REPUBLIC OF KENYA

MINISTRY OF ENVIRONMENT & FORESTRY

KENYA METEOROLOGICAL DEPARTMENT

Dagoretti Corner, Ngong Road, P. O. Box 30259, 00100 GPO, Nairobi, Kenya

Telephone: 254 (0) 20 3867880-7, 0724 255 153/4

E-mail: director@meteo.go.ke, info@meteo.go.ke

Website: http://www.meteo.go.ke **Twitter:** @MeteoKenya

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WEATHER FORECAST FOR JANUARY 2022, WEATHER REVIEW FOR DECEMBER 2021 AND SEASONAL PERFORMANCE OF OCTOBER-DECEMBER 2021 "SHORT-RAINS"

1. HIGHLIGHTS

1.1. The Weather Outlook for January 2022

The rainfall outlook for the month of January 2022 indicates that most parts of the country will experience dry weather conditions. However, few areas over the Highlands West of the Rift Valley, the Lake Victoria basin the Central and southern Rift valley, the Highlands East of the Rift Valley, the South-eastern lowlands and the Coastal strip are likely to experience occasional rainfall during the first half of January 2022.

1.2. Review of December and October-December 2021 "Short-Rains" Seasonal Performance

1.2.1. December 2021 rainfall review

Enhanced rainfall was received over the eastern sector of the country while depressed rainfall was received over the western sector of the country during the month of December 2021. Most of the stations over the Highlands East of the Rift Valley including Nairobi, South-eastern Lowlands, North-eastern and the Coastal strip received rainfall that was above 75% of their December long term mean (LTM) while all the stations over the Highlands West of the Rift Valley, the Lake Victoria Basin, Central and South Rift Valley and the North-western regions received rainfall that was below 75% of their LTM. Malindi Meteorological station recorded the highest monthly percentage at 460.9%. Other stations that recorded above average rainfall are Voi (336.1%), Embu (250.6%), Thika (238.1%), Mombasa (214.0%), Laikipia Meru (200.7%), Wajir (185.9%), Msabaha (175.2%), Garissa (168.6%), Makindu (156.7%), Mtwapa (154.4%), Lamu (144.3%) and Machakos (130.5%). Nyeri, Moyale, Dagoretti and Eastleigh stations

*recorded near average rainfall at 109.4%, 96.7%, 94.4%*and 89.3%, *respectively. All the other stations recorded less than 75% of their December LTMs.*

1.2.2. October-December 2021 "Short-Rains" Seasonal Performance

An analysis of the OND 2021 seasonal rainfall up to 29th December indicates that depressed rainfall was received in North-western, North-eastern, parts of South-eastern lowlands, parts of Nairobi, parts of the Coastal strip and parts of the western sector of the country. Voi and Laikipia are the only stations that recorded above normal rainfall at 225.5% and 125.6%, respectively. Thika, Malindi, Meru, Makindu, Embu, Msabaha Kisumu, Nyahururu, Dagoretti, Eastleigh, Kitale, Nyeri, Mombasa and Kericho recorded near average rainfall between 75.2% and 117.2%. All the other stations recorded less than 75% of their OND LTMs.

The start of the seasonal rains (onset) was delayed in most places apart from the Highlands West of the Rift Valley, the Lake Victoria Basin, Central and South Rift Valley regions where the rainfall continued from September 2021 as had been predicted. The rainfall distribution both in time and space was poor throughout the country especially in the months of October and November and also in December over the western sector of the country. The poor rainfall performance in the country was mainly due to La Nina conditions linked to cooler than average Sea Surface Temperatures (SSTs) in the West - Central and eastern Equatorial Pacific Ocean and warmer than average Sea Surface Temperatures (SSTs) in the western Equatorial Pacific Ocean. The Indian Ocean dipole (IOD) remained negative in October and neutral in November and December.

2. Synoptic Features in the Month of January 2022

The rainfall forecast for January 2022 is mainly based on the evolution of Sea Surface Temperature (SST) gradients and the SST patterns over the global oceans (Indian, Pacific, Atlantic) as well as upper air circulation patterns. The SST patterns in the Indian and Pacific Oceans were mainly considered. The outlook for January 2022 is mainly based on empirical statistical models developed from expected evolution of global Sea Surface Temperature (SST) anomalies and the Southern Oscillation Index (SOI). The SST anomaly patterns considered include the near average SSTs over the Equatorial Indian Ocean. Equatorial sea surface temperatures (SSTs) are below average from the west - central to eastern Pacific Ocean and above average in the Western Pacific which implies that La Niña conditions are present. This usually results in below average rainfall over Kenya.

