



REPUBLIC OF KENYA  
MINISTRY OF ENVIRONMENT AND FORESTRY  
STATE DEPARTMENT OF ENVIRONMENT  
KENYA METEOROLOGICAL DEPARTMENT

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

Telephone: 254 (0) 20 3867880-7, Fax: 254 (0) 20 3876955/3877373/3867888,

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

Website: <http://www.meteo.go.ke>

Ref No: KMD/FCST/5-2018/SO/02

Issue Date: 16/05/2018

REVIEW OF RAINFALL DURING THE MARCH TO MAY 2018 "LONG RAINS"  
SEASON AND THE OUTLOOK FOR THE JUNE-JULY-AUGUST (JJA) 2018

## 1. HIGHLIGHTS

### 1.1 Performance of the Rainfall Conditions in March-April-May 2018

- Very heavy rainfall pounded most parts of the country during March-April-May (MAM) 2018 rainfall season. The rainfall was associated with massive flooding and other severe impacts including loss of several lives. It also led to displacement of thousands of families as well as massive destruction of property and infrastructure.
- Analyses of the MAM 2018 seasonal rainfall indicates that most Meteorological stations in the country had received **above-normal** rainfall by mid-May, well ahead of the cessation of the Long-Rains season.
- Further analyses indicates that the MAM 2018 seasonal rainfall totals recorded at some stations were the highest ever recorded since the stations were opened
- The most enhanced rainfall that was 318 percent of the seasonal Long-Term Mean (LTM) was recorded at Makindu station. Garissa, Narok and Laikipia Airbase stations also recorded more than 200 percent of their seasonal L TMs.

### 1.2 Outlook for June-July -August 2018

The outlook for June-July-August (JJA) 2018 season indicates that:

- The western highlands, the Lake Victoria Basin and parts of Central Rift Valley (Nakuru, Nyahururu) and Northwestern Kenya are likely to receive near normal rainfall with a tendency towards above normal (slightly enhanced rainfall).
- The coastal strip is also likely to receive near normal rainfall with a tendency towards above normal. However, the extreme northern parts of coast bordering the Somali Coast are likely to receive near normal rainfall with a tendency towards below normal (depressed rainfall)
- The rest of the country is expected to remain generally dry.
- Most areas in the Central highlands and Nairobi are expected to experience cool/cold and cloudy conditions with occasional light rains/drizzles. The day time temperatures are likely to be slightly cooler than average.

## 2.0. REVIEW OF MARCH-APRIL-MAY (MAM) 2018 SEASONAL RAINFALL

The March-April-May 2018 seasonal rainfall was characterized by heavy rainfall storms that caused massive flooding over most parts of the country and landslides/mudslides in some areas. Analysis of the MAM 2018 rainfall from 1<sup>st</sup> March to 17<sup>th</sup> May indicates that most meteorological stations in the country had already recorded **above-normal** rainfall well ahead of the cessation of the Long Rains. Four stations namely Makindu, Garissa, Narok and Laikipia Airbase recorded above 200 percent (more than twice) of their MAM seasonal LTMs. The stations recorded 318%, 310%, 204% and 202% respectively. Other stations that recorded above-normal rainfall (more than 125 percent of their LTMs) include Lodwar-198%, Meru-193%, Marsabit-190%, Wajir-186%, Embu-179%, Eldoret (Kapsoya)-176%, Wilson Airport-170%, Jomo Kenyatta International Airport-166%, Voi-165%, Nakuru-163%, Machakos-160%, Moi Airbase (Eastleigh)-158%, Thika-156%, Eldoret Airport-155%, Nyeri-153%, Dagoretti Corner-149%, Mandera-147%, Kitale-146%, Lamu-139%, Nyahururu-138%, Kakamega-137% and Mombasa-127%. Mtwapa, Kericho, Moyale, Kisii, Kisumu, Malindi and Msabaha were the only meteorological stations that recorded near-normal rainfall (between 75 and 125 percent) while no station in the country recorded below-normal rainfall (less than 75 percent).

