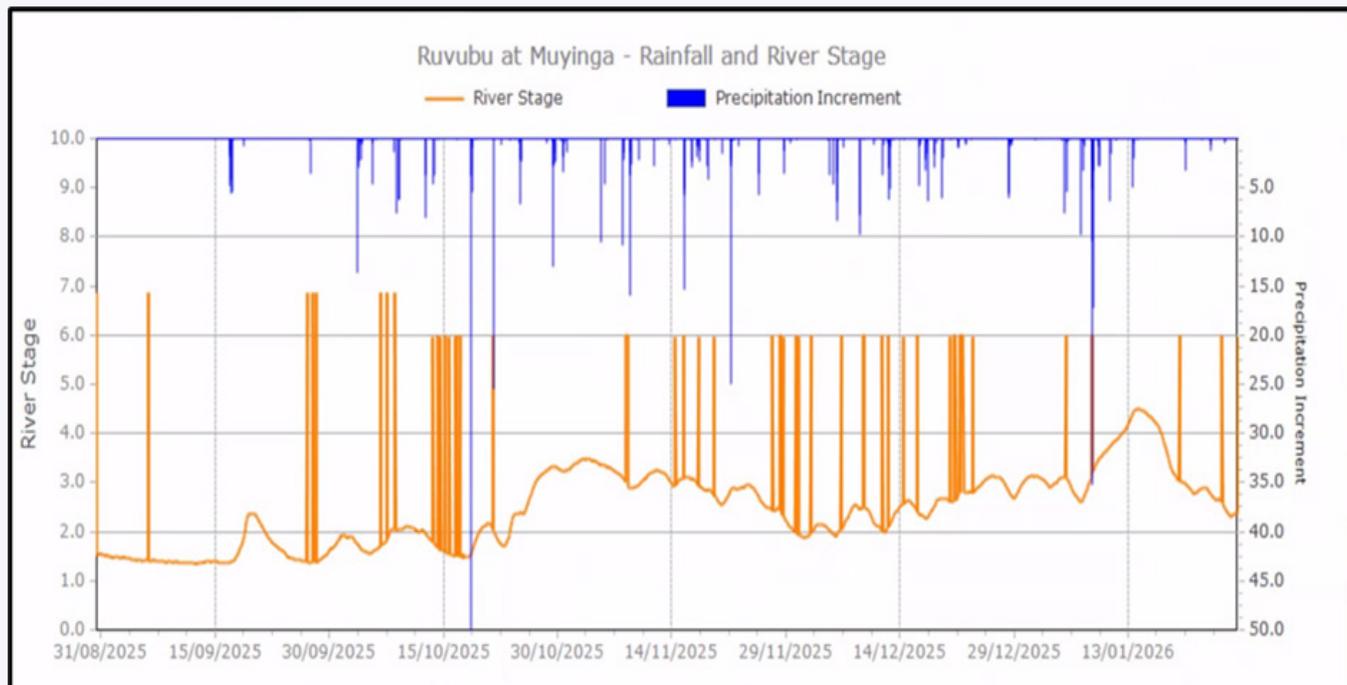


Figure 14: Observed Ruvubu River water level Musinga Station in Burundi.

The OND is a season to cultivate various food crops in Burundi. This season has been good for most crops hence promoted good harvest. Hydropower productions were good and water supply for domestic and irrigated agriculture was sufficient due to the increased river flows and water storages. However, in infrastructure and transport, the floods in Bujumbura had disrupted road traffic and affected several houses and public infrastructure were destroyed by the strong winds as observed in some areas.

5.1.2 Climate and Hydrological Outlook for MAM 2026 and Implications

Burundi generally experiences a tropical climate with two rainy seasons- the “long rains” (March-April-May) and the “short rains” (October-November-December). In the western regions (like Bujumbura and the surrounding areas), rainfall tends to be more evenly distributed, while the central and eastern parts may see less variation rainfall. The rainfall can vary, with occasionally dry spells during this period as well.

According to the climate seasonal forecast released by ICPAC and IGEBU, Burundi is expected to ex-

perience above normal rainfall during the MAM 2026 season in the central parts (Zone I) and normal in the most parts (Figure 15). The implications include improved crop performance, favourable conditions for pasture regeneration and improving livestock feed availability in the agricultural sector. Other expected implications are increased surface water availability and groundwater recharge, rising lake levels and rivers and flooding and overflow flood prone areas.

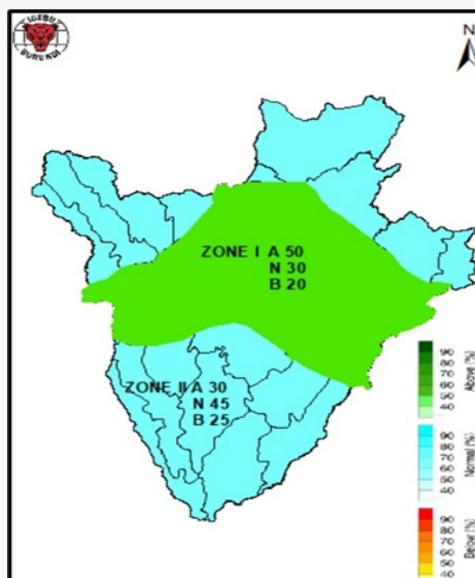


Figure 15: MAM Rainfall Forecast for Burundi.

5.1.3 Recommendations and Advisories

The March to May season is an important season for Burundi. The forecast for the MAM season developed by ICPAC in collaboration with national experts shows that Burundi will have above-normal rainfall. This situation can enhance water availability and agricultural and energy production in Burundi. However, it also significantly increases the risks of flooding, landslides, infrastructure damage, and disease outbreaks. Therefore, proactive preparedness, coordinated action, and community engagement are essential to reduce impacts and maximize benefits hence the following seven (7) recommendations and advisories are hereby issued to provide guidance to the national and local actors on the response action in Burundi:

1. Continuous monitoring of dams and rivers levels for early warning information and adaptive management.
2. Update the forecasts as needed and make them available to users
3. Enhance coordination between meteorological, hydrological, and civil protection services.
4. Translate climate information into simple, actionable messages for farmers and communities
5. Pre-position emergency response equipment and relief supplies in flood high-risk zones
6. Unblock drainage especially in urban centers and roads
7. Increase water quality monitoring, especially during peak rainfall periods.

5.2 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 the Congo River. About 1% of the country drains to the Nile River Basin constituting about 0.7% of the Nile Basin area. The Nile Basin in DRC is predominantly found in the northeastern part of the country. The region experiences a tropical climate with distinct wet and dry seasons. The climate in the region is influenced by both the equatorial and tropical monsoon systems, and the hydrological patterns are driven by rainfall, temperature, and the runoff from the surrounding highlands.

Despite the small part of the country in 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 and Semliki River between DR Congo and Uganda are vital for both countries and support the lives and livelihood of several communities. The Rutshuru and Rwindi River flow into Lake Edward while Semliki River flows out of Lake Edward into Lake Albert hence hold significant hydrological consideration for the Albert Nile.

5.2.1 Performance of the OND 2025 Seasonal and Impacts

Broader climate monitoring indicated widespread rainfall deficits across much of DRC during the OND period, aligning with both regional forecasts and drought pressures across parts of the country. Observational data and monitoring products (e.g., NOAA's SPI analysis) showed below-average rainfall anomalies over large parts of the DRC—including eastern provinces such as Nord-Kivu and Sud-Kivu—during the OND 2025 period, consistent with the broader suppressed rainfall signals. However, some parts of eastern DRC received above-average rainfall totals amid otherwise deficient data scarcity conditions, reflecting localized variability typical in complex topographies like South Kivu.

In general, the OND 2025 forecast broadly underestimated the variability and captured the overall trend of suppressed rainfall, particularly across the Nile Equatorial Lakes, East Africa, and adjacent portions of the DRC.

Observed hydrological impacts (river/lake levels declines) and areas of drought stress were generally consistent with forecasts, though localized heavy rainfall events—such as those in Bukavu—illustrate sub-seasonal extremes not fully resolved in broad

seasonal outlooks. However, the combined signals of below-average rainfall, elevated temperatures, and localized extremes underscore the need for integrated monitoring and risk management across transboundary basins and urban-rural landscapes. The observation on Lake Edward indicated an increasing trend of lake water levels to the end of November 2025 and the declining trend through January 2026 (Figure 16).

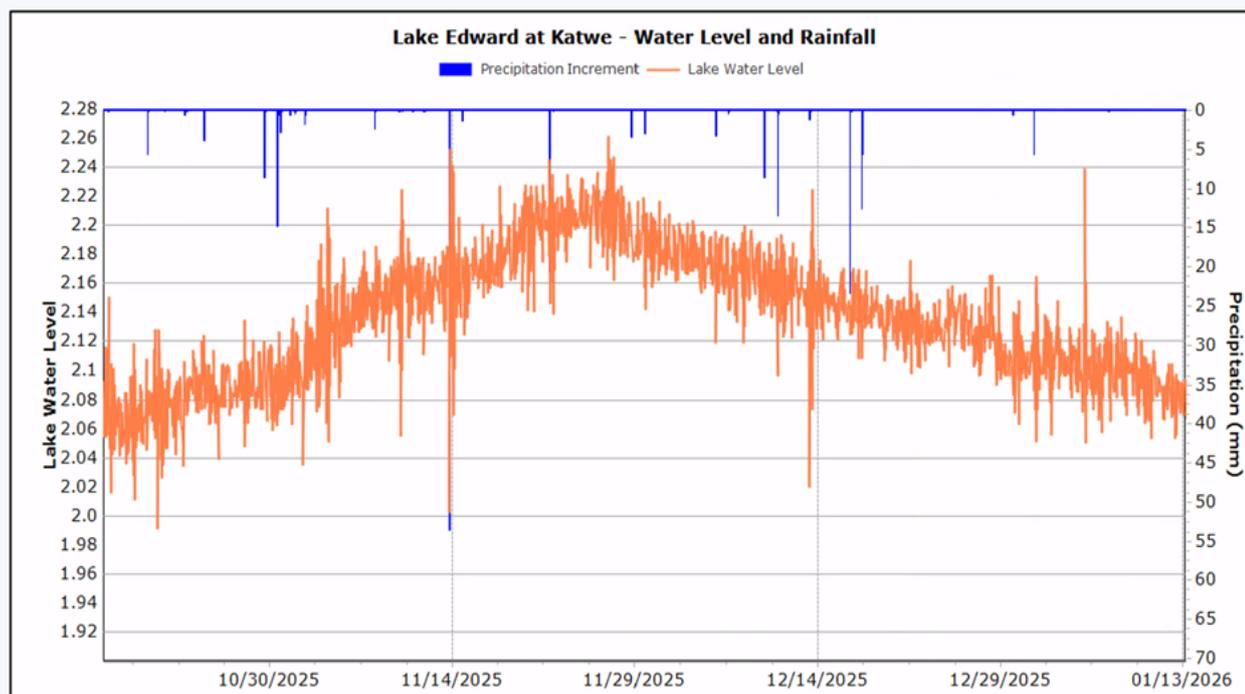


Figure 16: Lake Edward Water Levels and Rainfall for OND 2025 period.

5.2.2 Climate and Hydrological Outlook for MAM 2026 and Implications

While ICPAC’s regional outlook covers the Greater Horn and equatorial East Africa broadly, specific seasonal forecasts for eastern DRC are less frequently published regionally because much of the Congo Basin lies outside ICPAC’s core Greater Horn focus. However, eastern DRC (including South Kivu, North Kivu, Ituri and adjacent highlands) tends to experience its main rainfall peak during the March–May period as the Intertropical Convergence Zone (ITCZ) shifts over the region. Local meteorological services historically anticipate above-average rainfall in many eastern and

northeastern provinces during this time (based on past trends and climatology).

The ICPAC’s regional climate outlook for March–May 2026 indicates a moderate to high (about 45–70%) probability of wetter-than-normal rainfall over much of the Greater Horn of Africa, including adjacent areas such as Uganda, Rwanda, Burundi and parts of South Sudan and western Kenya. This reflects expectations for enhanced seasonal rainfall relative to climatology in many central and western sectors of the region. Near-normal rainfall probabilities (~40 %) are projected in some areas, rec-

ognizing spatial variability in seasonal totals. Seasonal forecasts also emphasize that sub-seasonal variability will occur — local dry spells or intense rain bursts may occur even within a generally wetter season.

Enhanced seasonal rainfall across equatorial East Africa and adjacent highlands supports a greater influx to feeder river systems of the Nile (such as the White Nile from Uganda and South Sudan) and to tributaries that influence water balance near the eastern Congo highlands including Lake Edward and Albert. This could lead to increased river flows and rising levels in lakes and tributaries during the peak MAM season, enhancing water availability if well managed.

In eastern DRC, headwater streams and rivers draining toward the western Rift and Albertine regions may see increased flows, with implications for both agriculture and hydropower resources. With wetter-than-normal conditions more likely, there is an elevated risk of flash flooding, riverine overflows and soil erosion, particularly in steep terrain of South and North Kivu, Ituri and neighbouring areas. Such hazards can disrupt transportation, damage infrastructure and impact communities in both rural and urban centres. Above-average rainfall generally improves soil moisture and pasture conditions, benefiting crop planting and regrowth after dry spells. However, excessive rain intensity or prolonged wet spells may delay planting in valley bottoms or cause waterlogging of crops, affecting early season agricultural yields.

Integrated monitoring that includes eastern DRC hydrological nodes, especially where cross-border watersheds interface with Nile tributaries, will be important for basin-wide water management and risk mitigation.