2.1. The Weather Outlook for January 2022

The forecast indicates that a few parts of the country will experience occasional rainfall during the first and second weeks of January and remain generally sunny and dry towards the end of the month. These include a few areas in western Kenya, especially those around the Lake Victoria basin (Siaya, Busia, Kisumu, Homa Bay, Migori, Kisii, Nyamira), Southern Rift Valley (Bomet, Kericho, Narok), the south eastern lowlands (Kajiado, Kitui, Makueni, Machakos and Taita Taveta) and parts of the Highlands East of the Rift Valley (Nyandarua, Nyeri, Kirinyaga, Murang'a, Kiambu, Meru, Embu). **Figure 1** portrays the expected rainfall pattern during January 2022.

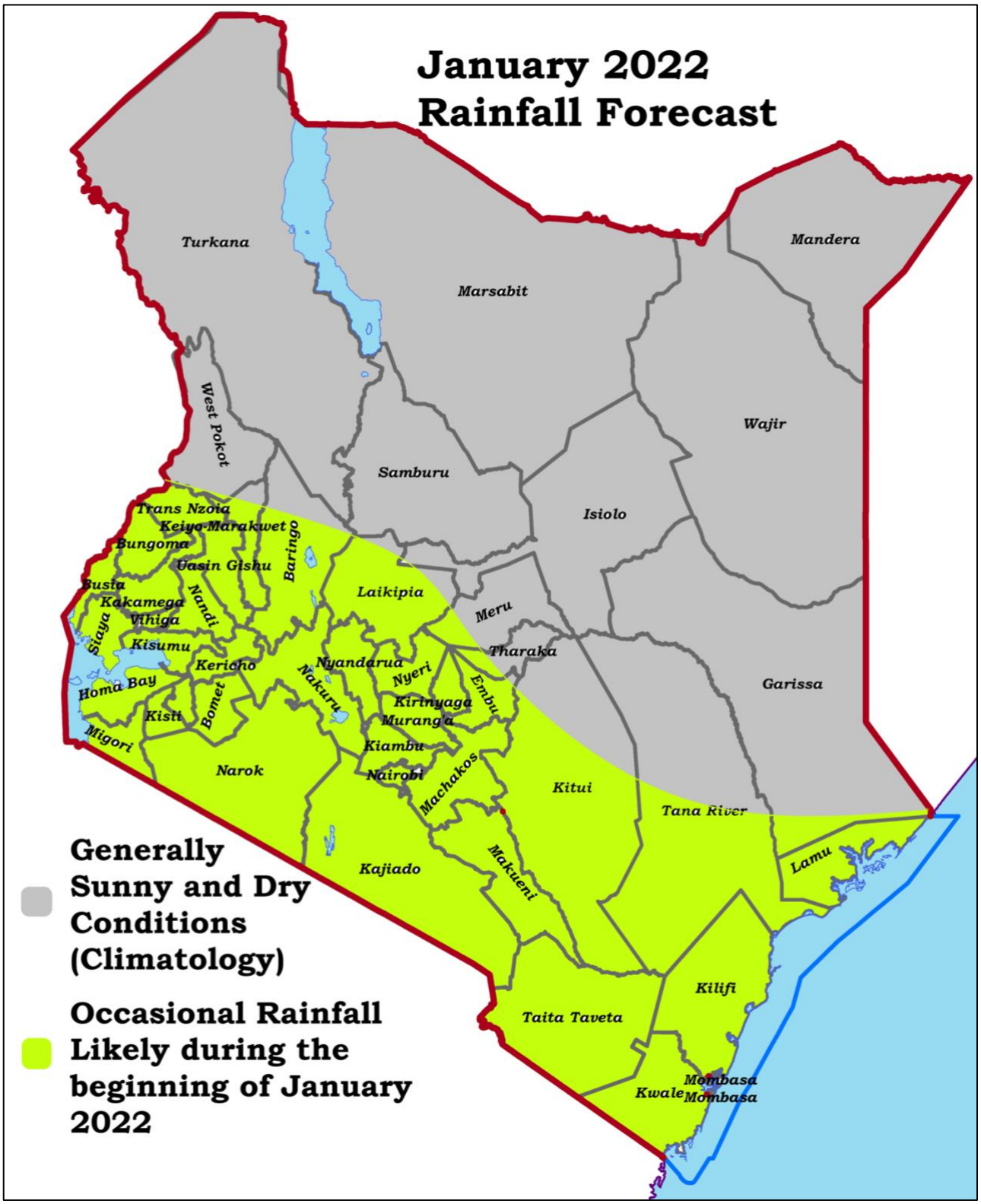

Figure 1: January 2022 Rainfall Forecast

2.2. Specific Outlook for Individual Areas

2.2.1. The Lake Victoria Basin, Highlands West of the Rift Valley and Central and South Rift Valley (Siaya, Kisumu, Homa Bay, Migori, Kisii, Nyamira, Trans Nzoia, Baringo, Uasin Gishu, Elgeyo-Marakwet, Nandi, Laikipia, Nakuru, Narok, Kericho, Bomet, Kakamega, Vihiga, Bungoma and Busia):

are likely to experience generally dry conditions for most of the month. However, Occasional light to moderate rainfall is expected over few areas during the first half of the month especially in the Lake Victoria basin, Central and Southern Rift Valley. The total rainfall amounts are expected to be near to above the January Long Term Mean.