Further Analyses indicate that MAM 2018 seasonal rainfall recorded at some stations were the highest on record. The rainfall recorded at Narok station, for example, was the highest ever recorded since 1950, considering both the MAM and October-November-December (OND) seasons. The station recorded 706.6mm as compared to 686.4mm recorded during the OND 1961 and 610.8mm in MAM 1957 seasons. Other stations that recorded the highest amounts in record include Eldoret-Kapsoya (highest for both MAM and OND since 1972), Laikipia Airbase (highest for MAM and second highest for both seasons since 1957), Makindu (highest for MAM and sixth highest for both seasons since 1950), Garissa (second highest for MAM and fourth highest for both seasons since 1959), Kakamega (second highest for MAM and fourth highest for both seasons since 1958), Nakuru (second highest for both MAM and OND since 1964) and Embu (second highest for both MAM and OND since 1976).

Several rainfall storms were recorded during the season. In March, Siakago rainfall station in Embu County recorded 182.6mm on 25<sup>th</sup> March 2018 while Mrangi Primary School station in Taita Taveta County recorded 138.0mm on 16<sup>th</sup> March 2018. Other rainfall storms of above 90mm recorded during the month of March include 97.8mm at Iten rainfall station on 14<sup>th</sup> March, 94.9mm at Busia Ministry of Water Rainfall Stations on 14<sup>th</sup> March and 91.2mm at Kitui Meteorological Station on 25<sup>th</sup> March.

In April, Marsabit station recorded 151.8mm on 13<sup>th</sup> April while Garissa and Moi Airbase (Eastleigh) stations recorded 125.3mm and 103.5mm on 16<sup>th</sup> and 23<sup>rd</sup> April 2018 respectively. During the first seventeen days of May 2018, Malindi station recorded 128.1mm on 16<sup>th</sup> May while Mombasa station recorded 98.7mm on 3<sup>rd</sup> May 2018.

Up to 17<sup>th</sup> May, Embu Meteorological station recorded the highest seasonal rainfall amount of 1087.0mm (189%) as compared to its MAM seasonal LTM of 575.3mm. Other stations that recorded rainfall exceeding 700mm include Kakamega – 956.7mm, Meru – 882.6mm, Kericho – 823.1mm, Dagoretti Corner – 788.4mm, Kisii – 774.1mm, Thika – 743.3mm, Wilson Airport – 735.7mm, Marsabit – 709.1mm and Narok – 706.6mm. Mtwapa, Eldoret Airport, Kitale, Moi Airbase (Eastleigh), Nyeri, Lamu, Eldoret (Kapsoya), Makindu, Malindi, Mombasa, Kisumu, Nakuru and Jomo Kenyatta International Airport recorded between 500 and 700mm while the rest of the stations recorded below 500mm. The lowest amount of 201.9mm was recorded at Lodwar meteorological station. **Figure 1a** shows the MAM 2018 rainfall recorded from 1<sup>st</sup> March to 17<sup>th</sup>

May (**Blue bars**) compared to the MAM LTMs (**Red bars**). **Figure 1b** depicted the MAM 2018 rainfall performance as a percentage of the MAM LTMs

### **3.0. EXPERIENCED IMPACTS**

The MAM 2018 seasonal rainfall was associated with both positive and negative impacts country-wide as follows:

#### **Positive Impacts**

- ✓ In the agricultural areas of the country that include Western, Nyanza, central Rift Valley, central and Southeastern Kenya, good crop performance was reported in some regions that were not affected by floods and landslides.
- ✓ The enhanced rainfall in pastoral areas was expected to improve pasture and water availability for livestock despite the flooding experienced in the areas.
- ✓ The Seven Forks, Turkwel and Sondu Miriu power generating dams filled to capacity as a result of the heavy rainfall in the catchment areas. This was expected to increase hydro-power generation in the country
- ✓ Water resources for drinking, sanitation and industrial use improved significantly as a result of the heavy rainfall experienced over most parts of the country.
- ✓ The heavy rainfall experienced in the entire country was conducive for tree-planting. The Ministry of Environment spearheaded the tree-planting exercise country-wide and this will go a long way to increase the forest cover.