5.2.3 Recommendations and Advisories

Eastern DRC, particularly North Kivu, South Kivu, and Ituri—lies within the Albertine Rift highlands, characterized by steep terrain, high rainfall inten-

sity, and transboundary hydrological linkages with the Upper Nile system. Considering the seasonal outlook issued by the IGAD Climate Prediction and Applications Centre and regional coordination frameworks under the Nile Basin Initiative, the following key recommendation and advisories are hereby issued:

1. Meteorological and Hydrological Services
 - i. Intensify real-time rainfall, lake water levels and river flow monitoring, especially in high-risk catchments and steep slope zones.
 - ii. Strengthen dissemination of seasonal and sub-seasonal forecasts (10-day and monthly updates) to provincial authorities and humanitarian partners.
 - iii. Establish rapid reporting systems for flood, landslide, and river overflow events.
2. Disaster Risk Reduction & Emergency Authorities
 - i. Activate Early Warning Systems (EWS) for flash floods and landslides in vulnerable urban and peri-urban centers such as Goma, Bukavu, and Beni.
 - ii. Pre-position emergency supplies in high-risk communities along flood-prone valleys and unstable slopes.
 - iii. Conduct slope stability assessments and enforce temporary relocation where high landslide risk is detected.
 - iv. Improve drainage clearance in urban settlements before peak rainfall months (April–May).
3. Water Resources & Basin Management Authorities
 - i. Monitor river discharge trends in Albertine Rift catchments that influence cross-border hydrological systems.
 - ii. Enhance coordination with neighbouring

countries (Uganda, Rwanda, Burundi) on transboundary watershed monitoring and information exchange.

iii. Promote small-scale water storage and watershed protection measures to harness excess rainfall and reduce runoff losses.

4. Agriculture and Rural Development

i. Promote soil and water conservation practices such as contour farming, terracing, agroforestry, and mulching to reduce erosion.

ii. Encourage flood-tolerant and fast-maturing crop varieties in valley bottoms.

iii. Support livestock owners with pasture monitoring and water access planning

5. Infrastructure and Urban Planning

i. Reinforce riverbanks, bridges, and culverts in erosion-prone areas.

ii. Integrate flood and landslide risk mapping into municipal planning frameworks.

iii. Restrict settlement expansion into floodplains and unstable hillsides.

6. Public Health Authorities

i. Strengthen surveillance for waterborne diseases (cholera, typhoid) during peak rainfall months.

ii. Promote safe water storage and sanitation campaigns in flood-affected communities.

iii. Prepare health facilities for potential outbreak response following extreme rainfall events

7. Humanitarian & Development Partners

i. Use forecast-based financing mechanisms to trigger early preparedness actions.

ii. iSupport community-based disaster preparedness training and climate resilience

programs.

iii. Integrate climate risk information into food security and livelihood programming.

The MAM 2026 season presents both opportunities (enhanced water availability, improved soil moisture, potential agricultural gains) and risks (flash floods, landslides, infrastructure damage). Proactive preparedness, strengthened coordination, and localized risk assessments will be essential to safeguard lives, livelihoods, and infrastructure in eastern DR Congo.

5.3 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 Km² 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 tributaries of the Nile River (Figure 17). 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.

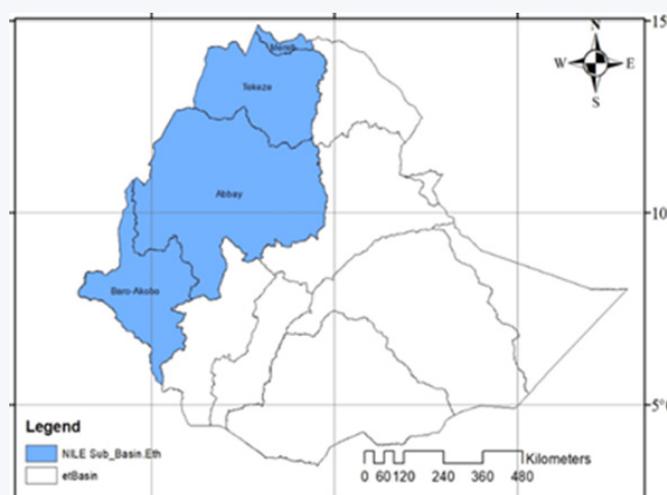


Figure 17: Map of Nile Basin in Ethiopia

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.

5.3.1 Performance of the OND 2025 Seasonal Impacts

The seasonal rainfall prediction for October, November, December, and January 2025/2026 indicates that rainfall was near-normal to below-normal in Borena, Guji, Sidama, and the southern parts of Ethiopia, with below-normal rainfall dominating much of the southern Somali Region (Figure 18). The Bega 2025/2026 season is expected to start early and end early, potentially shortening the rainy season. In contrast, the southwestern and western regions of the country are expected to receive normal to above-normal rainfall, with occasional heavy rain events. After October, much of the northern half of the country is expected to remain largely dry.

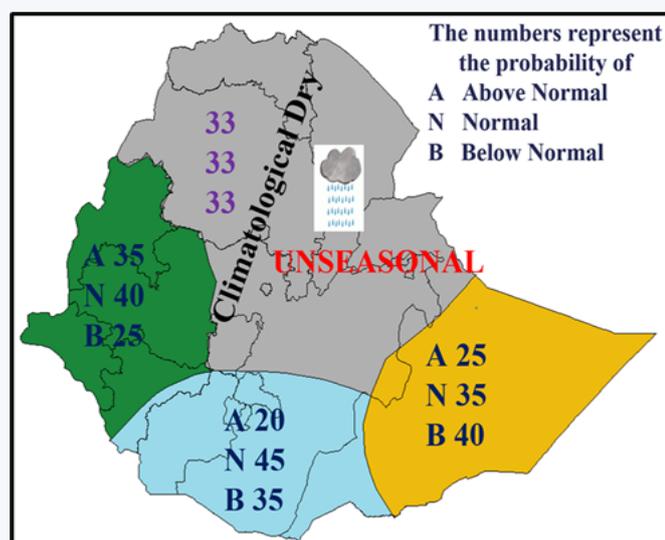


Figure 18: Predicted OND 2025 rainfall in Ethiopia.

The following impact were registered in several parts of Ethiopia:

- i. At the end of the Kiremt rainy season, rivers, lakes, and reservoirs are well filled
- ii. Groundwater recharge improves, especially in the highlands
- iii. Major rivers like the Blue Nile (Abay) maintain flow
- iv. Stored water in dams and reservoirs supports irrigation and hydropower

- v. Reduced water demand helps conservation and management
- vi. Sustains ecosystems and wetlands
- vii. Reliable water supply supports urban areas and rural communities
- viii. After September, rainfall drops sharply in most parts of Ethiopia.
- ix. Rivers, streams, and ponds that depend on rain begin to shrink or dry up.
- x. Water levels in lakes and reservoirs decline hence the rural communities that rely on surface water (rivers, ponds, hand-dug wells) experienced water shortages and scarcity.

Figure 19 predicted and historical reservoir water levels at Tana Belese Dam and Gibe III from October to January, comparing 2025/2026 (observed/predicted) to 2006, 2018, and the long-term average. The reservoir water level gradually drops from October to January, indicating a seasonal draw-down caused by decreased inflow. Between October and January 2025/2026, the water level is expected to gradually fall while remaining within safe operating limits, with no risk of flooding or critically low water levels. Water levels in 2006 were significantly lower than the long-term average, but levels in 2018 were slightly higher.

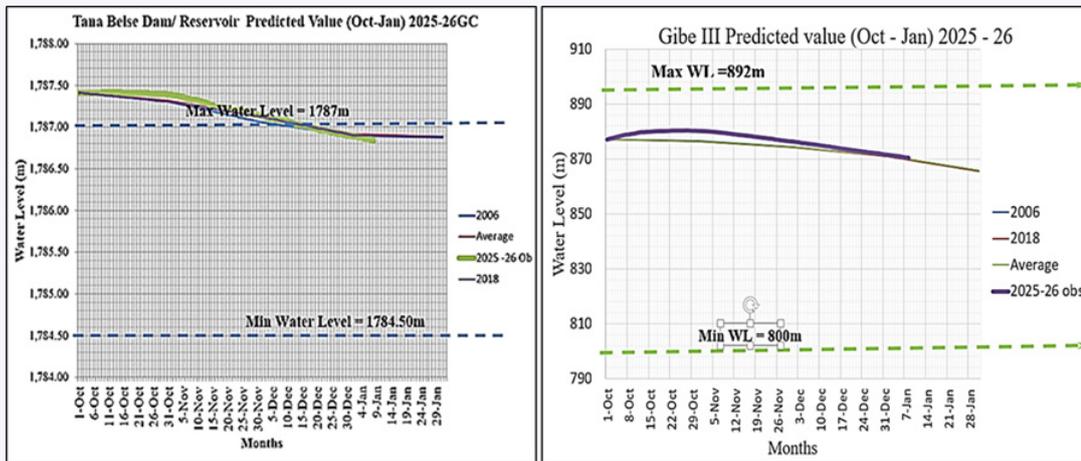


Figure 19: Storage in Belse and Gibe III reservoirs in October 2025-January 2026 period.

The projected levels for 2025/2026 indicate a return to near-average conditions, ensuring a consistent supply of water for irrigation and hydroelectric power generation. The dam’s operators will most likely continue to closely monitor inflow and outflow rates to keep the reservoir within its optimal range and ensure consistent water availability during the dry season.

The 2025/2026 observed/predicted line Gibe III shows a slight increase in October, with a small peak in late October, followed by a gradual and continuous decline from November to January. The reservoir level remains around 870-880 meters, indicating a moderate storage condition. The predicted and observed levels remain below the Maximum Water Level (892 m), indicating no risk of overtopping, and significantly above the Minimum Water Level (800 m), indicating no critical low-storage condition. In comparison to 2006 and 2018, the 2025/2026 trend is very similar, and it also closely aligns with the long-term average, in-

dicating generally normal hydrological conditions Fincha from October to January with analog years (2006 and 2018) and the long-term average. The 2025/2026 observed/predicted line shows a slight increase or stable condition in early October, then a gradual and steady decline from November to January (Figure 20). Water levels fall from around 2219.7 m to 2218.8 m, indicating a small seasonal drawdown. The reservoir levels are very close to the Maximum Water Level (2219 m) in October and slightly lower after November, but still within the normal operational range. Throughout the period, water levels have remained well above the minimum water level (2213 m), indicating no risk of critically low storage. Meleka Wakena from October to January, compared with analog years (2006 and 2018) and the long-term average. The 2025/2026 observed/predicted line shows a slight increase or stable condition in early October, followed by a gradual and continuous decline from late October through January.

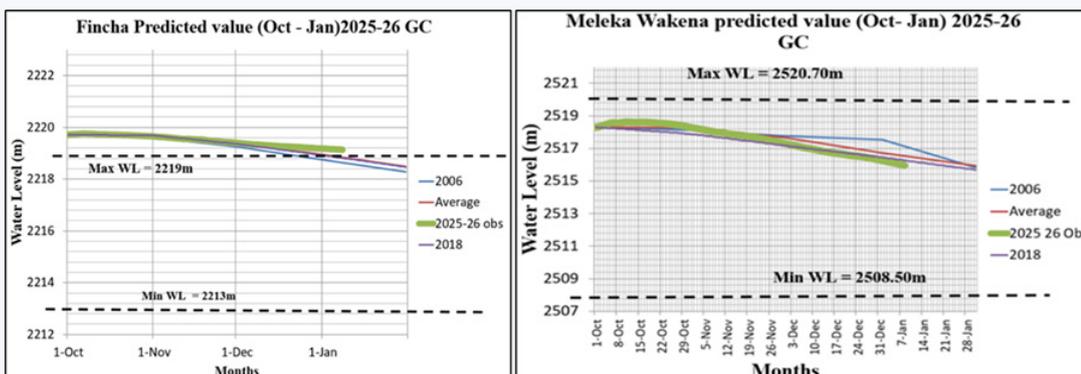


Figure 20: Observed water level in Fincha and Meleka Wakena dam for OND 2025 period

Water levels decrease from approximately 2518.5 m to about 2516.0 m, indicating a moderate seasonal drawdown. Throughout the period, reservoir levels remain well below the Maximum Water Level (2520.70 m), indicating no flood risk, and comfortably above the Minimum Water Level (2508.50 m), indicating no risk of critically low storage. Compared to historical years and the long-term average, the 2025–26 trend closely follows the typical seasonal pattern and is generally consistent with both 2006 and 2018, reflecting normal seasonal hydrological behavior. Overall, Meleka Wakena Reservoir is expected to remain within a normal and safe operational range during October to January 2025/2026, with the gradual drawdown reflecting typical seasonal inflow reduction and reservoir regulation, and with no indications of extremely high or low water levels during this forecast.

(Figure 21) shows the predicted and observed reservoir water levels at Koka Dam from October to January, compared with analog years (2006 and 2018) and the long-term average. The 2025/2026

observed water level shows a steady decline from about 110.1 m in October to around 108.0 m by early January. This trend is consistent with historical patterns and the long-term average, indicating a normal seasonal drawdown of the reservoir. Throughout the period, the water level remains below the maximum operational level (110.30 m), meaning there is no risk of overtopping or flooding. At the same time, the water level stays well above the minimum operational level (103 m), indicating that dead storage is not approached and that water availability remains acceptable. Compared to the long-term average, the 2025/2026 observed levels are slightly lower, suggesting moderate water release, reduced inflow, or a combination of both during this period. Overall, the reservoir is operating within safe limits; however, the declining trend highlights the need for careful water management to ensure sufficient storage for the coming dry months and to meet downstream water demands.