2.2.2. North-western Region (Turkana, West Pokot and Samburu):

Sunny and dry conditions are expected to occur in the month of January 2022. High temperatures (30°C - 40°C) are expected to prevail in most places during the month.

2.2.3. Highlands East of the Rift Valley and Central Kenya (Nairobi, Nyandarua, Nyeri, Kirinyaga, Murang'a, Kiambu, Meru, Embu, and Tharaka):

are expected to experience occasional light to moderate rainfall during the first half of the month and generally dry conditions for the rest of the month. The total rainfall amounts are expected to be near to slightly above the January Long Term Mean.

2.2.4. North-eastern Region (Wajir, Garissa and Isiolo, Mandera and Marsabit):

are likely to experience occasional light rainfall over few areas during the first week especially over Wajir, Garissa and Isiolo Counties and remain generally sunny and dry thereafter. High temperatures (30°C - 40°C) are expected to prevail throughout the month. The total rainfall amounts are expected to be near to below the January Long Term Mean

2.2.5. South-eastern Lowlands (Kajiado, Kitui, Makueni, Machakos and Taita Taveta):

are likely to experience generally dry conditions for most of the month. However, occasional light to moderate rainfall is expected to occur over few areas during the first half of the month and it is likely to extend to the end of the month in a few places over the southern

parts of Kajiado County. The total rainfall amounts are expected to be near to above the January Long Term Mean.

2.2.6. The Coastal Strip (Mombasa, Tana River, Kilifi, Lamu and Kwale): are likely to experience occasional light to moderate rainfall during the first half of the month and remain generally sunny and dry for the remaining part of the month. The total rainfall amounts are expected to be near the January Long Term Mean.

2.3. Potential impacts

The following are the likely impacts during the month of January 2022:

2.3.1. Agriculture and Food Security

January being a typically dry month may be suitable for harvesting, drying and storage of grains in the agricultural areas of South-eastern and Highlands East of the Rift Valley. Reduction of pasture and fodder for wildlife and livestock is still likely especially over the North-western and parts of the North-eastern sectors of the country.

2.3.2. Disaster Management

The reduction of water and pasture over the northern sector of the country may lead to human to human and human to wildlife conflicts.

The Ministry of Interior and Coordination of National Government and humanitarian institutions are therefore advised to put in place measures to avert possible negative impacts that may arise such as the loss of lives, livelihoods and property.

2.3.3. Water Resources Management and Energy

The expected dry conditions in January 2022 may impact negatively on the major river catchment areas for the country's hydroelectric power generating dams. The public is advised to invest in water harvesting practices/techniques to harness the occasional rain water in areas where rainfall is expected.

2.3.4. Environment

The dry conditions expected in January may result in reduced water levels in reservoirs, lakes, and ponds. It is also likely to lead to loss of wetlands and occurrence of wildfires in forests, parks and reserves. The public should therefore be alert while putting in place measures to conserve the environment.

2.3.5. Health

The high temperatures expected during the month of January in most parts of the country may lead to heat stress and heat related discomforts such as headaches and fatigue. The public is therefore advised to hydrate appropriately and avoid working in the open especially in the afternoons.

2.3.6. Transport and Public Safety Sector

The expected occasional rainfall especially at the beginning of the month may cause slippery roads in some parts of the country increasing the risk of accidents. Flash floods may cause transport challenges especially during rush hours and more so in areas where the roads become impassable when it rains.

3. Weather Review for December 2021 And OND 2021 Season

3.1. Review of December 2021 Rainfall Performance

The month of December marks the cessation of the October to December (OND) seasonal rainfall. An analysis of rainfall up to 29th December 2021 indicates that enhanced rainfall was experienced over the eastern sector of the country while depressed rainfall was experienced over the western sector of the country. Rainfall recorded over most meteorological stations over the Highlands East of the Rift Valley including Nairobi, South-eastern Lowlands, North-eastern and the Coastal strip was above 75% of the December-long term means (LTMs), while all the stations over the Highlands West of the Rift Valley, the Lake Victoria Basin, Central and South Rift Valley and the North-western regions recorded below 75% of their December LTMs.

