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MINISTRY OF ENVIRONMENT AND FORESTRY
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**THE CLIMATE OUTLOOK FOR OCTOBER 2023 AND THE
REVIEW FOR SEPTEMBER 2023**

1. HIGHLIGHTS

1.1 The Climate Outlook for October 2023

The outlook for October 2023 indicates that the Highlands West of the Rift Valley, the Lake Victoria Basin, the Central and parts of the South Rift Valley, the Highlands East of the Rift Valley, the Coast, North-eastern Kenya and most of the South-eastern lowlands, are likely to receive above average rainfall. The Northwestern parts of the country, parts of the Southeastern lowlands (Kajiado) and parts of the Southern Rift Valley (parts of Narok) are likely to experience near to above-average rainfall. The onset of the rains is expected between the second to third week of October over several parts of the country except over the Highlands West of the Rift Valley, the Lake Victoria Basin, Central and Southern Rift Valley where rainfall is expected to continue from September.

1.2 The Climate Outlook for October, November and December

The outlook for the next three months indicates that most parts of the country will experience above average rainfall. Temperature is expected to be warmer than average over most parts of the country.

1.3 The Weather Review for September 2023

Several parts of the Highlands West of the Rift Valley, the Lake Victoria Basin and some parts of the Central and South Rift Valley received significant amounts of rainfall during the month. The Highlands East of the Rift Valley including Nairobi County, a few areas over the Northwest, Isolated areas over the Southeastern lowlands as well as the Coastal region remained generally dry with a few rainy days. The Northeastern and most of the Southeastern lowlands experienced dry weather conditions throughout the month.

2 THE WEATHER FORECAST FOR OCTOBER 2023

This climate outlook is based on models that have been developed based on the expected evolution of global Sea Surface Temperatures (SSTs). The warmer-than-average SSTs over the Western Equatorial Indian Ocean and the cooler-than-average SSTs over the Eastern Equatorial Indian Ocean, which comprise a positive Indian Ocean Dipole (IOD), have been

considered. Furthermore, SSTs are warmer than average across the Central and Eastern Equatorial Pacific Ocean, indicating the presence of El Niño. These two phenomena are associated with enhanced rainfall over the country.

2.3 Rainfall Forecast for October 2023

As shown in Figure 1, Counties in the Highlands West of the Rift Valley, the Lake Victoria Basin, the Central and parts of South Rift Valley, the Highlands East of the Rift Valley including Nairobi County, the Northeast, the Coast and most of the Southeastern lowlands, are likely to receive above average rainfall. The Northwestern, parts of the South Rift Valley and parts of the Southeastern lowlands are likely to receive near to above average rainfall.

The rainfall in October 2023 is expected to be well distributed across most parts of the country, both in time and space.