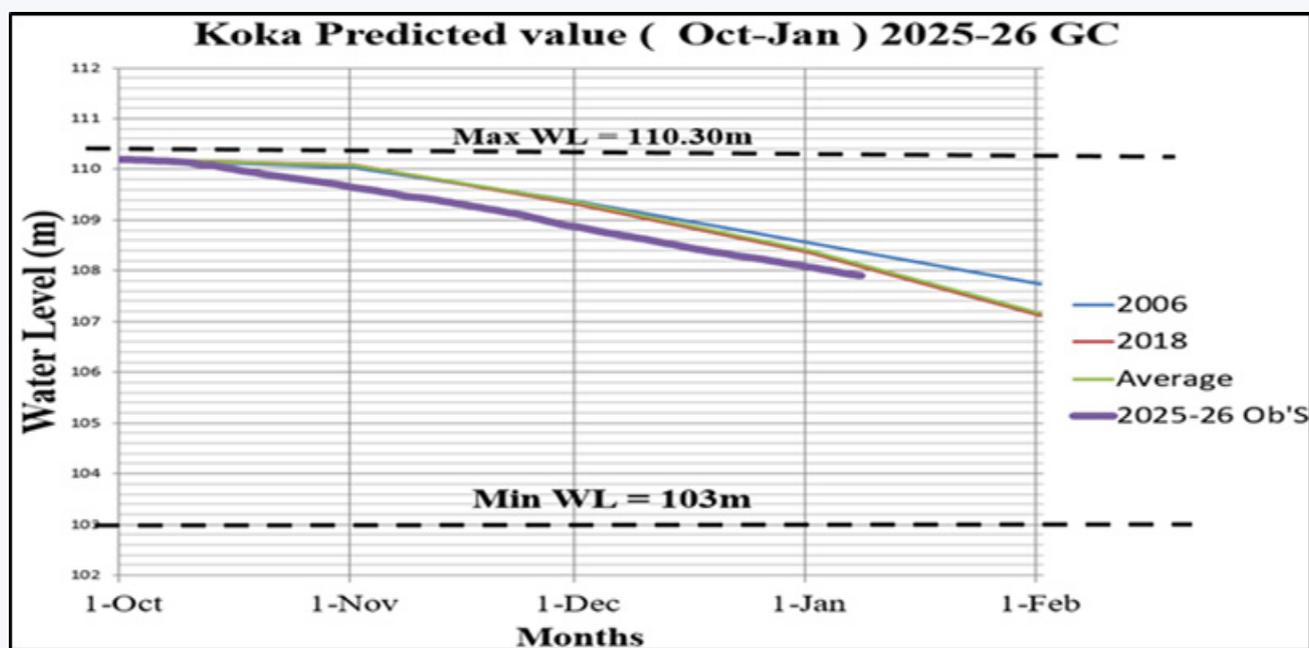


Figure 21: Predicted and observed reservoir water levels at Koka Dam in Ethiopia for OND 2025

5.3.2 Climate and Hydrological Outlook for MAM 2026 Season and Implications

According to the ICPAC forecast for MAM 2026, the probability of the above-normal category is

45%, while the probabilities of the normal and below-normal categories are 30% and 25%, respectively. Based on this information, the majority of the country will get normal rainfall.

5.3.3 Recommendations and Advisories for Stakeholders in Ethiopia

1. Follow up an update monthly and decadal forecasts disseminated by Ethiopian Meteorological Institute (EMI)
2. Provided timely advisories for irrigation managers, pastoral communities, and urban water utilities
3. Working closely with Ethiopian Electric power (EEP) for proper management on dams and reservoirs holding sufficient water on the next season and release surplus water
4. Invest in rainwater harvesting and small-scale irrigation infrastructure
5. Implement watershed management programs to improve the groundwater recharge
6. Monitor river discharge in key basins for hydro-power and downstream planning
7. Supervise irrigation and drainage structures for efficient water usage.

5.4 Kenya

Kenya falls within the Lake Victoria basin in the Horn of Africa region of East Africa with a land surface area of about 583,370 km². The Lake Victoria basin represents 8.5% of the basin drainage area in Kenya and about 1.5% in the Nile

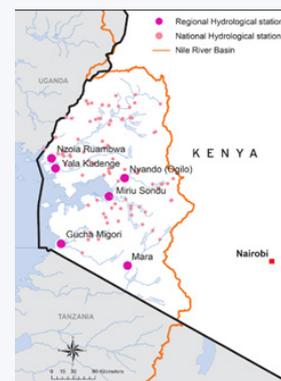


Figure 22: Map of part of the Nile Basin in Kenya.

River Basin (Figure 22). 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.

5.4.1 Performance of the JJAS 2025 Season and Impacts

The Kenya Meteorological Department (KMD) climate outlook for October-November-December (OND) 2025 indicated a likelihood of near to above average rainfall in the Lake Victoria basin. It was observed that many parts of the western Kenya received moderate to below average rainfall during the OND 2025 season. Although rivers Nzoia, Yala, Nyando, Mara Sondu and Gucha-Migori recorded increased flows in the months of October and November across, none, except the Nzoia reached the flood alert levels (Figure 23 and Figure 24). Floods were experienced in the lower Nzoia, downstream of Ruambwa in early November 2025 as well as Trans Nzoia County within the upper Nzoia which was hit by severe flooding triggered by the River Sabwani breaking its banks. The most affected areas included Namanjalala, Kapomboi, Siuna, Namawanga, Rwanda, and Tembelela where farmlands were inundated and crops destroyed.

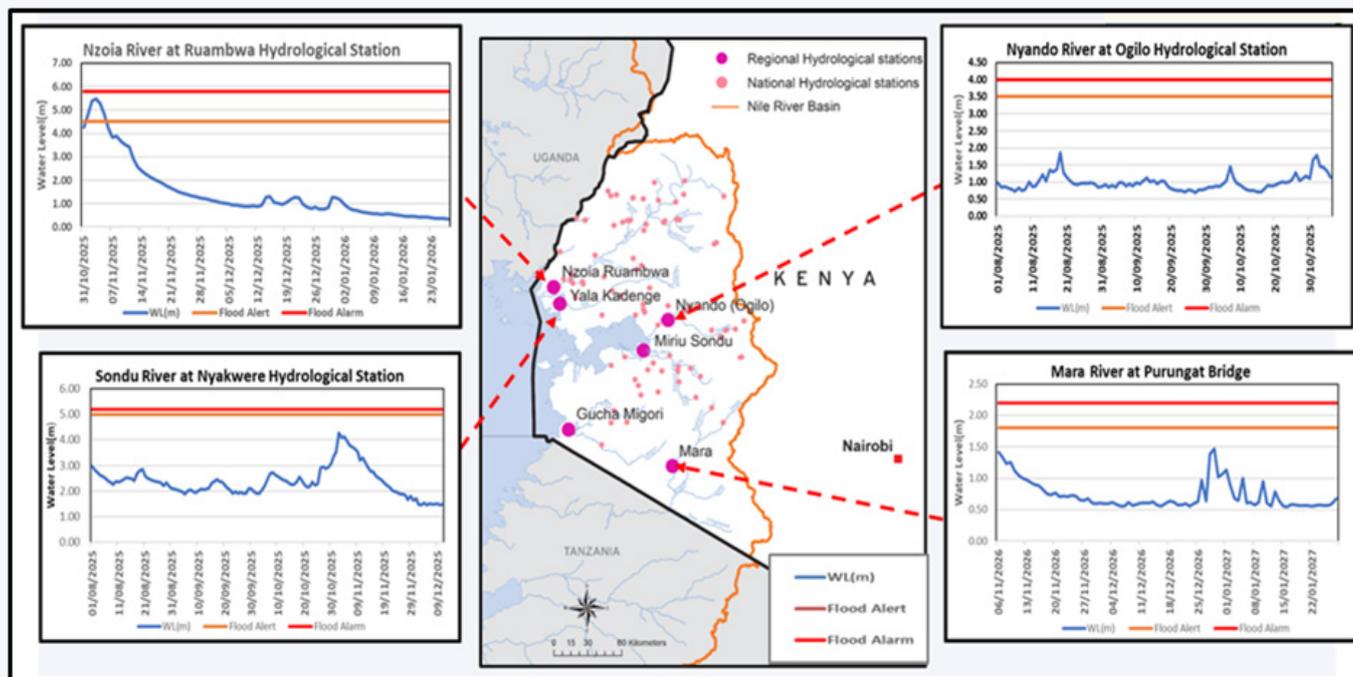


Figure 23: Observed River levels compared to flood levels in some major rivers in Lake Victoria Sub-basin.



Figure 24: Status of Mara River (left) and right: River Talek (tributary of Mara) in December 2025.

5.4.2 Climate and Hydrological Outlook for MAM 2026

The ICPAC forecast for March – April - May 2026 season indicates a 30% probability of below normal condition, 45% probability for above normal and 30% probability below normal in the Lake Victoria basin. Consequently, it is expected that rivers within the Lake Victoria basin will maintain normal to above normal flows with a possibility of overtopping the banks.

The above forecast is confirmed by the Kenya Meteorological Department (KMD) that also predicted March-April-May (MAM) 2026 long rains forecast projects near-to-above-average rainfall for West-

ern, Rift Valley, and Central Highlands, while coastal and some northern areas face below-average, uneven rainfall (Figure 25). The season, is expecting to in early March, is expected to be

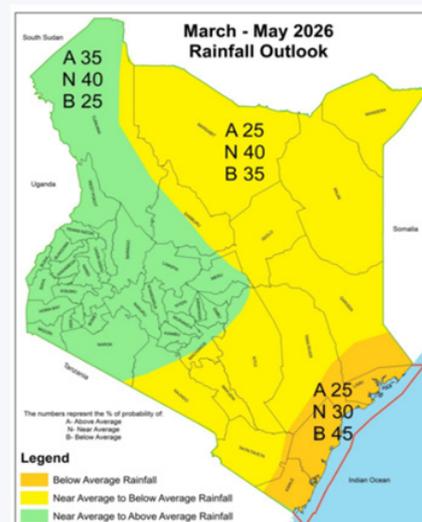


Figure 25: MAM 2026 rainfall forecast for Kenya

warm with potential for flooding in wet regions and drought in dry areas.

Simulation and forecasting of Nzoia River flow at Ruambwa indicate peak flow of 150m³/s in mid-

May 2026 (Figure 26). On the other hand, Yala River at Kadenge is forecasted to reach a peak flow of 55m³/s in mid-June 2026 (Figure 27).

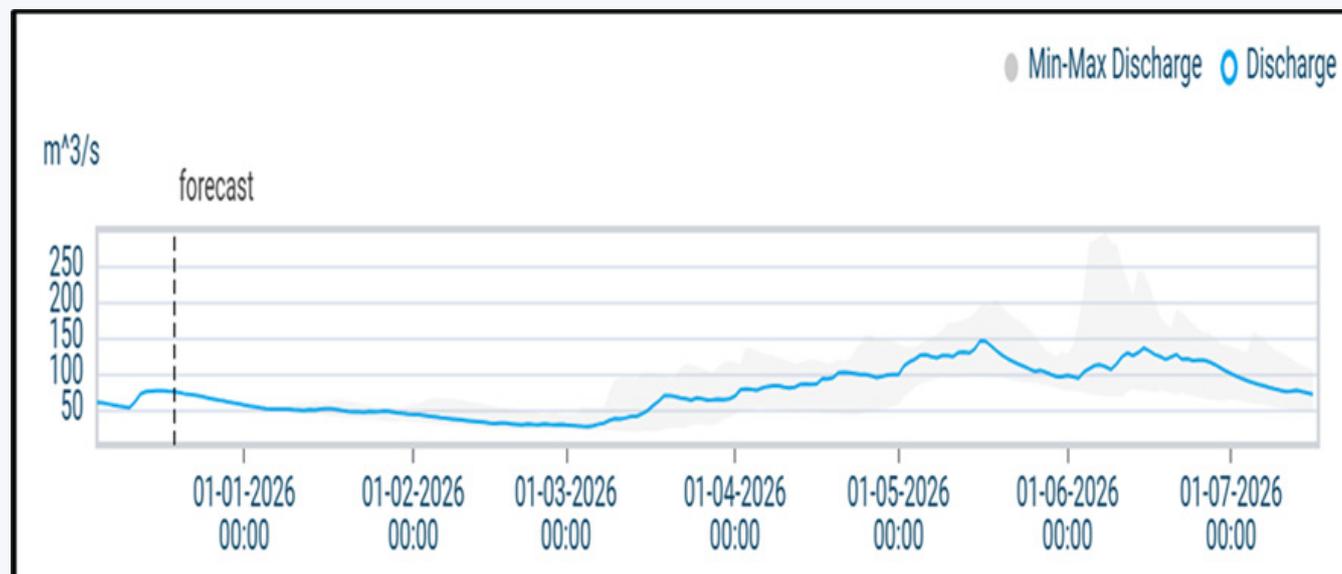


Figure 26: Nzoia River flow forecast at Ruambwa regional station for MAM 2026 Season.