Malindi Meteorological station recorded the highest monthly percentage at 460.9%. Other stations that recorded above average rainfall are Voi (336.1%), Embu (250.6%), Thika (238.1%), Mombasa (214.0%), Laikipia Air Base (201.5%), Meru (200.7%), Wajir (185.9%), Msabaha (175.2%), Garissa (168.6%), Makindu (156.7%), Mtwapa (154.4%), Lamu (144.3%) and Machakos (130.5%). Nyeri, Moyale, Dagoretti, and Moi Air Base stations recorded near average rainfall at 109.4%, 96.7%, 94.4% and 89.3% respectively. All the other stations recorded less than 75% of their December LTMs.

December was characterized by isolated severe storms over the Highlands East of the Rift Valley, South-eastern lowlands and the Coastal strip. For instance, Malindi Meteorological station in Kilifi County recorded 91.1mm in 24 hours on 25th December 2021 while Msabaha station also in Kilifi recorded 53.0mm on the same day. Meru recorded 56.0mm on 2nd December, Kangema 42.9mm on 14th December and Kitui 40.0mm on 24th December. Other rainfall stations that recorded high amounts of rainfall in 24 hours include Kirie in Embu County that recorded 85.0mm on 20th December. On the same day, Managia and Muthanthara also in Embu county

and Bishop Ndingi in Machakos recorded 68.0mm, 55.8mm and 67.4mm respectively. Mtito- Andei in Taita Taveta county recorded 66.8mm on 13th December, while Shigharo and Wundanyi also in Taita- Taveta county recorded 56.5mm and 52.0mm respectively on 4th December. Kavoo station in Kitui County and Teresiah Kahindi in Kilifi county recorded 51.6mm and 53.1mm respectively on 25th December.

The highest monthly total rainfall of 315.2 mm (200.7%) was recorded in Meru station. Other stations that recorded above 100mm of rainfall include Thika 232.5mm, Voi 215.9mm, Embu 192.2mm, Makindu 189.6mm, Mombasa 149.7mm, Malindi 140.4mm and Machakos 133.2mm respectively. All the other stations recorded less than 100mm with Lodwar and Mandera recording no rainfall at all throughout the month. The distribution both in time and space was fairly good over the eastern sector and poor over the western sector where long dry spells were experienced.

Figure 2a shows the December 2021 rainfall performance (%) while **Figure** 2b shows total rainfall amount recorded in December (Blue bars) in comparison with the December LTMs (Red bars)