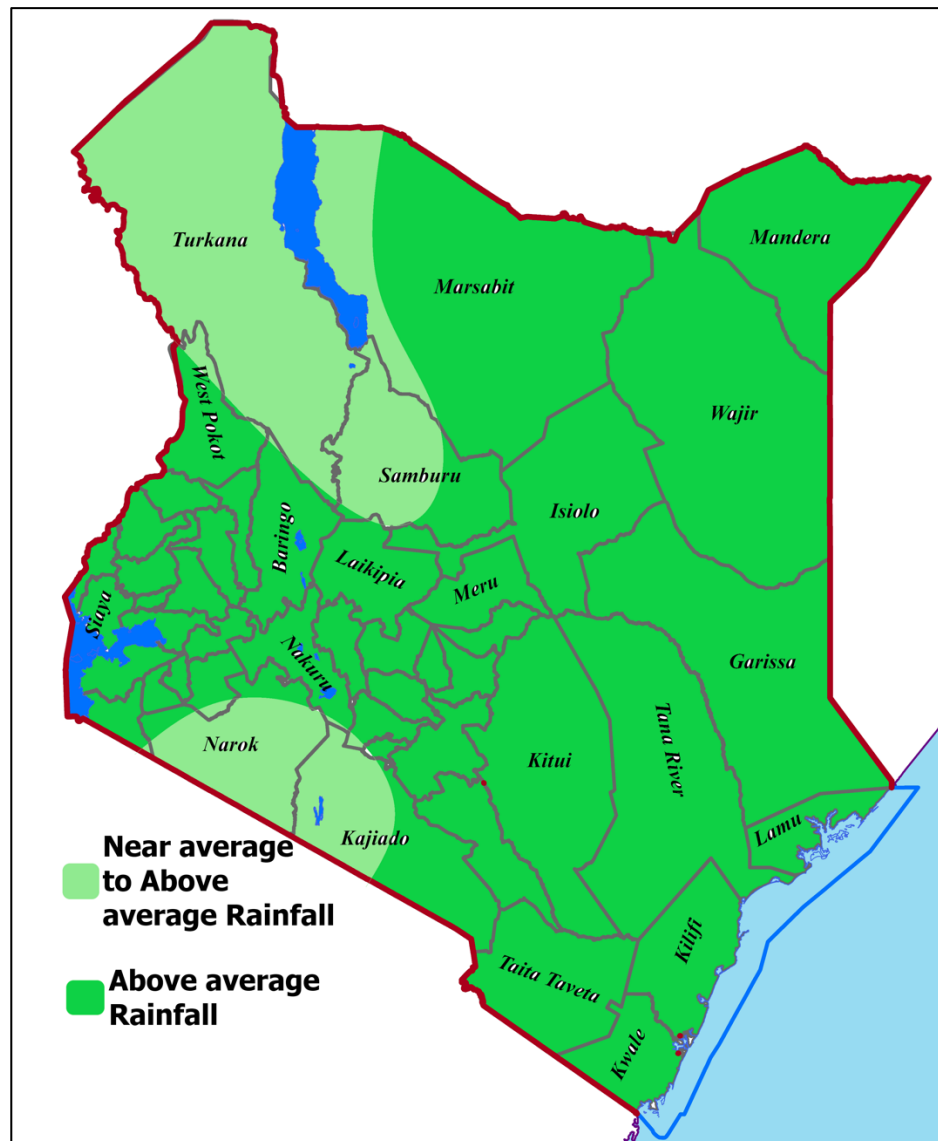


Fig. 1: Rainfall forecast for October 2023

2.1. Specific Outlook for Individual Areas

2.3.1 The Highlands West of the Rift Valley (*Trans Nzoia, Kericho, Bomet, Nandi, Uasin Gishu, West Pokot, Elgeyo Marakwet, Kakamega, Vihiga, Bungoma, Kisii and Nyamira counties*); **the Lake Victoria Basin** (*Kisumu, Homa Bay, Migori, Siaya and Busia counties*); **the Southern and Central Rift Valley** (*counties of Nakuru, Baringo and parts of Laikipia*); are likely to experience enhanced rainfall during the month. The expected total rainfall amounts are likely to be above the long-term average amounts for October.

2.3.2 The Northwestern Kenya: Turkana and Samburu Counties are likely to experience rainfall from the third to fourth weeks of October. The expected total rainfall amounts are likely to be near to above the long-term average amounts for October.

2.3.3 Parts of Southeastern lowlands (Kajiado) and **parts of the South Rift Valley** (Narok) are likely to experience enhanced rainfall amounts exceeding the long-term average for October. The expected rainfall is likely to be from the third to fourth week of October in Kajiado while over Narok, the rainfall is likely to continue from September.

2.3.4 The Highlands East of the Rift Valley (including Nairobi County): Counties of Kirinyaga, Nyandarua, Nyeri, Murang'a, Embu, Meru, Nairobi, Kiambu, Tharaka Nithi and parts of Laikipia are likely to experience the seasonal rainfall onset from the second to third weeks of October. The expected total rainfall amounts are likely to be above the long-term average for October.

2.3.5 The Coast: Lamu, Kilifi, Mombasa, Kwale and Tana River counties are likely to experience enhanced rainfall during the month. The expected total rainfall amounts are likely to be above the long-term average for October.