#### **Negative Impacts**

- ✓ The heavy rainfall experienced in various agricultural areas caused massive flooding that hampered crop performance. The floods submerged crop plantations in counties like Kisumu.
- ✓ The floods and landslides that have resulted from heavy rainfall affected the better part of the country. According to the National Disaster Operations Centre (NDOC), the most affected counties include Tana-River, Mandera, Turkana, Kisumu, Garissa, Isiolo, Taita-Taveta, Wajir, West-Pokot, Marsabit, Samburu and Narok.
- ✓ Report from NDOC also indicate that up to mid-May, the heavy rainfall in the country had claimed 183 people, 54 people were injured, 53675 households were affected while 225,360 people were displaced from their homes.
- ✓ Flash floods that occurred in various parts of the country led to transport problems after several roads became impassable. There was also massive destruction of property and infrastructure country-wide.
- ✓ Isolated cases of diseases like cholera emerged in some areas due to contaminated water that mixed with sewage. Water-borne diseases such as malaria were also on the increase due to flooding.
- ✓ Several areas suffered environmental degradation that was caused by soil erosion following the heavy rainfall. Several rivers such as Tana, Ewaso Nyiro, Yala and Nyando burst their banks due to heavy rains in the catchment areas.
- ✓ Infrastructure such as roads were destroyed by the floods.

### **4.0. FORECAST FOR JUNE-JULY-AUGUST (JJA) 2018.**

Rainfall is normally concentrated over the western and the coastal regions during the June-July-August (JJA) season. The rest of the country remains generally dry as seen in **Figure 2**.

The climate outlook for June to August 2018 was based on the expected evolution of global Sea Surface Temperature (SST) patterns as well as upper air circulation patterns. The process involved multiple linear regression of sea surface temperature anomalies (SSTAs) and wind patterns in the upper levels (Quasi-Biennial Oscillations (QBO), Southern Oscillation Index (SOI) and Indian

Ocean Dipole (IOD) on the Kenyan rainfall. The expected distribution is derived from statistical analysis of past years, whose characteristics were found to exhibit similarities to the current year. The forecast indicates that the Western highlands, the Lake Victoria Basin, parts of Central Rift Valley (Nakuru, Nyahururu), Northwestern Kenya and Southern Coastal strip are likely to receive near-normal rainfall with a tendency to above normal (enhanced rainfall). The northern Coastal strip bordering the Somali Coast is expected to receive normal rainfall tending towards below normal (depressed rainfall) while the rest of the country is expected to remain generally dry.

Most areas in the Central Highlands and Nairobi are expected to experience cool and cloudy conditions with occasional drizzles or light rains (see *Figure 3*). The specific outlooks for individual areas are as follows:

**The Western Highlands** (*Kitale, Kericho, Nandi, Eldoret, Kakamega, Bungoma, Butere/Mumias, Vihiga etc.*), **Lake Victoria Basin** (*Kisumu, Nyando, Kisii, Busia*), **Parts of Central Rift Valley** (*Nakuru, Ol Kalao, Nyahururu*) are likely to receive near-normal rainfall with a tendency to above-normal (enhanced) rainfall.

**Most of the Coastal strip** (*Malindi, Msabaha, Mombasa, Kilifi and Mtwapa*) is likely to receive near-normal rainfall tending to above-normal (enhanced rainfall). However, North Coast (Lamu, Mpeketoni) is likely to receive near normal rainfall with a tendency of below normal (depressed rainfall).

**The Northwestern region bordering South Sudan and Uganda** is expected to experience normal rainfall with a slight tendency to above normal. However, the better part of Northwestern Kenya is expected to remain generally dry.