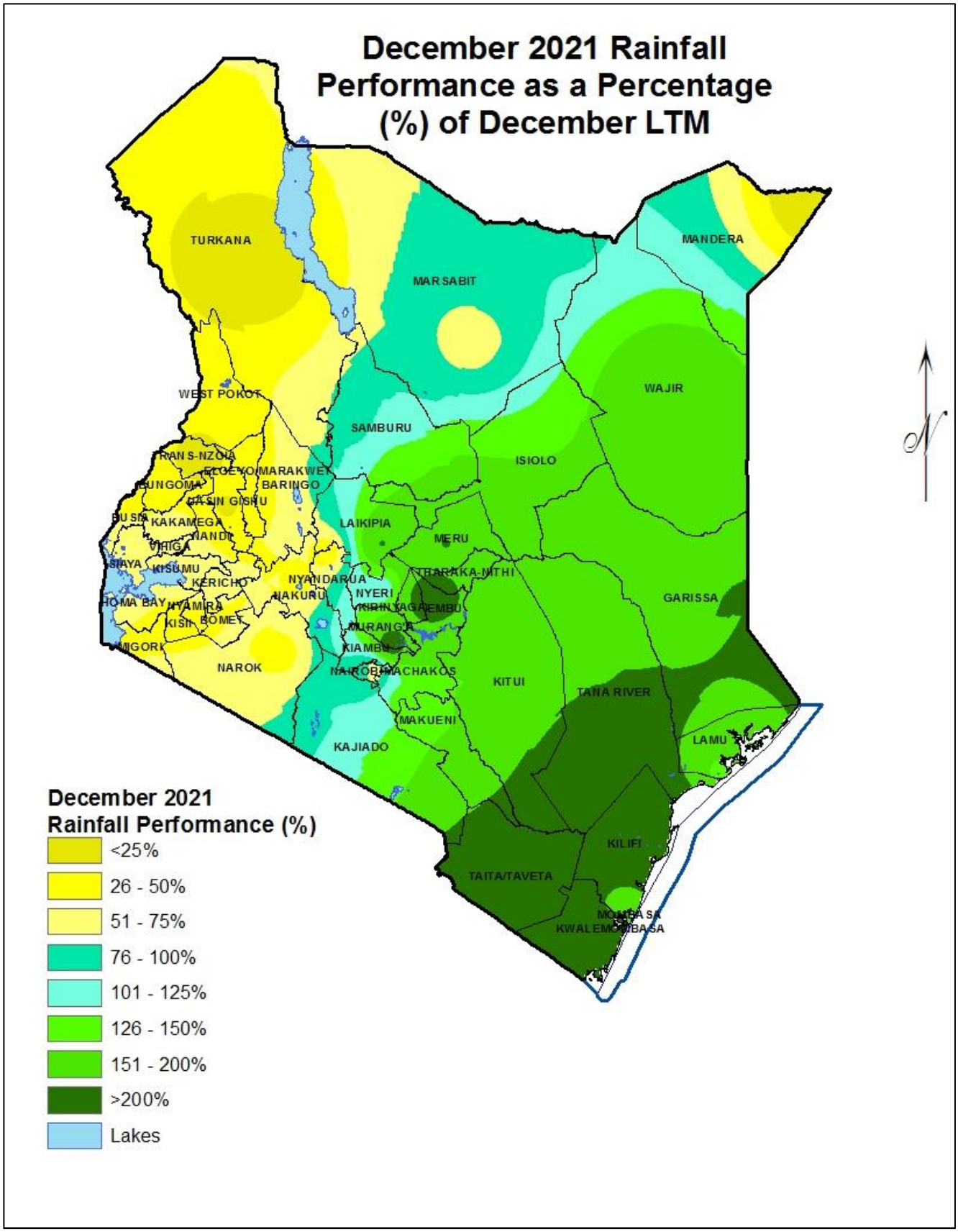

Figure 2a: December 2021 Rainfall Performance (%) Against December LTM

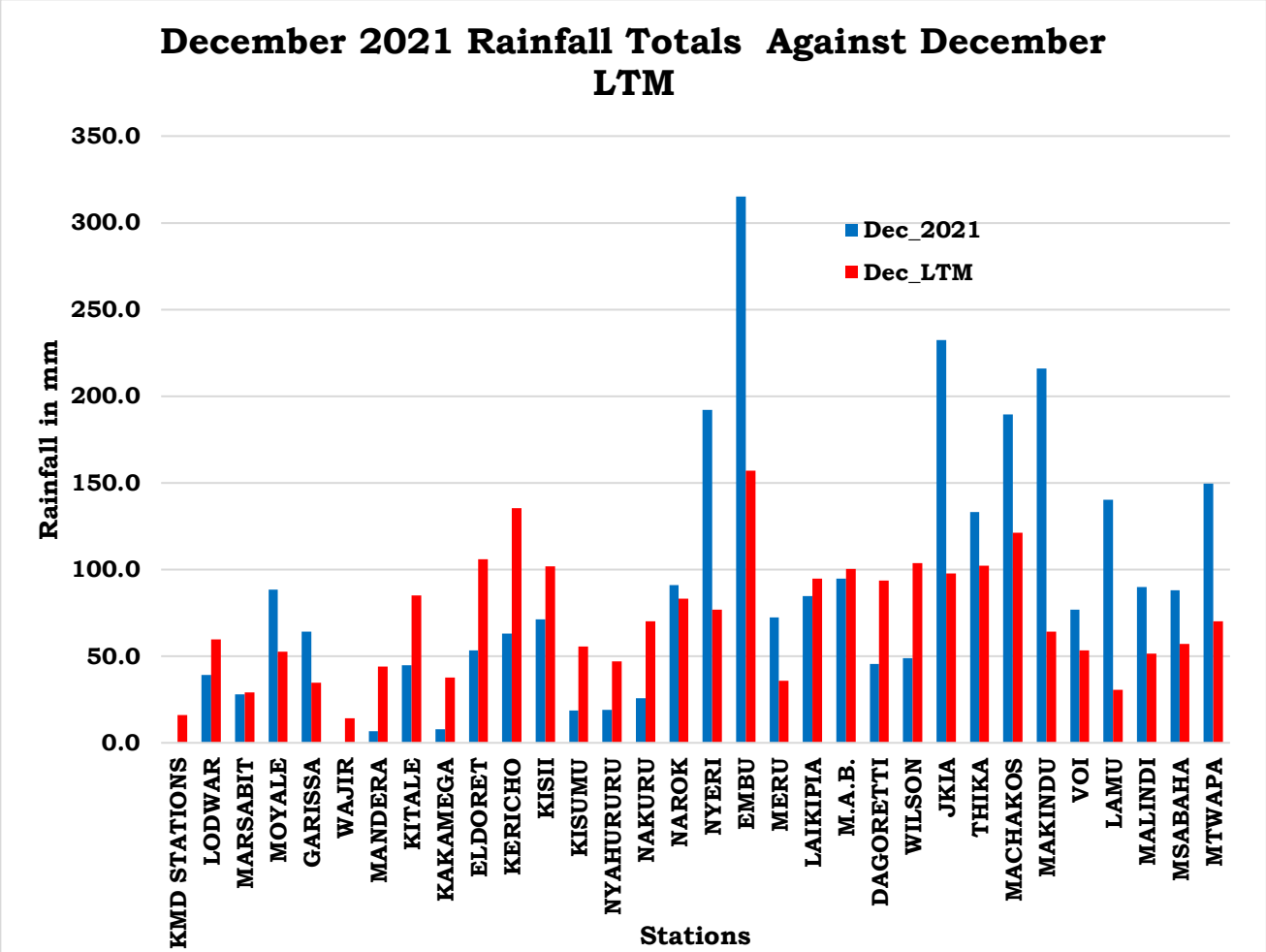

Figure 2b: December 2021 Monthly Rainfall Totals against December LTM

3.2. Review Of October-December 2021 "Short-Rains" Seasonal Performance

The start of the seasonal rains (onset) was delayed over most places in the country apart from a few areas over the Highlands West of the Rift Valley, the Lake Victoria Basin, Central and South Rift Valley regions where rainfall continued from September 2021 as had been predicted. The rainfall distribution both in time and space was poor throughout the country especially in the months of October and November and also in December over the western sector of the country. The poor rainfall performance in the country was mainly as a result of the La Nina conditions owing to the prevailing cooler than average Sea Surface Temperatures (SSTs) in the central and eastern Equatorial Pacific Ocean and the warmer than average Sea Surface Temperatures (SSTs) in the Western Equatorial Pacific Ocean. The Indian Ocean dipole (IOD) remained negative in October and neutral in November and December.