2.3.6 The South-eastern lowlands: Counties of Machakos, Makueni, Kitui, and Taita Taveta are likely to experience rainfall onset from the third to fourth week of October. The expected total rainfall amounts are likely to be above the long-term average for October.

2.3.7 Northeastern Kenya: Marsabit, Isiolo, Wajir, Mandera, and Garissa counties are likely to experience the seasonal rainfall onset from the third to fourth week of October. The expected total rainfall amounts are likely to be above the long-term average for October.

2.4 Potential Impacts

The following are the likely weather-related impacts during the month of October 2023.

2.4.1 Agriculture and Food Security

The anticipated rainfall is expected to provide favorable conditions for agricultural endeavors in the high-potential regions encompassing the Highlands West and East of the Rift Valley, the Lake Victoria Basin, Central and South Rift Valley, as well as the Southeastern lowlands. Moreover, it is foreseen that pastureland will undergo rejuvenation in the arid and semi-arid (ASAL) areas of the Northern, Southeastern, and Coastal regions. Farmers are strongly encouraged to seize this opportunity to expand their crop cultivation and pasture production to fully leverage the projected increase in precipitation.

All the same, it is essential to be mindful of potential challenges that may arise with enhanced rainfall, including soil erosion, waterlogging, and land degradation. To mitigate these issues, farmers are advised to implement soil conservation measures and embrace sustainable land management practices as part of their agricultural strategies.

2.4.2 Disaster Management

There is a possibility of isolated storms occurring, which could result in flash floods, particularly in the low-lying areas of the northern regions, the Southeastern lowlands, the Coastal region, parts of the Central and South Rift Valley, and inadequately drained urban areas. It is strongly recommended that the general public refrain from walking or driving through flooded areas or attempting to cross swollen rivers to prevent loss of life. It is also advisable for relevant authorities to implement measures addressing flood-related concerns, including the prepositioning of both food and non-food supplies, as well as resource mobilization.

Additionally, there is a chance of lightning strikes happening over the Lake Victoria Basin and Western parts of the country, notably in areas like Kisii, Kisumu, Nandi, Kakamega, and Bungoma (specifically, Mt. Elgon areas). The public is cautioned against seeking shelter under trees or near metallic structures, particularly during rainy conditions.

2.4.3 Environment

The increased rainfall is expected to supply ample soil moisture, promoting favorable conditions for tree growth. It is strongly recommended that the public engage in tree planting initiatives to contribute to the expansion of forest cover across the country. However, it's important to note that excessive rainfall can potentially result in environmental deterioration, particularly in the form of soil erosion. In light of this, the public is advised to adopt sound agricultural practices, including the implementation of soil conservation measures, to help safeguard and preserve the environment.

2.4.4 Health

The increased rainfall is expected to have a positive impact on food availability, which, in turn, should help decrease nutrition-related diseases. However, there is a potential risk of higher instances of waterborne and vector-borne diseases due to water source contamination

resulting from flooding and the presence of stagnant water, which can serve as breeding grounds for disease-carrying insects like mosquitoes.

To mitigate these risks, it is advisable for relevant authorities to strengthen disease surveillance and early detection systems. Additionally, they should distribute insecticide-treated mosquito nets to areas with a higher risk of malaria outbreaks. Furthermore, providing water treatment chemicals to communities that rely on open water sources is crucial for ensuring safe drinking water. Lastly, promoting education on Water and Sanitation Hygiene (WASH) practices can play a vital role in preventing the spread of waterborne diseases.

2.2.6 Water Resources Management and Energy

The boosted rainfall is set to enhance water availability, benefiting both domestic and livestock use. To meet their water requirements, the public is encouraged to adopt rainwater harvesting and storage practices.

Nevertheless, the increased rainfall may have some adverse effects, including heightened siltation and sedimentation in certain rivers and dams, as well as the potential for flooding, such as river channel overflows, urban flooding, and flash floods. In light of these challenges, relevant authorities are advised to prioritize dam desilting efforts and implement measures for separating stormwater and wastewater channels. These steps can help mitigate the impact of flooding on communities.