**The Central Highlands** (*Kiambu, Nyeri, Embu, Meru, Murang'a and Kirinyaga*) and **Nairobi Area** (*Dagoretti, Kabete, Wilson, Jomo Kenyatta International Airport, Eastleigh etc*) are likely to experience cool and cloudy conditions with occasional early morning light rains/drizzles. Prolonged hours of overcast skies (cloudy conditions) might be experienced on some days resulting to cold and chilly conditions. A few days are expected to be extremely cold with temperatures falling below 18°C in some areas. Daytime temperatures are likely to be cooler than average during the forecast period. The forecasted temperature condition is shown in **Figure 4**.

**Most parts of Northeastern Kenya** (*Wajir, Mandera, Garissa, Moyale, Marsabit, Isiolo, and Garbatulla*) and **Southeastern lowlands** (*Machakos, Makindu, Kitui, Mwingi, Kibwezi, Voi, Taveta*) are expected to remain generally sunny and dry throughout the forecast period. The southeastern regions bordering Nairobi and Central counties (Machakos) are likely to experience occasional cool and cloudy conditions with light rains.

## **5.0.POTENTIAL IMPACTS**

The following are the expected impacts during the coming season:

### **5.1. Agriculture and Food Security Sector**

The expected enhanced rainfall in western Kenya will lead to improvement in crop performance and subsequent agricultural production. The cloudy and drizzly conditions in central highlands are also favorable for maturing of the crop planted during the MAM season.

### **5.2. Disaster Management Sector**

The generally sunny and dry weather conditions expected in the Arid and Semi-Arid Lands (ASALs) will be conducive for resettlement of people who were displaced by the floods that

emanated from the heavy rains during the MAM season. The dry conditions may, however, lead to water scarcity and reduced pasture for livestock towards the end of August and in September 2018. Some flooding may still occur in western Kenya and along the Coastal strip where enhanced rainfall is expected. The current contingency measures should therefore be sustained in these areas.

### **5.3. Health Sector**

In areas such as Nairobi, Central highlands, and parts of the Highlands west of the Rift Valley (Kericho, Eldoret and Kitale), cases of respiratory diseases like asthma, pneumonia and common colds (flu) are expected to be on the increase due to the expected cool/cold and chilly conditions. The general public (especially the young and elderly members of society) are advised to adopt warm dress code to avoid contracting such diseases.

In western and Nyanza, cases of Malaria may increase as a result of the flooding that occurred during the MAM season and the forecasted enhanced rainfall. The health authorities should therefore be on the lookout to facilitate supply of drugs necessary to combat these diseases.

***ADVISORY: During chilly days, people are advised not to warm themselves close to jikos in poorly ventilated houses with closed windows. Burning charcoal produces Carbon Monoxide gas that is lethal when inhaled.***

### **5.4. Transport and Public Safety**

Wet conditions are expected to be sustained in Western Kenya and some parts of Central Rift Valley. Transport problems are therefore likely to continue in the areas where roads were rendered impassable by the heavy MAM 2018 rains.

Poor visibility resulting from foggy conditions may pose danger to motorists and pedestrians along the Nairobi-Naivasha road, especially along the Kikuyu-Kinungi stretch. All should, therefore, take utmost care to minimize accidents that may result from such weather conditions. Landing and takeoff at Jomo Kenyatta International Airport (JKIA) may occasionally be disrupted by thick fog and associated very poor visibility leading to diversion of aircrafts to other airports.

### **5.5. Water Resources Management and the Energy Sectors**

The water levels in the western Kenya reservoirs such as Turkwel and Sondu Miriu are expected to continue rising due to the forecasted enhanced rainfall in the region. The high levels in the Seven-Folk dams will be maintained due to the cool/cold and cloudy conditions in the catchment areas that will keep the rate of evaporation very low.