The seasonal rainfall analysis from 1st October to 29th December shows that depressed rainfall was received in North-western, North-eastern, parts of South-eastern lowlands (Machakos), parts of Nairobi, parts of the Coastal strip and parts of the western sector of the country. Voi and Laikipia Air Base are the only stations that

recorded above normal rainfall at 225.5% and 125.6% respectively. Thika, Malindi, Meru, Makindu, Embu, Msabaha Kisumu, Nyahururu, Dagoretti, Moi Air Base, Kitale, Nyeri, Mombasa and Kericho recorded near average rainfall at 117.2%, 109.2%, 104.7%, 103.6%, 95.6%, 94.1%, 91.9%, 87.1%, 82.3%, 81.9%, 80.1%, 78.9%, 76.3% and 75.2 respectively. All the other stations recorded less than 75% of their OND LTMs with Lodwar recording the lowest percentage at 2.1%.

The highest seasonal total rainfall amount of 725.9mm was recorded at Meru Meteorological station. Other stations that recorded significant amounts of rainfall are Embu (473.8mm), Thika (429.2mm), Kisii (356.3mm), Kericho (329.8mm), Makindu (329.5mm) and Kisumu (301.8mm). The other stations recorded between 100-300mm except Lamu, Narok, Mandera, and Lodwar that reported 95.9mm, 95.0mm, 83.5mm and 1.0mm respectively. **Figure 3a** shows the OND 2021 rainfall performance (%) while Figure **3b shows** total rainfall amount recorded in OND 2021 (Blue bars) in comparison with the OND LTMs (Red bars)