Furthermore, the increased inflow into hydropower reservoirs is expected to boost hydropower generation and contribute to groundwater recharge for geothermal power production. However, it's important to note that this heightened rainfall may also lead to disruptions in power supply, which could result in social and economic losses. Therefore, there is a pressing need to enhance power transmission and distribution infrastructure to ensure a reliable and stable power supply.

2.2.7 Transport and Public Safety

Anticipated intermittent flash floods could result in the disruption of transportation infrastructure, particularly in the regions of the Highlands West of the Rift Valley, the Lake Victoria Basin, South Rift Valley, Tana River Basin, Northeastern, and sections of the Southeastern lowlands. Additionally, reduced visibility caused by the weather conditions may lead to a rise in road, marine, and aviation accidents.

3. OUTLOOK FOR OCTOBER TO DECEMBER

The outlook for the next three months indicates that the Highlands West and East of the Rift Valley, the Lake Victoria Basin, the Central and South Rift Valley as well as the Coastal region are likely to experience rainfall throughout the period. The Northeast, Northwest and Southeastern lowlands are likely to remain generally dry during the first half of October and receive rainfall from the second half of October and continue into November and December.

The temperatures are expected to be warmer than average over most parts of the country.

3 WEATHER REVIEW FOR SEPTEMBER 2023

3.3 Rainfall Review

In September 2023, the rainfall performance across various Kenya Meteorological Department stations exhibited significant variations in the amounts received. Several parts of the Highlands West of the Rift Valley, the Lake Victoria Basin, parts of Southern and Central Rift Valley and a few areas over the Highlands East of the Rift Valley, including Nairobi County and isolated areas over the Southeastern lowlands received rainfall that was near to above average; the exceptions were Embu, Nyeri and Jomo Kenyatta International Airport where below average rainfall was received. The Coastal region received below average rainfall except over Lamu where near average rainfall was received. The Northeast, most of the Southeastern Lowlands and the Northwestern regions remained dry during the month except over Machakos where above average rainfall was received.

Up to 28 September, Kakamega stood out with the highest recorded rainfall, receiving 336.0 mm, which significantly surpassed its September Long-Term Mean (LTM). This was followed by Kisii with 314.3 mm. Other stations that recorded above 200 mm are shown in **Table 1**. Nyahururu and Kisumu reported notable rainfall figures of 140.6 mm and 111.2mm, respectively, reflecting significant precipitation levels. Nakuru received 105.0 mm of rainfall during the month.

In contrast, coastal areas such as Mombasa and Malindi recorded relatively lower amounts of rainfall, receiving 16.3 mm and 11.5 mm, respectively. The northern regions, including Garissa and Moyale, encountered significant rainfall deficits, recording less than 1mm.

Notably, several stations stood out for their above-average rainfall performance. For instance, Thika and Machakos received exceptionally high levels of rainfall in comparison with their monthly LTMs, with Thika receiving 369.7% while Machakos received 256.4%. Other stations that recorded high amounts of rainfall as compared to their September LTMs are Dagoretti, Wilson and Laikipia with 270.5%, 258.9% and 187.6% respectively.

Conversely, most stations over the Northern region and the Coast, few stations over the Highlands East of the Rift Valley and Southeastern lowlands experienced below average

rainfall. For instance, Voi, Malindi, Mombasa, Msabaha, Mtwapa, Nyeri, Garissa and Moyale recorded 48.1%, 45.8%, 30.7%, 25.3%, 22.6%, 17.9%, 11.6% and 6% respectively. Lodwar, Wajir, Mandera and Makindu recorded no rainfall at all during the month, highlighting a significant rainfall deficit. See **Figure 2a and 2b**

The month was characterized by isolated storms over the western sector of the country. For instance, ADC Olngatongo recorded 76.0mm in 24 hours on 7th September while Kisii recorded 69.2mm on 9th. On 10th September, Moi University recorded 73.7mm. On the same day, Namahindi Primary School, Kibisi Secondary, Mabanga ATC, Kitinda Secondary and Hekima Academy recorded 70.8mm, 59.7mm, 59.0mm, 58.5mm and 53.9mm respectively. Kakamega station recorded 63.2mm on 15th while Nambale Agricultural office recorded 52.8mm on 17th. On the 18th, Korieko, Nyaroya and Sony Sugar recorded 70.0mm, 66.6mm and 55.0mm respectively.