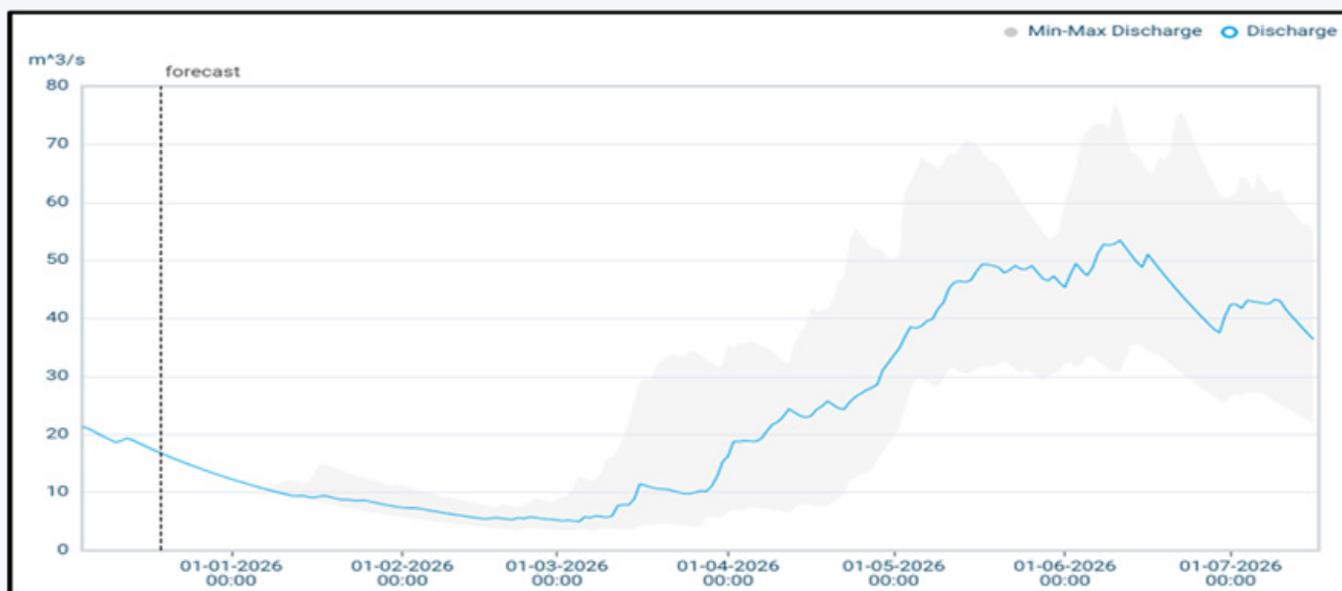


Figure 27: Yala River flow forecast at Kadenge regional station for MAM 2026 Season.

5.4.3 Implications of MAM 2026 Seasonal Outlook

Arising from the MAM 2026 rainfall forecast, increased river flows are expected across the Nzoia, Yala, Nyando, Sondu, Kuja Migori sub basins. Flooding is likely to occur in the flood prone areas within the lower reaches and shoreline 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 Ruambwa and Budalangi among others. Incidences of flash floods may occur within the urban areas and towns while the river mouths and lake shoreline areas are likely to remain inundated.

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, good crop yields are expected. Good pasture is also expected during this period. However, destruction of crops by floods may occur in the low-lying flood prone areas.
- ii. It is anticipated that there will be sufficient water resources for competing uses as well as enhanced groundwater recharge. However, low-lying areas prone to waterlogging may experience increased inundation leading to contamination of open water sources and shallow wells thereby compromising the potability.
- iii. Optimum Hydroelectric Power generation is expected at Sondu Miriu, Gogo and other small hydroelectric power plants within the basin.
- iv. Potential destruction of roads and other infrastructure may have a significant impact on the transport sector.
- v. Widespread displacement of population by floods especially in the flood prone areas may occur.

5.4.4 Recommendations and Advisories for Stakeholders in Kenya

1. Prompt dissemination of the MAM 2026 Hydrological Outlook to relevant (County/National) stakeholders.
2. Downscale the regional outlook to country hydrological outlook to affirm the advisory and actions to specific locations in Kenya.
3. The responsible agencies to issue timely Flood Early Warning/Advisories to the Vulnerable Communities and stakeholders.
4. County Governments and responsible National Government agencies to maintain/repair dykes within the Lower Nzoia, Lower Nyando, Lower Gucha-Migori and other River.
5. Respective County Governments should clear drainage systems in urban centres before the onset of the rains.
6. Continuous monitoring of river levels, flows and lake levels for regular review and updates of the forecast.
7. Maintain/ Rehabilitate the Hydrological monitoring network to ensure continuous data generation.
8. Counties and National Government to activate the flood response plans.

5.5 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 discharge into the Nile Basin (Figure 28). 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. Historically, droughts, floods, and landslides have resulted in infrastructure damage, loss of lives, livelihood and property, and increased soil erosion and water pollution.

5.5.1 Performance of the OND 2025 Season and Impacts

October-November-December is the rain season in

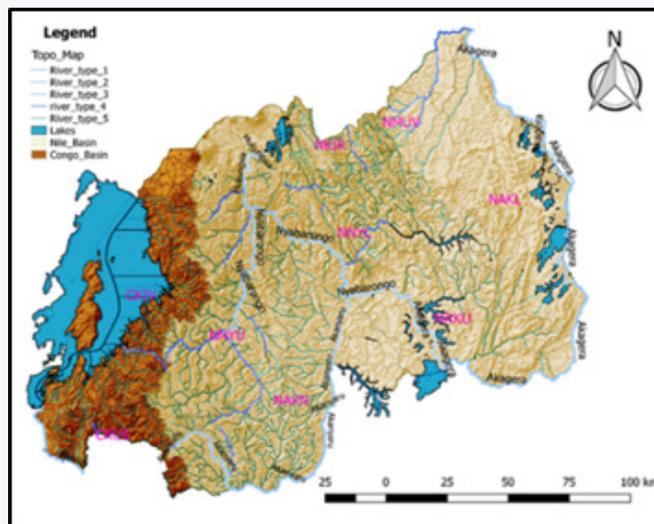


Figure 28: Rwanda drainage system

Rwanda. As it was forecasted in the seasonal hydrological outlook for OND 2025, river flows and water levels increased, which resulted in some cases of flash floods due to high rainfall intensity. It was also forecasted that a part of the Eastern Province will receive less rainfall which caused reduction in river water levels (Figure 29). This was confirmed by the reported drought cases in some parts of the Eastern Province. Equally flooding was also recorded in the areas of Nyamagabe and Kayonza districts (Figure 30).

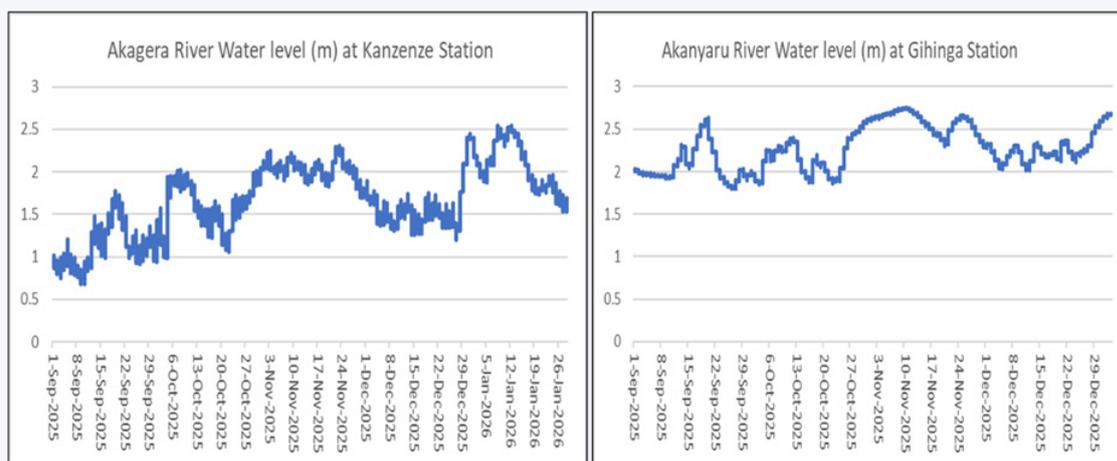


Figure 29: Recorded water levels fluctuation in Akagera and Akanyaru rivers at Kanzenze and Gihinga stations during OND 2025 season.



Figure 30: Flood incident in Kayonza and Nyamagabe Districts

5.5.2 Climate and Hydrological Outlook for MAM 2026 and Implications

The March-April-May (MAM) is the main rainy season with cases of high rainfall intensity in Rwanda. The seasonal climate outlook for the March-April-May (MAM) 2026 rainfall season published by the Rwanda Meteorology Agency (Meteo-Rwanda) indicates a high probability of slightly above-normal rainfall across the country. Rainfall amounts during this season are forecasted to range between 280 and 800 mm, while the long-term mean (LTM) rainfall ranges between 270 and 770 mm (Figure 31). Consequently, river flows are expected to increase, which may lead to riverine and flash floods as well as an increased sedimentation in rivers, lakes and dams in various areas, especially in the North-West of Rwanda.

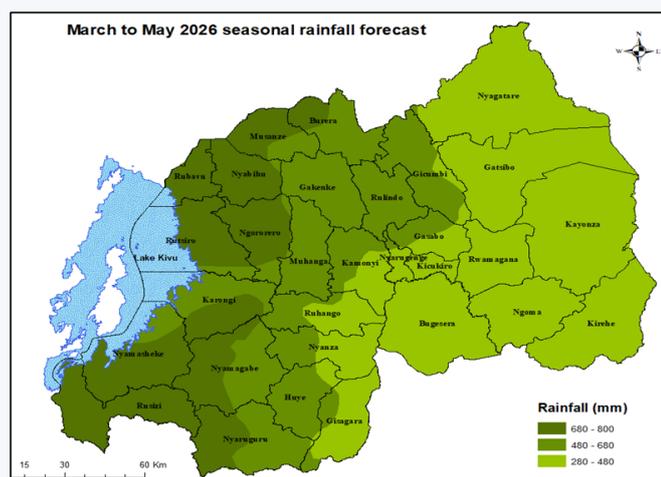


Figure 31: MAM 2026 Seasonal Rainfall Forecast for Rwanda (Meteo-Rwanda).

As the seasonal forecast presents some uncertainties, the national team should regularly monitor the changes and use the Nile Basin Flash Flood Early Warning System for short-period forecasts (2 days) for updating information to the specific areas.

5.5.3 Recommendations and Advisories

Rwanda is predicted to receive near normal to above normal rainfall which may result in flash floods in various flood hotspots and landslides, especially in the North-West part of the country. Therefore, the following recommendations are proposed to reduce the risk and enhance the opportunities.

1. The Ministry in charge of Emergency Management (MINEMA) should activate disaster response strategies in flood-prone areas.
2. Rwanda Water Resources Board (RWB) should continue monitoring real time stations and forecasting river flows for improved early warning information to the vulnerable communities.
3. Rwanda Water Resources Board (RWB) should enhance dam monitoring for dam safety assessment and enhance water storage.
4. All concerned institutions should ensure that urban drainages are cleared before and during the rainy season to provide quick and safe evacuation of peak runoff from the impervious areas in the urban centres.
5. Increase awareness of flood preparedness and mitigation measures in the communities living around flood hotspots.
6. Hydropower plants including Rusumo HP that directly depend on the river runoff are encouraged to take advantage of the increased river flows to enhance more energy production.
7. Heavy rain will trigger an increased river sedimentations and water quality deterioration which may interrupt the water treatment plants (WTP) operations i.e. Nzove WTP and Gihira WTPs.
8. To ensure rainwater harvesting and water storage for reducing downstream flood risk and mitigate water shortage in the next dry season.

5.6 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 32). 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.

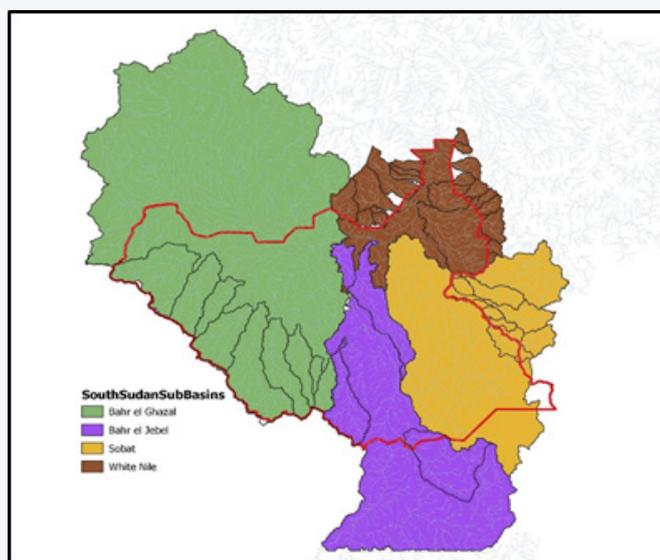


Figure 32: South Sudan drainage system

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. Under the NBI-Hydro met Project, five of these stations have been upgraded into fully functional regional hydrological observatories, enhancing real-time data acquisition and basin-wide interoperability. Furthermore, the re-activation of 18 flood emergency gauge stations under the Regional Climate Resilience Program (South Sudan Project) has significantly strengthened the country's capacity for hydrological monitoring, flood forecasting, and early warning dissemination during the 2025 flood season.