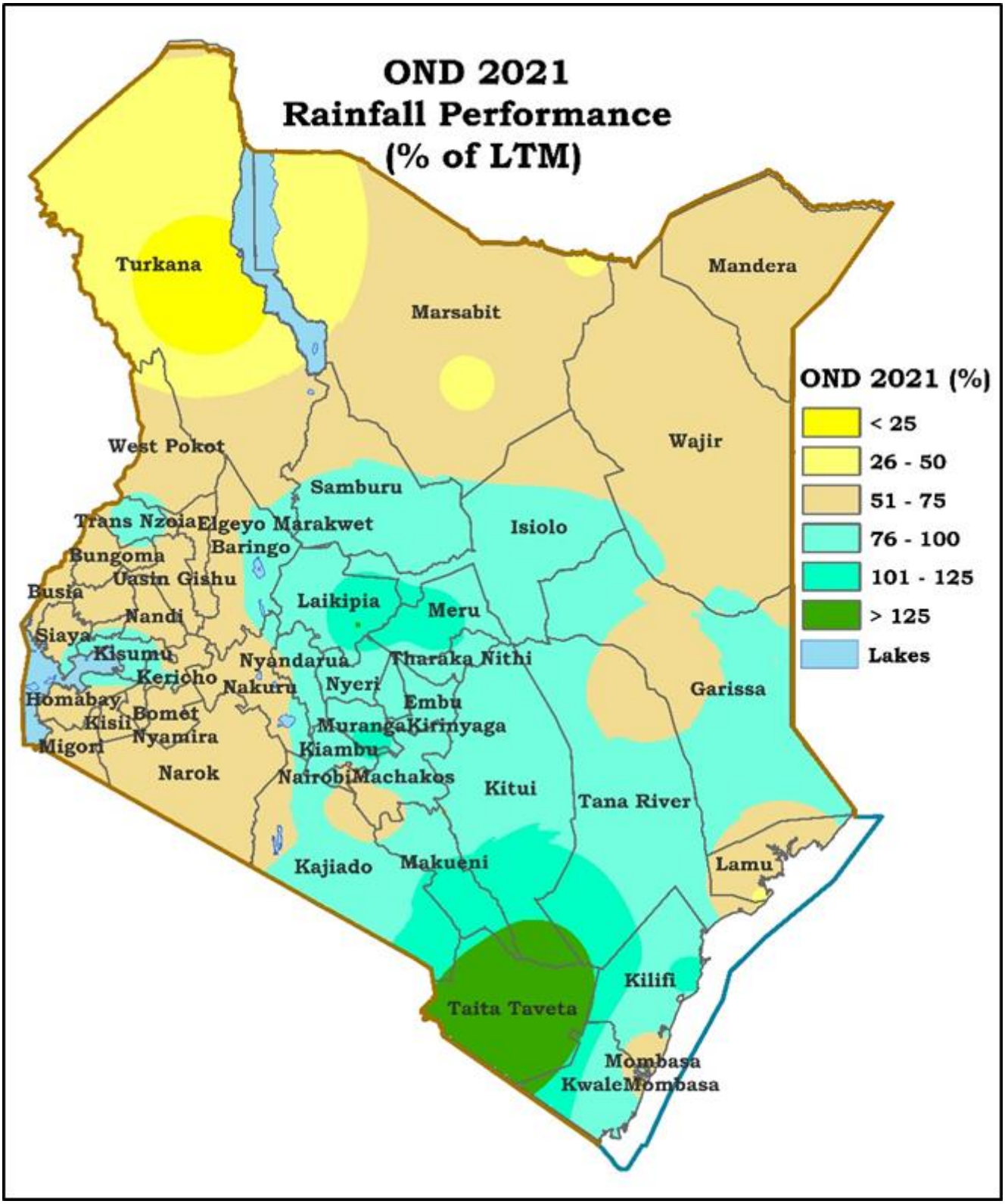

Figure 3a: October-December 2021 Seasonal Rainfall Performance (%) against OND LTM