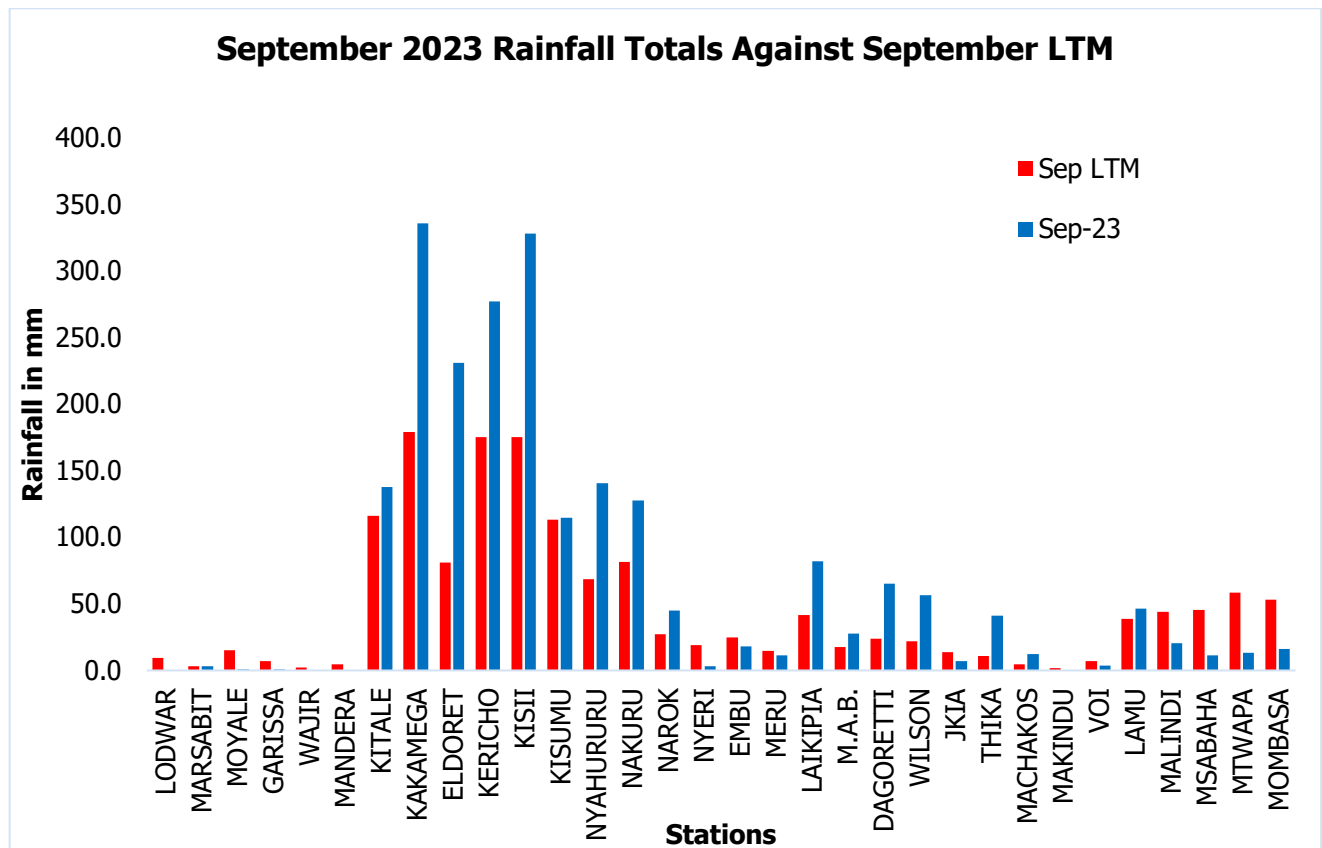


Fig. 2b: September 2023 Rainfall Totals Against September LTM

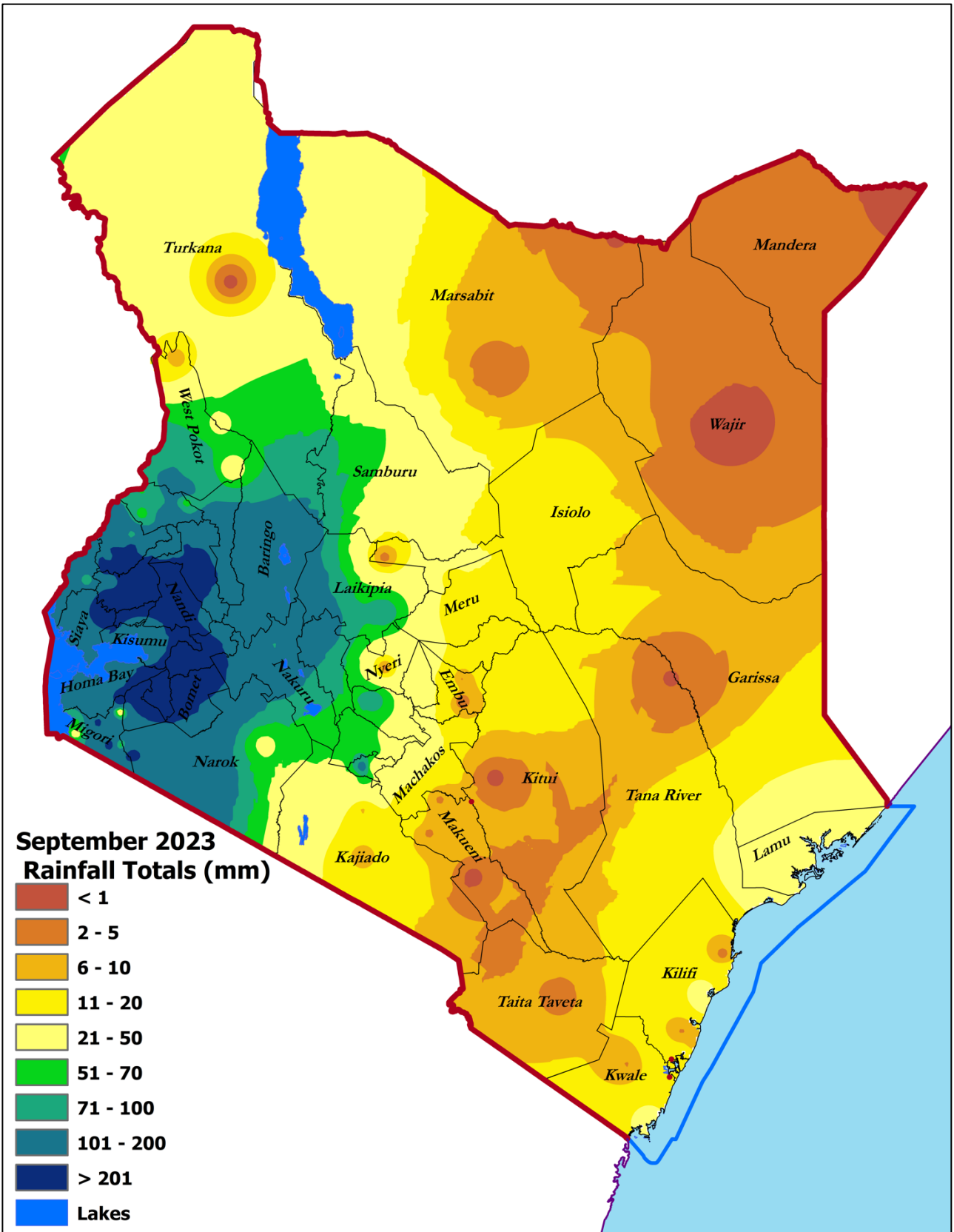


Figure 2b: September 2023 Rainfall Totals

Table 1: Stations that recorded significant amounts of rainfall in September

Station	County	Monthly Totals (mm)
Kanduyi Agricultural Office	Bungoma	294.5
Bungoma Water Supply Office	Bungoma	277.7
Kericho Meteorological station	Kericho	277.5
Butere	Kakamega	272.2
Khalaba Ward	Bungoma	266.9
Kitinda Secondary School	Bungoma	261.1
Machwele Vocational Centre	Bungoma	258.9
Miyare	Migori	258.0
Annex B. Wareng Location	Uasin Gishu	248.0
Masaba CTC	Migori	247.2
Moi University	Uasin Gishu	241.7
Nabichakha Secondary School	Bungoma	241.4
Koromangucha	Migori	239.3
Eldoret Meteorological station	Uasin Gishu	231.3
Mabanga A.T.C	Bungoma	229.5
Nyaroya	Migori	223.9
Sony Sugar	Migori	221.4
Mukakula Farm	Bungoma	217.2
University of Eldoret	Uasin Gishu	216.7
Brookside Dairies Eldoret	Uasin Gishu	213.5
ADC Olngatongo	Trans Nzoia	208.9
Korieko	Migori	206.4
Hekima Academy Annex	Uasin Gishu	203.4
Komool Farm	Uasin Gishu	201.7

3.4 Experienced Impacts in September 2023

3.4.1 Agriculture and Food Security