5.6.1 Performance of the OND 2025 Season and Impacts

The OND 2025 season, which coincides with the principal hydrological peak in South Sudan, generated significant basin-wide hydrological responses despite climatological anomalies characterized by sub-seasonal temperatures and near- to below-normal precipitation totals. This period exhibited peak flow conveyance, driven by antecedent catchment saturation and sustained upstream hydrological contributions, which collectively resulted in critical high-flow stages across the major river systems. The following impacts were observed and recorded;

- i. Recent riverine flooding events have resulted in the lateral expansion of floodwaters into residential zones situated along the riverbanks in Mangala, Unity, Jonglei, and Upper Nile states.
- ii. Extensive riverine flooding has impacted Bentiu and its surrounding areas, leading to the inundation of residential settlements and significant damage to critical infrastructure.
- iii. The increasing magnitude of flood events substantially elevates the risk of waterborne disease outbreaks in affected communities.

Simultaneously, the Sobat River system recorded elevated flows at Anakdiar Station, resulting from sustained inflows originating in the Ethiopian highlands and Gambela region of Baro Akobo-Sobat sub-basin. These upstream contributions significantly increased discharge into the White Nile, leading to notable water level rises at Malakal Station, a key downstream monitoring point (Figure 33).

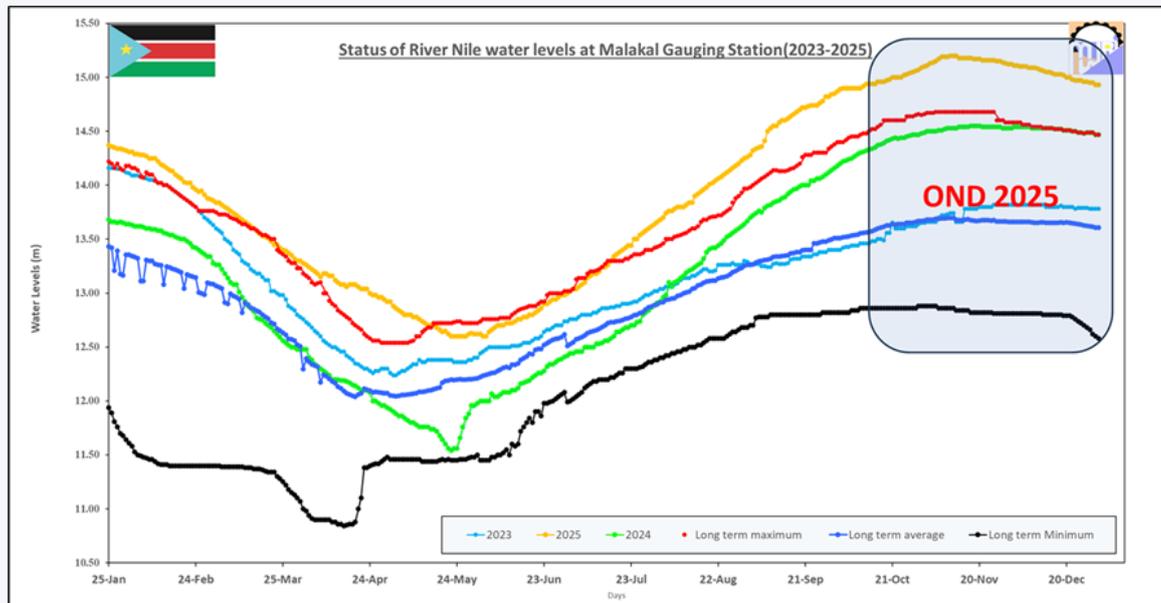


Figure 33: Nile River water levels at Malakal hydrological station

5.6.2 Climate and Hydrological Outlook for MAM 2026 and Implications

The MAM season in South Sudan is climatically distinct from the principal rainy season, characterized by pronounced spatial and temporal variability in precipitation. It is predicted that most parts of South Sudan will experience near-normal to above normal rainfall based on the ICPAC climate outlook. The Equatorial and central part of South Sudan will experience near normal rainfall while the northern and central basins, including the Bahr El Ghazal and White Nile systems, remain largely dry, resulting in negligible recharge and minimal hydrological contribution, thereby underscoring the season's secondary role in basin-wide And light and scattered rainfall will occur mainly in the Equatoria region, insufficient to offset soil moisture deficits outside this zone. Hydrologically the River flows and water levels at key monitoring stations and tributaries are expected to decline toward normal or below-normal seasonal thresholds. Groundwater recharge will remain negligible, with limited aquifer replenishment. Therefore, the following are the expected implications of the projected hydrological changes.

- i. The current status observations indicate a basin-wide reduction in discharge across the Nile system.
- ii. The observed decline in river water levels is expected to lessen flood hazards in traditionally flood-prone zones, most notably within the Sudd wetlands and the Bahr El Ghazal lowlands.
- iii. Projected increases in ambient temperatures, coupled with declining river flows, are expected to intensify water demand across multiple sectors.
- iv. With declining river flows and heightened water demand, rural communities are expected to intensify reliance on rainwater harvesting and localized storage systems.
- v. Localized rainfall events during the early part of the season are likely to provide favorable conditions for short-cycle crops in the Equatoria region, supporting timely planting and early growth. However, northern and central basins are expected to experience delayed rainfall onset and reduced precipitation intensity, limiting agricultural potential and constraining soil moisture availability will face soil moisture deficits, constraining planting options.

5.6.3 Recommendations for Stakeholders in South Sudan

Based on the current observations and the forecast for the MAM season, the following recommendations and advisories are hereby issued to provide guidance on the necessary actions that reduce the risk and enhance optimal

1. Sustained real-time monitoring should be maintained across all operational gauging stations situated at critical hydrological control points.
2. Weekly water level bulletins should be systematically disseminated to relevant ministries, state authorities, and river transport operators to support evidence-based decision-making on navigation safety, water abstraction planning, and resource allocation.
3. The prevailing dry season provides an optimal window for undertaking essential maintenance of flood protection infrastructure.
4. It is imperative to prioritize the maintenance, cleaning, and strategic expansion of existing water storage infrastructure.
5. The anticipated seasonal decline in river discharge will result in reduced navigable depths, thereby constraining channel capacity and posing operational challenges for medium- and heavy-draft vessels.
6. The onset of rainfall during the MAM season is expected to trigger substantial mobilization of sediments and solid waste from upstream micro-catchments into the primary river systems. Consequently, water treatment intake facilities should prepare for episodes of markedly elevated turbidity and increased particulate loading.

5.7 Sudan

Sudan has a total land area of approximately 1.864 million km², of which about 1.4 million km² lies within the Nile River Basin, representing nearly 75% of the national territory and approximately 44% of the total Nile Basin drainage area. Within Sudan, the basin comprises the Blue Nile, White Nile, and Atbara River sub-basins. The Blue Nile and White Nile converge at Khartoum, forming the main Nile River, which flows northward for approximately 1,755 km before entering Egypt and reaching the High Aswan Dam (Figure 34). The hydrological regime of the Nile in Sudan is characterized by pronounced seasonality driven by monsoonal rainfall over the Ethiopian Highlands, with the majority of annual discharge occurring during the July–October period. This seasonal pattern is primarily, which contributes most of the flow to the Blue Nile and Atbara River, while the White Nile provides a more regulated baseflow, driven by rainfall over Equatorial Nile systems.

The Nile constitutes a critical socio-economic and environmental resource for Sudan. It supports extensive irrigated agriculture, supplying water for key crops such as cotton, wheat, and sorghum, and underpins some of the country's most productive agricultural systems. The river also plays a central role in hydropower generation, with major infrastructure such as the Merowe Dam depending on sustained river flows for electricity production. In addition, Nile flows contribute to the recharge of major groundwater systems. The Nile functions as an important inland transportation corridor and supporting regional trade and connectivity.

Sudan is one of the most downstream countries within the Nile River system, receiving the majority of its surface water inflows from upstream trans-boundary sources, including both the Eastern Nile and the Equatorial Nile systems. The White Nile flood regime in Sudan is primarily influenced by inflows from the Equatorial Nile (Bahr el-Jebel) and

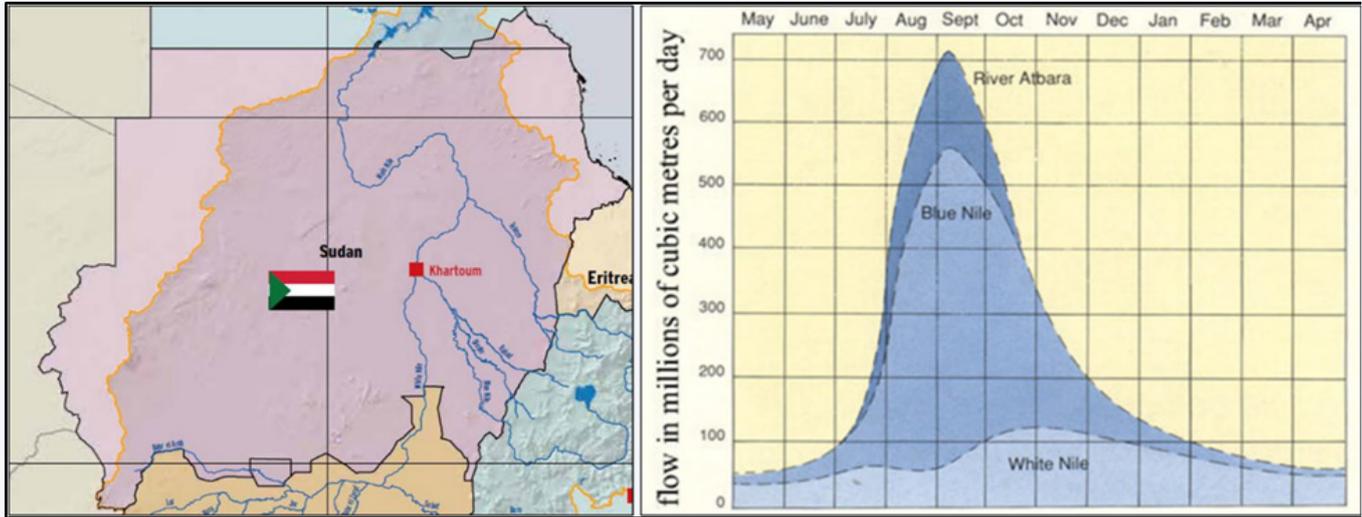


Figure 34: Nile Basin in Sudan and Nile Hydrograph

the Sobat River, the latter draining the Baro–Ako-bo sub-basin in southwestern Ethiopia. As a result, seasonal climate forecasts (OND) period over the Equatorial Nile region and southwestern Ethiopia are of critical importance for anticipating White Nile riverine flooding in Sudan. In contrast, seasonal climate forecasts over Sudan itself are particularly important for assessing the risk of flash flooding, which is primarily driven by intense, short-duration rainfall events rather than upstream river discharge. Flash floods in Sudan typically occur during the June–October rainy season.

5.7.1 Performance of OND 2025 Season and Impacts

According to the Sudan Meteorological Authority (SMA), seasonal forecasts for the period October to December indicate predominantly dry conditions across most parts of Sudan. This aligns with the country’s typical dry season, which normally extends from November to May. The only exception was expected along the Red Sea Coast, where relatively more humid or less arid conditions may prevail compared to inland regions (Figure 35).

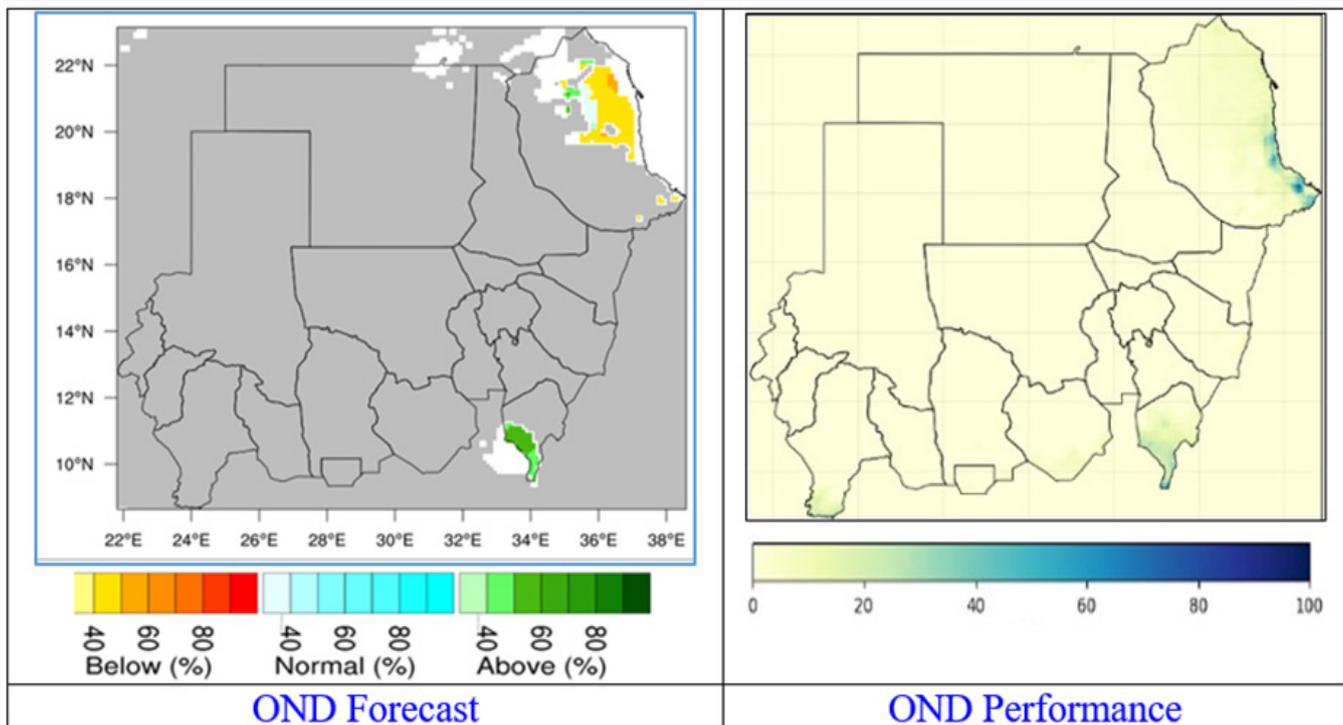


Figure 35: OND 2025 Prediction and performance

The forecasted and performance dry pattern of (OND 2025) season –within Sudan, was consistent with climatological norms. No significant deviations from typical dry-season behaviour were reported over most of Sudan. The estimated White Nile inflows to Jebel Aulia Dam indicated unprecedented above-normal discharge during the reporting period. This elevated inflow is consistent with enhanced upstream contributions from the Equatorial Nile and Sobat (Baro–Akobo) sub-basins, reflecting wetter-than-average conditions in those catchments.