***NB: This outlook should be used together with the 24 hour, 5-day, 7-day and monthly forecasts and regular updates issued by this Department.***

Mr. Peter G. Ambenje

**DIRECTOR OF METEOROLOGICAL SERVICES & PERMANENT  
REPRESENTATIVE OF KENYA WITH WMO**



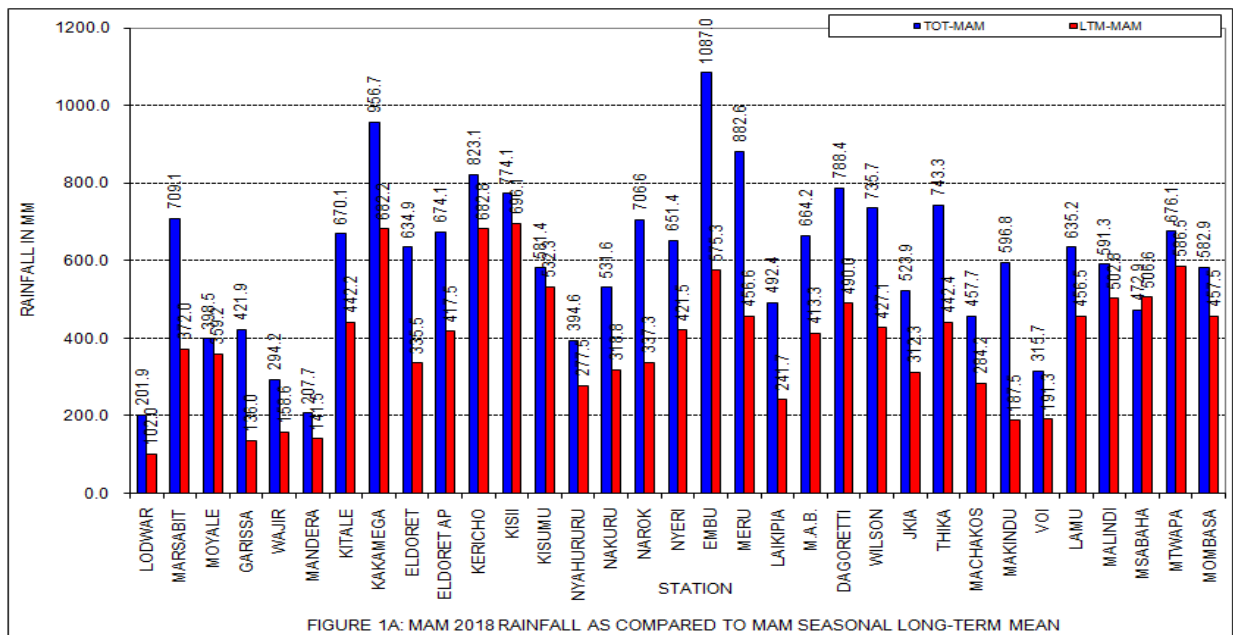


FIGURE 1A: MAM 2018 RAINFALL AS COMPARED TO MAM SEASONAL LONG-TERM MEAN