Hailstorms have been reported across several regions in the western sector of the country, as well as in parts of Central Kenya, particularly in Kamae, Kiambu County. These hailstorms have had a significant and detrimental impact on agricultural crops. For instance, on 12 September 2023, in Moiben, Uasin Gishu County, wheat crops suffered substantial damage as a result of the hailstorms.

Similarly, in Kamae, the hailstorms struck on the 20 September 2023, causing destruction to vital crops such as vegetables and maize. These weather events have underscored the vulnerability of agricultural livelihoods in these areas and the need for measures to mitigate the impact of extreme weather conditions on the region's agricultural sector.

3.4.2 Disaster Management

On 13 September 2023, a severe weather event, characterized by heavy rains and turbulent winds, wreaked havoc in Baringo South Sub-County, resulting in extensive destruction. The inclement weather caused substantial damage to homes, schools, sanitation facilities, and businesses, leaving many residents with no choice but to spend the night outdoors. Students were compelled to continue their studies under the shelter of trees, as their usual learning environments had been severely impacted by the adverse weather conditions.

On 25 September 2023, the region experienced yet another bout of intense rainfall, leading to flash floods in Kerio Valley, Elgeyo Marakwet. These flash floods had a destructive impact, washing away a fence and causing other damage to the area. Additionally, the accompanying strong winds toppled trees and demolished a house within the vicinity, further exacerbating the challenges faced by the local residents in this vulnerable area.

3.4.3 Water Resources Management and Energy

On 30 September 2023, the Turkwel Dam's water level measured 1133.40 m above sea level, marking an increase from previous levels. The persistently dry weather conditions in September have led to ongoing water shortage for both human and livestock needs in the arid and semi-arid regions.

3.4.4 Transport and Public Safety

On the 13 September 2023, Baringo South Sub-County encountered heavy rainfall, resulting in the obstruction of several roads due to falling trees. These adverse weather conditions led to disruption in transportation and prompted immediate attention to clear the affected routes for safe and efficient travel.

NB: This outlook should be used together with the 24-hour, 5-day, 7-day, special forecasts and regular updates/advisories issued by this Department as well as weekly and monthly county forecasts developed and availed by County Meteorological Offices.



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DIRECTOR OF METEOROLOGICAL SERVICES