In contrast, flows in the Blue Nile are currently subject to significant regulation due to the filling and operational commissioning of the Grand Ethiopian

Renaissance Dam (GERD). Consequently, downstream discharge into Sudan reflects controlled release patterns rather than purely natural hydrological variability. Similarly, flows in the Setit (Upper Atbara) River are influenced by the operation of the Tekeze (TK5) Dam, further moderating seasonal flow variability entering eastern Sudan (Figure 36). As a result, while White Nile inflows exhibited exceptional hydrological conditions, discharge in the Blue Nile and Setit systems was strongly shaped by reservoir regulation and operational management, highlighting the increasing role of infrastructure in modifying the natural flow regime of the Nile within Sudan.

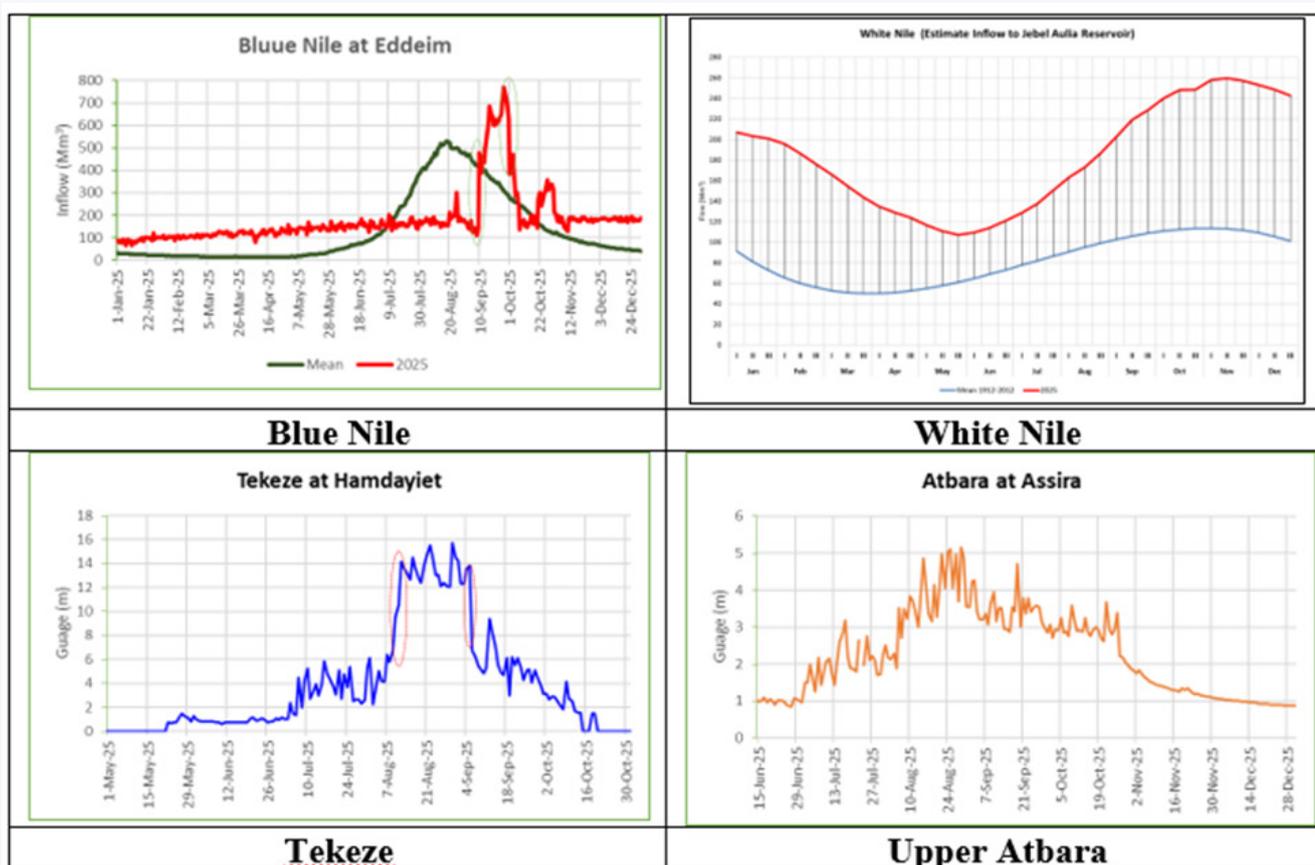


Figure 36: Observed River flow at various hydrological stations in the Nile and tributaries Sudan.

5.7.2 JClimate and Hydrological Outlook for OND 2025 and Implications

ICPAC and SMA Climate outlook for March to May 2026 Season forecast, indicates a dry season probability over most of Sudan, which is consistent

with climatological norms (Figure 35). On the other hand, Nile flows are subject to above/near normal rains over Equatorial Nile and Ethiopian high lands.

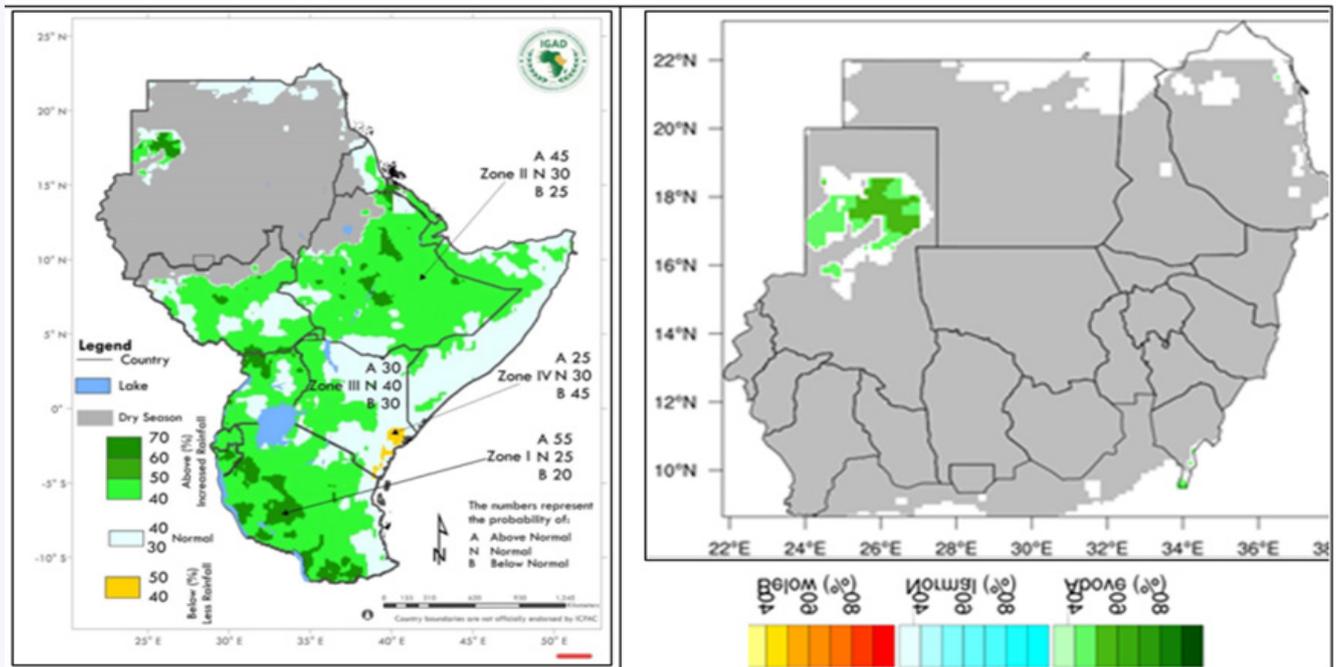


Figure 37: ICPAC and SMA Seasonal forecast for MAM 2026.

5.7.3 Recommendations and Advisories

1. As the most downstream country receiving riverine flood from Lake Plateau and Ethiopian Highlands, the Seasonal forecast JJAS and OND by ICPAC is an essential outlook for planning in Sudan.
2. For water resources management and flood early warning, NBI products (NB-RFFS), (EN-NEWS) are of great importance as well.
3. For flash flood, Sudan relies on the forecast of SMA (Sudan Meteorological Authority) and the Nile Basin Flash Flood Early Warning System (NB-FFEWS). NB-FFEWS has become the basis for Sudan's Daily flash flood bulletin.
4. For better performance in Sudan, as the downstream country, the regional monitoring network and exchange of transboundary data and information have to be enhanced

5.8 Tanzania

Tanzania lies in the upstream part of the Nile Basin, covering approximately 945,100 km², of which about 12% falls within the Nile River Basin. This area represents around 2.7% of the entire Nile Basin drainage area. The Lake Victoria Basin within Tanzania supports a population of about 15 million people and is divided into five catchments: Kagera, Mara, Simiyu, Magogo-Moame, and Isanga (Figure 38). The main rivers in these catchments include the Kagera, Simiyu, Mbarageti, Grumeti, Duma, Mara, Ngono, Magogo-Moame, Isanga, and Mori.

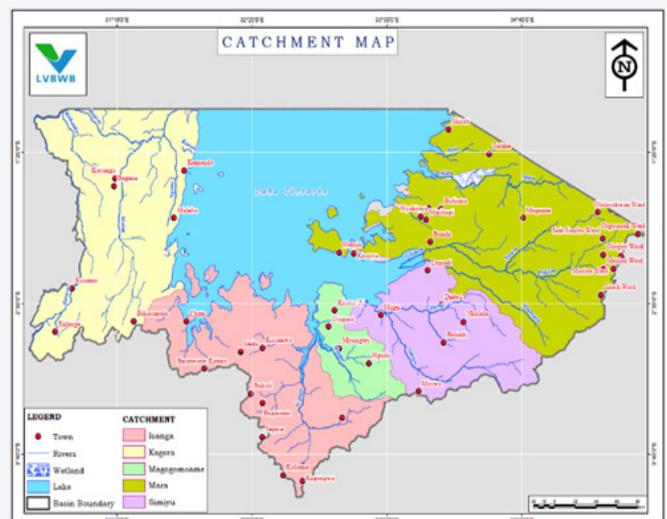


Figure 38: Lake Victoria drainage basin in Tanzania

5.8.1 Performance of OND 2025 Season

The October–November 2025 seasonal forecast issued by TMA projected rainfall totals of up to 200 mm in parts of the Basin. Observed rainfall during this period ranged from 50 mm to 300 mm, indicating general agreement with the forecast despite

localized exceedances. However, the December 2025 forecast indicated predominantly dry conditions, whereas observed data show that December was the wettest month of the season, representing a significant deviation from the forecast (Figure 39 and Figure 40).

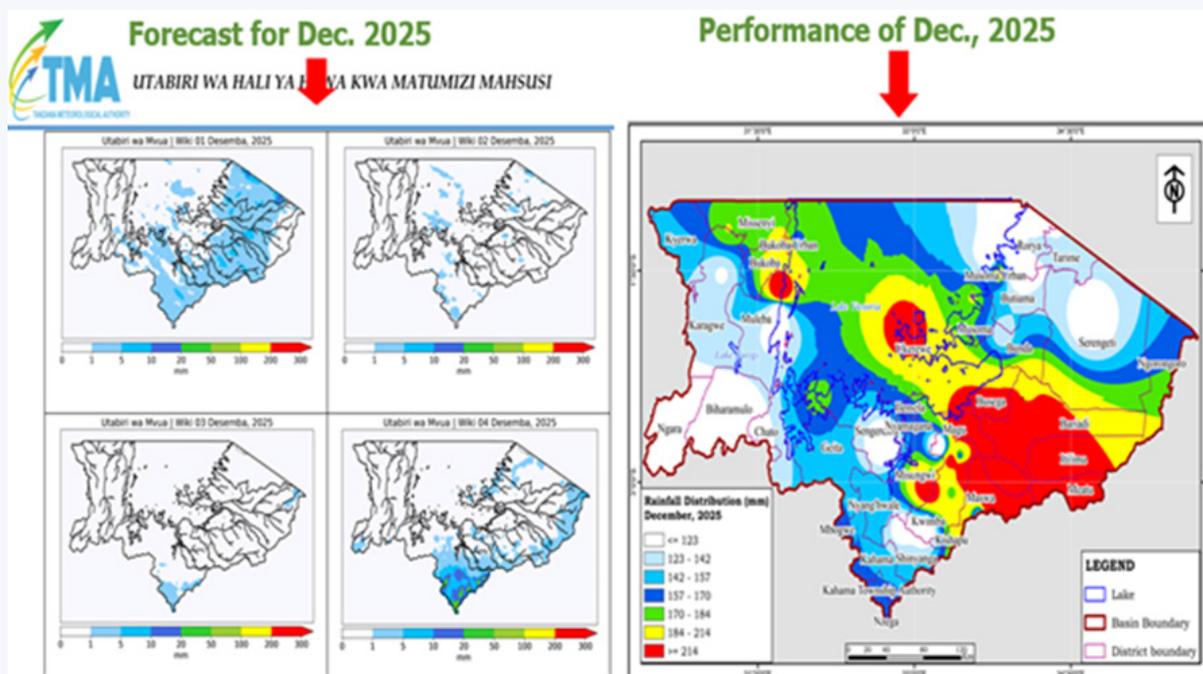


Figure 39: Forecasted versus observed rainfall



Figure 40: Floods in different areas within the Basin for the Tanzanian side

Data from both regional and national hydro-meteorological monitoring stations for OND 2025 indicate a decline in Lake Victoria water levels compared to OND 2024 (Figure 41). Despite this decline, lake levels remained above the long-term average (LTA). With respect to inflows particularly from the Kagera River the forecasted and observed

inflows behaved differently than expected, although there was no water stress in the basin.