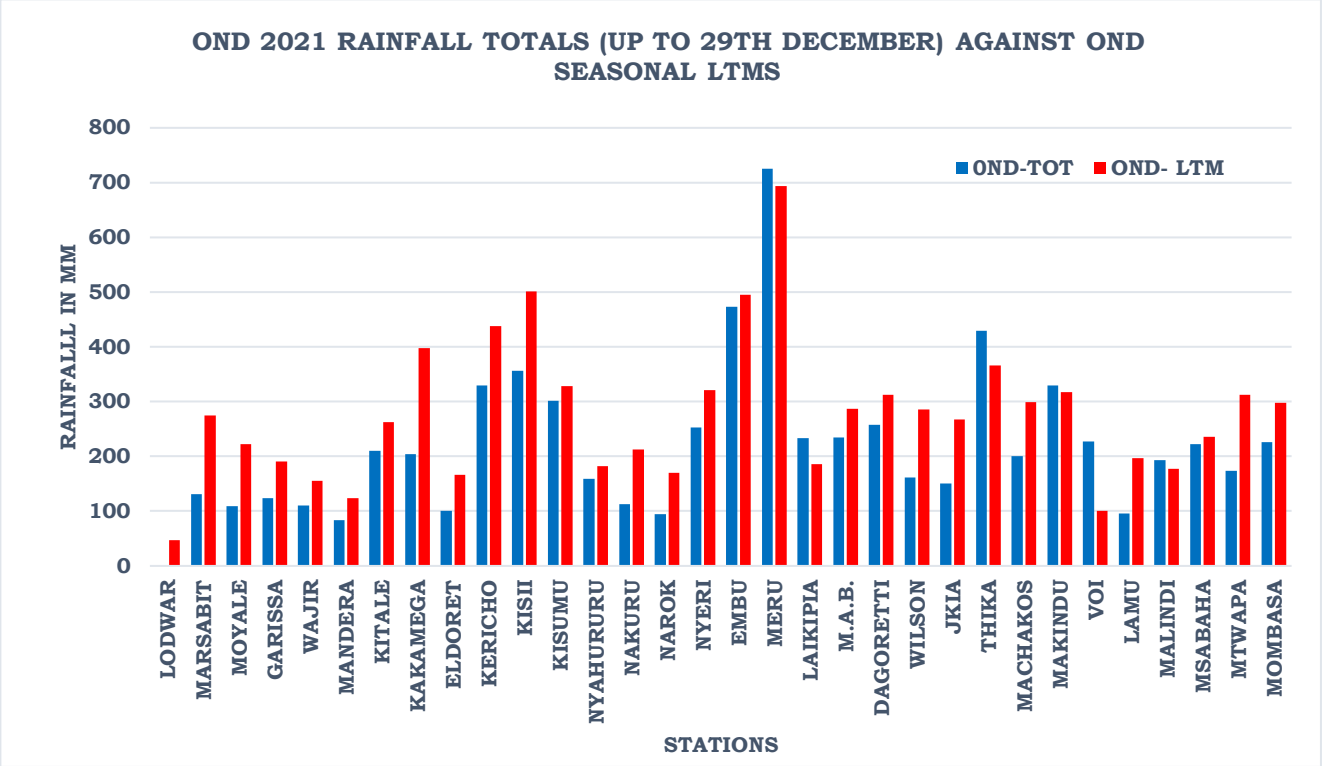

Figure 3b: October-December 2021 Seasonal Rainfall Totals against OND LTM

3.3. Experienced Impacts During the October-November-December Seasonal Rainfall

3.3.1. Agriculture and Food Security

In December, conditions were favourable for agricultural production in the South-eastern lowlands and Highlands East of the Rift Valley as a result of the enhanced rainfall experienced in these regions. However, crops were destroyed in Taita Taveta County as river Lumi burst its banks on 2nd December following heavy rains that pounded the area.

During the months of October and November, dry conditions over the ASAL areas led to diminished pasture and water for livestock and food for human consumption. Residents in these areas were faced with acute food shortage and children were severely malnourished and had to rely on food supplements. Livestock deaths were reported in Taita Taveta, Kwale, Marsabit, Wajir, Garissa, Kilifi, Samburu, Tana-River and Isiolo, Counties. The body conditions of the remaining livestock in these areas were bad and this affected milk and meat production.

3.3.2. Disaster Management

Thirty-two lives were lost on 4th December in Kitui County when a bus was swept away as the driver attempted to cross swollen river Enziu. A child was swept away in Kyandoo village also in Kitui on 14th December as he attempted to cross river Kanzili. On 13th December, three children were swept away while attempting to swim in the swollen river Mwache in Dundaloma village in Kwale County.

A landslide occurred in Mwangia village in Taita- Taveta County 0n 8th December and destroyed property.

Crops and cattle were swept away in Taita Taveta County following heavy rains that pounded the area on 26th November.

A man was struck and killed by lightning in Bungoma County on 26th November 2021.

There was a case of human wildlife conflict in Samburu County in October where an elderly man was killed by a rogue elephant.

Heavy rainfall accompanied by strong winds destroyed farms, houses and school roofs in Kisii, Elgeyo Marakwet and TransNzoia counties in October 2021.

Drought was reported during the season in more than twenty counties where over 2.5 million people were faced with acute food shortage.

3.3.3. Water Resources Management and Energy

The depressed rainfall received during most of the OND 2021 season led to reduced water resources especially in the months of October and November where residents and livestock were faced with acute water shortage. Water sources dried up in most ASAL regions and residents had to walk for long distances in search of water both for human and livestock consumption. However, the water situation improved over most of the ASAL areas in eastern sector in December following the enhanced rainfall but the North-western sector of the country was still faced with water stress.

3.3.4. Environment

Wildlife deaths were reported in Wajir and Garissa Counties as a result of lack of food and water in the conservancies and in the neighbouring areas.

3.3.5. Transport and Public Safety

Transport was temporarily disrupted along the Njabini- Engineer and Pesi roads in Nyandarua County on 1st October following heavy rainfall that was accompanied by hailstones in the area. Traffic was also temporarily disrupted

along Uhuru highway, Mombasa road and Waiyaki way in Nairobi following heavy rains that caused flooding on 27th and 28th November 2021.

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.

KEY OF SCIENTIFIC WORDS USED

Rainfall performance is generally categorized as follows:

- Below 75% of the LTM – Below Normal (Depressed) rainfall
- Between 75% and 125% of the LTM - Near normal rainfall
- Above 125% of the LTM – Above Normal (Enhanced) rainfall

Stella Aura, MBS

Director of Kenya Meteorological Department