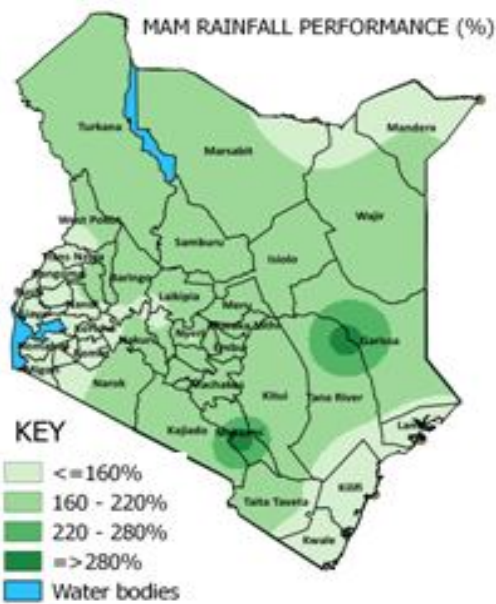


Figure 1b: MAM 2018 Rainfall as a Percentage of MAM LTMs

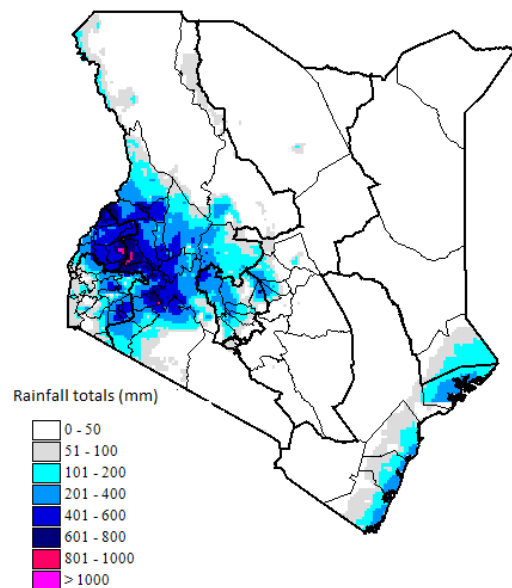
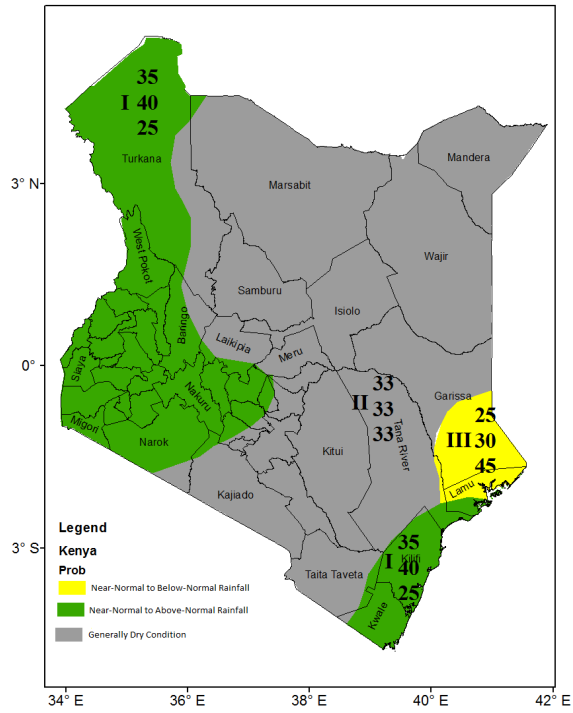
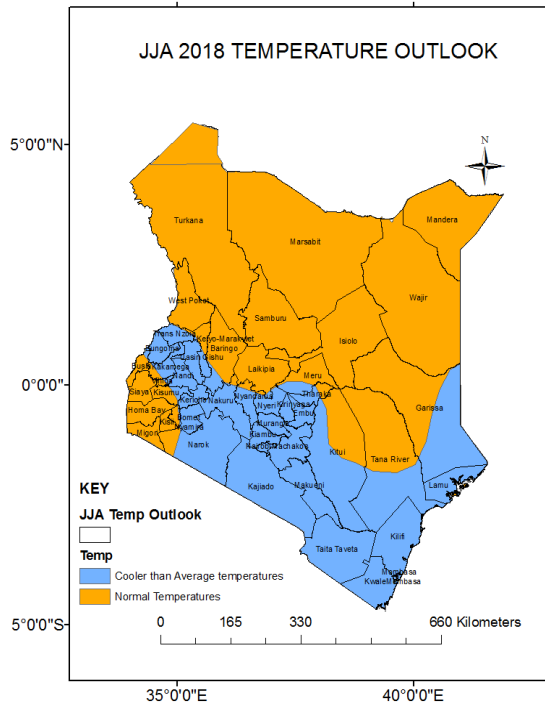


Figure 2: June -July- August Normal Rainfall Distribution



**Figure 3: June July August 2018 Rainfall Outlook**



**Figure 4: June July August 2018 Temperature Outlook**