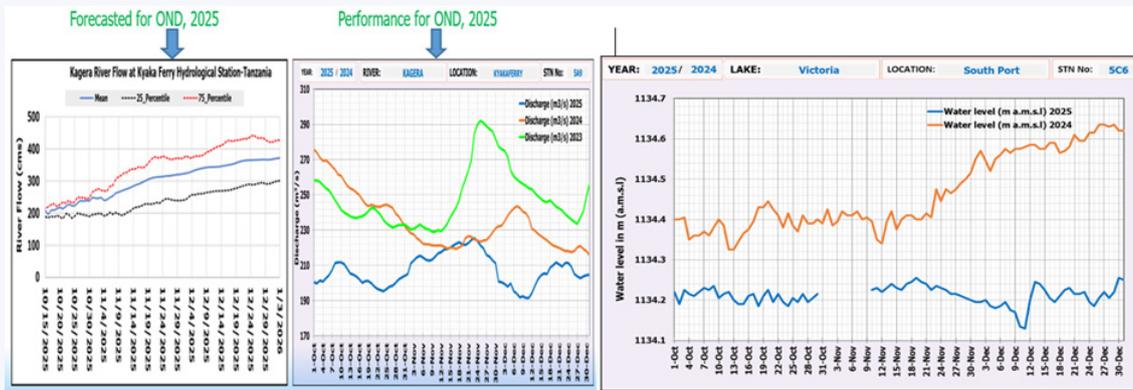


Figure 41: Flow OND forecast vs Observed and Lake water levels for OND 2025 vs OND 2024

5.8.2 Climate and Hydrological Outlook for MAM 2026 and Implications

According to the forecast released by IGAD during the 72nd Greater Horn of Africa Climate Outlook Forum (GHACOF72), most parts of Tanzania are expected to receive normal to above-normal rainfall. This implies that the country is likely to receive rainfall ranging from 600–700 mm (classified as normal) and amounts exceeding 700 mm, which are termed above-normal rainfall. Therefore, the implications of the forecasted normal to above-normal rainfall in Tanzania include the following:

1. Water Resources

- i. Increased river flows, reservoir levels, and groundwater recharge.
- ii. Improved water availability for domestic, industrial, and hydropower use.
- iii. Potential risk of flooding in low-lying areas and along major river basins if rainfall exceeds normal levels.
- iv. Increased water treatment costs for water supply due to high sediment levels in various water sources.

2. Agriculture and Food Security

- i. Favourable conditions for crop growth, especially rain-fed agriculture.
- ii. Increased crop yields if rainfall is well distributed.

- iii. Risk of crop damage, waterlogging, or post-harvest losses in areas receiving excessive rainfall.

3. Disaster Risk and Infrastructure

- i. Higher likelihood of floods and landslides, particularly in flood-prone and highland areas.
- ii. Possible damage to roads, bridges, and housing in vulnerable communities.
- iii. Need for preparedness and early warning measures.

4. Energy Sector

- i. Improved hydropower generation due to higher reservoir inflows such as Rusumo Hydropower Station.
- ii. Reduced reliance on alternative energy sources during dry periods.

5.8.3 Recommendations and advisory

Generally, while the forecast presents significant opportunities for water availability and agricultural productivity, it also calls for enhanced flood preparedness and risk management to minimize potential negative impacts.

1. i. Conduct pre-season water resource assessments i.e map storage levels in dams, reservoirs, and wells.
2. ii. Plan strategic water allocation: Prioritize

use for drinking, livestock, irrigation and critical services if dry conditions materialize.

3. Enhance river monitoring systems: Install/maintain gauges on key rivers to track rising levels and support forecasts.
4. Regularly update plans using short-range forecasts (daily & 10-day forecasts from TMA).
5. Optimal preparedness involves combining the seasonal forecast with local real-time weather updates and community-level observation systems.
6. Coordination between water authorities, agriculture services, health departments and disaster management teams will improve resilience to both flooding and moisture deficits.
7. Integrate climate and hydrological data systems to enhance anticipatory action planning.
8. Strengthen disease surveillance for malaria, cholera and diarrhoeal diseases during peak rain periods.
9. Clear and maintain drainage in settlements, farms and along roads.
10. Develop local flood action plans including evacuation routes, shelters, and emergency supplies.

5.9 Uganda

Uganda, a landlocked country in Eastern Africa, lies almost entirely within the Nile Basin, with 98% of its 235,880 km² territory contributing about 7.4% of the basin's drainage area. Its hydrology is dominated by a network of rivers, lakes, wetlands, and aquifers, with Lake Victoria as the principal source of the White Nile River (Figure 42). The Victoria Nile links Uganda's major lakes Victoria, Kyoga, and Albert, forming a natural regulation system that buffers seasonal variability and sustains flows downstream. The country's equatorial climate with bimodal rainfall supports relatively stable runoff, while tributaries, wetlands, and groundwater maintain base flows and ecological balance. Uganda's water system underpins hydropower, irrigation, and navigation, making it central to Nile Basin water security and cooperation.



Figure 42: Drainage system in Uganda

5.9.1 Performance of OND 2025 Season and Impacts

Most parts of the country received near normal rainfall; Mt. Elgon region received an average of 758.7mm of rainfall as reported from Buginyanya meteorological station in the Eastern part of the country and Karamoja sub region 309mm at Kotido meteorological station (Figure 43 and Fig-

ure 44). There was a delayed onset of rainfall followed by an early dry spell from mid-November to December. The variation in the amount of rainfall received within the season, there was a relative decrease in water level in relation to the maximums ever recorded on average for the season; Lake Victoria recorded 0.86m, Lake Kyoga 0.32m and Lake Albert 0.44m below their maximums, hence, the observed water levels for the season for the three lakes were below the maximums ever recorded (Figure 45). However, flooding was observed in the areas of Kampala and Mt. Elgon (Figure 46)

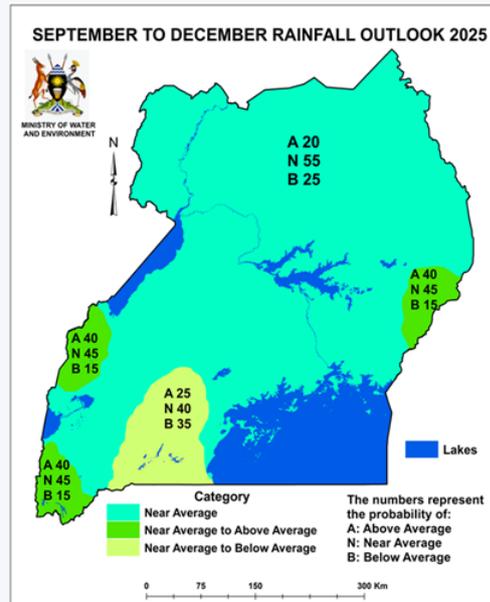


Figure 43: Uganda SOND 2025 prediction

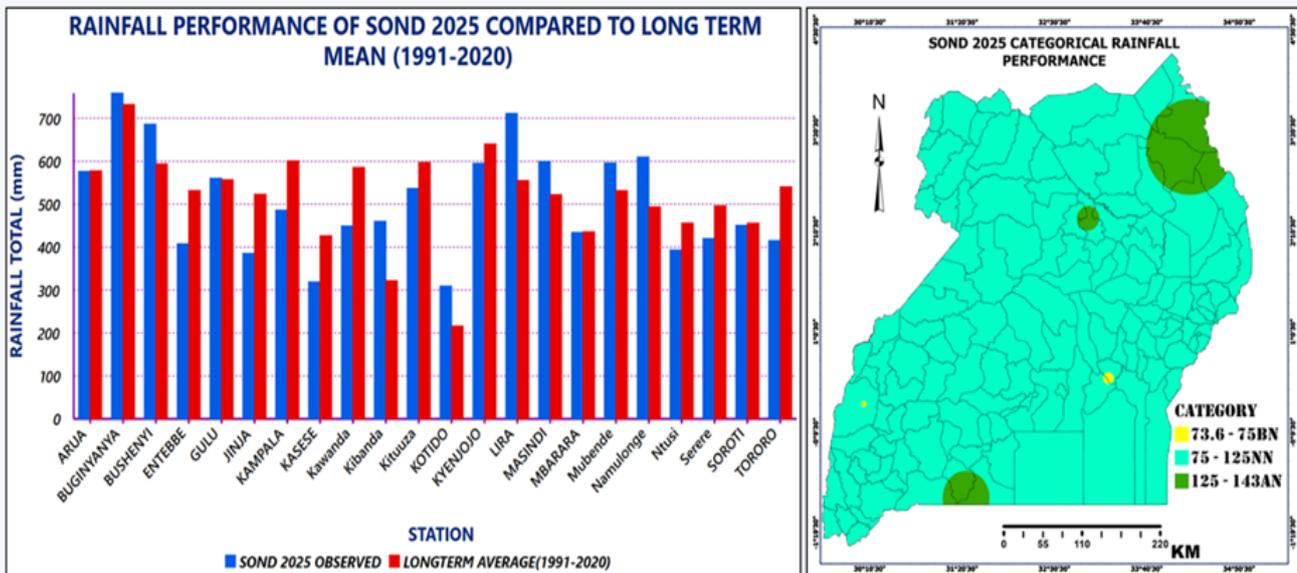


Figure 44: Performance of SOND rainfall in Uganda.

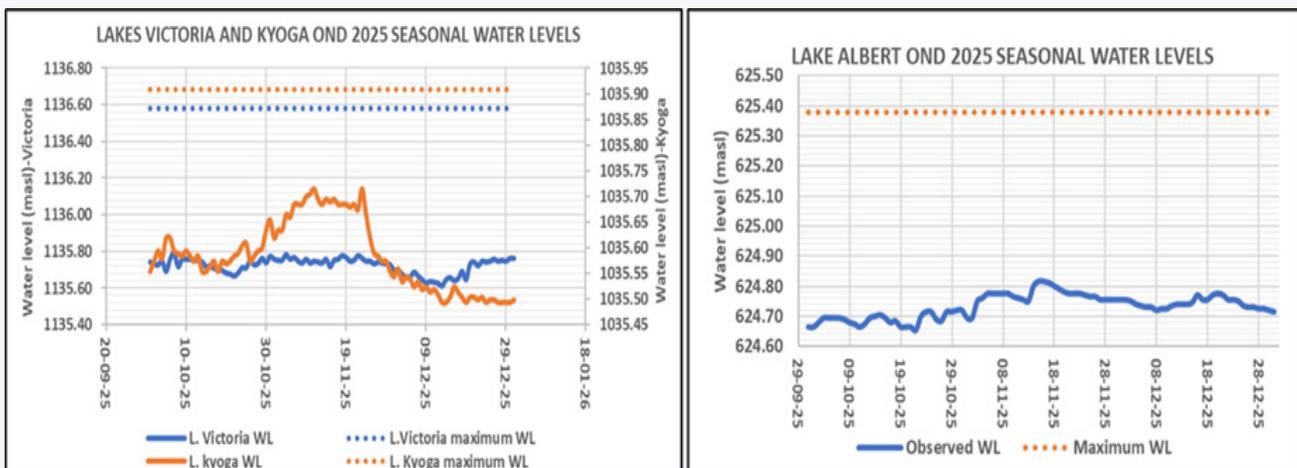


Figure 45: Observation on Lake Victoria, Kyoga and Albert OND 2025 season.

Flood instances around Kampala suburbs and the Mt. Elgon region



Floods around Kampala suburbs; 31st /10/2025



Effect of land and mud slides over Mt Elgon ranges; 31st – 01st /10/2025

Figure 46: Incidences of flood occurrence in Uganda during the OND 2025 Season.

5.9.2 Climate and Hydrological Outlook for MAM 2026 and Implications

Climate outlook for March to May 2026, indicates a probability of 45% near to above normal rains over most parts of Uganda. With 30% for the occurrence to have normal and 25% below normal rains. Hydrologically, water levels are expected to rise in the MAM 2026 season even flooding as the major lakes' water levels are still relatively high

5.9.3 Recommendation and Advisory

1. Continued monitoring of water levels to manage the outflow from the lake and floods.
2. Water user committees are encouraged to ensure proper maintenance, as well as hygiene and sanitation, around water sources.
3. Monitoring and removal of floating islands in Lake Victoria and Kyoga.
4. Leverage on the established channels to share notifications to downstream countries, mainly South Sudan.
5. Improved dissemination of the forecasted information to the communities and stakeholders in the form of bulletins, community baraza.

6.0 BASIN WIDE IMPLICATION AND ADVISORY

The March–April–May (MAM) rainfall season is a critical hydrological period for the Nile Equatorial Lakes (NEL) Region, Eastern Nile Equatorial tributaries, parts of the Sudd, and eastern sub-basins of the Nile Basin. Rainfall during this season significantly influences Lake Victoria water levels, Kagera River flows, White Nile inflows, Soil moisture and groundwater recharge and Flood and drought risk patterns. However, the hydrological responses across the basin during this MAM season are expected to vary depending on the spatial and temporal distribution of rainfall..

6.1 Increased likelihood of above normal rainfall

The regional climate outlook indicates an increased likelihood of above-normal rainfall across significant parts of the Nile Basin during the MAM 2026 season. This forecast, informed by regional climate centers including the ICPAC and aligned with basin-wide monitoring under the Nile Basin Initiative, suggests enhanced precipitation over key headwater regions of the White Nile and Blue Nile systems. The above-normal rainfall in these upstream catchments—particularly over the Lake Victoria Basin and the Ethiopian Highlands—has important hydrological implications, including increased river flows, rising lake levels, elevated reservoir inflows, and a heightened risk of localized flooding in vulnerable low-lying areas. While these conditions might improve water availability for hydropower generation, irrigated and rainfed food production, and ecosystem recharge, proactive preparedness and coordinated transboundary water management will be essential to mitigate potential flood-related impacts and optimize basin-wide benefits. Therefore, the following hydrological responses are expected:

- Increased surface runoff across the Lake Victoria Basin- Kagera, Nzoia, Nyando,

Sondu-Miriu, and other tributaries

- Rising water lake levels (Victoria, Kyoga, Albert, Edward)
- Increased White Nile flows downstream to South Sudan and Sudan
- Elevated flood risk in flood-prone areas including:
 - o Lake Victoria shoreline communities
 - o Sudd wetlands expansion in South Sudan
 - o Low-lying areas along the White Nile
- Decreasing water level trend in Lake Tana
- Increased sediment transport in highland catchments

6.1.1 Sectoral Implications

Hydropower

- Improved inflows at Nalubaale–Kiira, Rusumo, Sondu-Miriu and other run-of-river schemes
- Higher energy generation potential
- Possible spillway releases if reservoir levels rise rapidly

Agriculture

- Enhanced soil moisture conditions
- Improved pasture regeneration
- Risk of crop waterlogging in poorly drained areas

Water Resources

- Improved groundwater recharge
- Enhanced water availability for domestic and irrigation use

6.1.2 Key Recommendations and Advisories

i. Hydrological Monitoring and Forecasting

- Strengthen real-time hydrometeorological monitoring across the basin through national agencies and coordination.
- Enhance short- and medium-range flood forecasting, particularly in major tributaries of the White Nile and Blue Nile systems targeting flood prone areas..
- Increase data sharing among riparian countries in line with Nile Basin Interim Data and Information Sharing Protocol to support anticipatory decision-making and actions.

ii. Flood Risk Preparedness and Early Warning

- Activate and continuously update Early Warning Systems (EWS) in flood-prone areas, especially along the main Nile, the Sudd wetlands, the Blue Nile corridor, and downstream floodplains.
- Pre-position emergency response resources and reinforce community-based early warning information and disaster preparedness mechanisms.
- Conduct public awareness campaigns to inform communities about potential flood risks and safety measures.

iii. Reservoir and Hydropower Operations - Operators

- Optimize reservoir operation rules to balance flood control and water storage objectives, particularly for major dams in upstream and downstream reaches of the Nile.
- Increase coordination among hydropower operators to manage inflows efficiently and reduce downstream flood peaks.
- Inspect dam safety infrastructure and spill-

way readiness in anticipation of high inflow events.

iv. Agriculture and Water Resources Management

- Promote timely planting and drainage management in areas likely to benefit from enhanced soil moisture.
- Implement soil and water conservation measures to reduce erosion in highland catchments.
- Encourage efficient water storage, invest in storage tanks to capitalize on the abundant rainfall for domestic and agricultural use for dry-season use.

v. Navigation, Infrastructure, and Urban Planning

- Monitor river transport corridors for rising water levels and potential hazards.
- Clear urban drainage systems to minimize flash flooding in rapidly growing towns and cities within the basin.
- Safeguard critical infrastructure such as bridges, roads, and water supply systems in flood-prone zones.

vi. Transboundary Coordination

- Convene technical consultations among riparian states to review evolving hydrological conditions and coordinate adaptive measures.
- Align national contingency plans with basin-wide strategies to ensure harmonized responses and maximize shared benefits.

Overall, proactive preparedness, strengthened coordination, and adaptive water management will be essential to mitigate flood risks while leveraging the opportunities presented by above-normal rainfall across the Nile Basin.

6.2 Increased Likelihood of below normal rainfall

The MAM 2026 Seasonal Climate Outlook indicates an increased likelihood of below-normal rainfall to be experienced in some parts. This projection suggests suppressed precipitation over key headwater regions of the White Nile and Blue Nile systems. This condition will result in reduced river flows, declining lake levels, lower reservoir inflows, and increased pressure on water supply systems could negatively affect hydropower generation, irrigated agriculture, livestock, navigation, and ecosystem services, particularly in downstream arid and semi-arid areas. Proactive water resources management, strengthened monitoring, and coordinated transboundary response mechanisms will therefore be critical to mitigate potential drought-related impacts and safeguard socio-economic stability across the basin.

6.2.1 Recommendations and Advisories

i. Strengthened Hydrological Monitoring and Drought Surveillance

- Intensify real-time monitoring of rainfall, river flows, lake levels, groundwater, and reservoir storage through national hydro-meteorological services coordinated by the Nile Basin Initiative.
- Enhance seasonal-to-sub seasonal forecasting and drought outlook updates from the IGAD Climate Prediction and Applications Centre to support anticipatory planning.
- Establish regular basin-wide technical briefings to assess evolving hydrological deficits and emerging hotspots.

ii. Reservoir and Hydropower Operations

- Adopt conservative reservoir operation strategies to preserve storage and prioritize critical water uses.
- Optimize hydropower generation schedules

to balance energy production with long-term water security.

- Conduct coordinated reservoir releases among upstream and downstream operators to reduce abrupt shortages and maintain environmental flows where feasible.

iii. Water Supply and Demand Management

- Implement water conservation measures in urban and rural supply systems to minimize losses.
- Promote efficient irrigation practices (e.g., drip irrigation, deficit irrigation scheduling) to reduce water demand.
- Prioritize water allocation for essential domestic use, public health, and strategic economic sectors.

iv. Agriculture and Food Security

- Encourage drought-tolerant crop varieties and adjusted planting calendars aligned with rainfall projections.
- Promote soil moisture conservation practices such as mulching and conservation tillage.
- Strengthen food security monitoring and contingency planning in vulnerable communities.

v. Ecosystem and Environmental Protection

- Monitor wetland systems, including the Sudd and other sensitive ecological zones, for signs of hydrological stress.
- Protect minimum environmental flows to sustain aquatic ecosystems and biodiversity.

vi. Transboundary Coordination and Policy Response

- Convene riparian technical and policy-level consultations to ensure harmonized

drought response strategies.

- Facilitate transparent data sharing and joint risk assessments to minimize tensions and support cooperative water management.
- Align national drought contingency plans with basin-wide adaptation frameworks.

Overall, early preparedness, coordinated trans-boundary action, and adaptive water management will be essential to reduce socio-economic impacts and enhance resilience to below-normal rainfall conditions across the Nile Basin.

7.0 ACKNOWLEDGMENT

The Nile Basin Initiative (NBI) expresses its profound gratitude to the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) for its generous funding and steadfast support, provided through the German Federal Ministry for Economic Cooperation and Development (BMZ), under the project “Support to Transboundary Cooperation in the Nile Basin.” This initiative has been instrumental in fostering regional collaboration and advancing sustainable water resource management across the Nile Basin. We also extend our heartfelt appreciation to the regional expert members for their invaluable contributions and expertise. Special gratitude is owed to the IGAD Climate Prediction and Applications Centre (ICPAC), the Lake Victoria Basin Commission (LVBC), and The World Meteorological Organization (WMO) for their dedicated support to the Nile Basin Regional Expert Working Group on Hydrology forum. Their collective efforts have significantly strengthened regional cooperation and enhanced the hydrological knowledge base critical to the unsustainable development of the Nile Basin.

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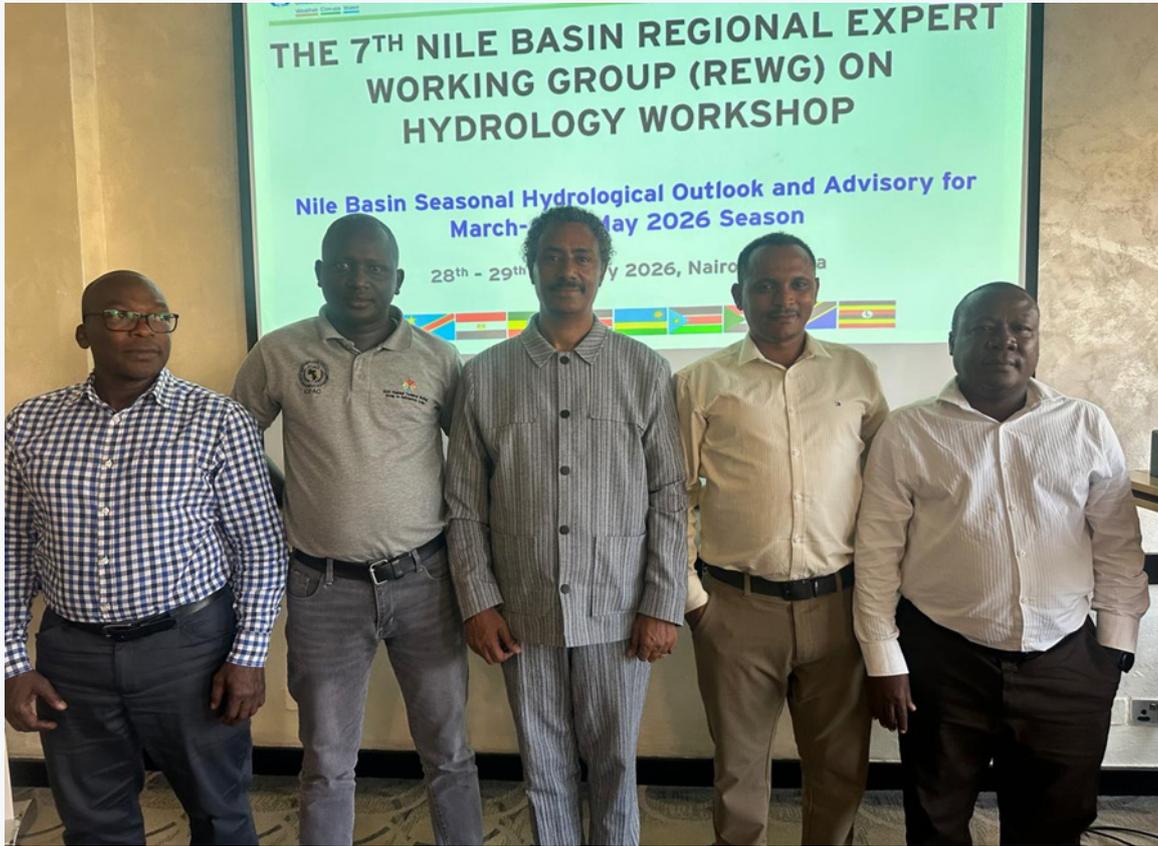


Group Photo for some of the Nile Basin Regional Expert Working Group on Hydrology –at the 72nd Greater Horn of Africa Climate Outlook Forum (GHACOF 72).



Group Photo: Nile Basin Regional Expert Working Group on Hydrology –at the 7th Seasonal Hydrological Outlook and Advisory Workshop in Nairobi Kenya.

Front Row: (L-R) Dr. Nancy Koech (rep Nile-TAC Kenya), Eng. Stephen Ogwete (rep Nile TAC Uganda), Dr. Abrah Adugna (Deputy Executive Director NBI), Dr. Ahmed Amdihun (Head of Disaster Risk Management Unit, ICPAC) and Dr. Malte Grossman (Head of Transboundary Water Cooperation Programme at GIZ).



Heads of National Hydrological Services Mr. Reuben Ngesa (Kenya), Eng. Ferdinand Kirura (Burundi), Eng. Micheale Brhane (Ethiopia) and Dr. Benon Zaake (Uganda) pose for a photo with the Deputy Executive Director NBI at the 7th Regional Expert Working Group on Hydrology Workshop for the Seasonal Hydrological Outlook and Advisory for MAM 2026, Nairobi Kenya.



REWG on Hydrology Working Session during the generation of the Hydrological Outlook and Advisory



Group Photo for Nile Basin Regional Expert Working Group on Hydrology –at the 7th Seasonal Hydrological Outlook and Advisory Nairobi Kenya.

ONE RIVER ONE PEOPLE ONE VISION



NILE BASIN INITIATIVE INITIATIVE DU BASSIN DU NIL

NBI Member States



Burundi



DR Congo



Egypt



Ethiopia



Kenya



Rwanda



South Sudan



The Sudan



Tanzania



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