MINISTRY OF TRANSPORT

DIVISION OF METEOROLOGY
WARREN AND CAREY STREETS,
MONROVIA, LIBERIA

2025 SEASONAL FORECAST FOR AGRO-CLIMATE CHARACTERISTICS OF LIBERIA

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INTRODUCTION

The 2025 Seasonal Forecast of Agro-Climate Characteristics for Liberia, produced by the Division of Meteorology under the Ministry of Transport, provides a comprehensive analysis of anticipated weather and climate patterns affecting the country. This forecast is based on regional and global climate models and aims to support decision-making across key sectors including agriculture, energy, infrastructure, health, transportation etc.

Liberia's climate, influenced by regional patterns in the West African Monsoon and global phenomena such as ENSO (El Niño-Southern Oscillation), plays a critical role in shaping the country's agricultural productivity and socio-economic stability. The forecast outlines expected rainfall distribution, onset and cessation of the cropping season, and dry spell patterns during different three-month periods — May–June–July (MJJ), June–July–August (JJA), and July–August–September (JAS).

This report not only provides regional outlooks but also delivers localized guidance for all counties in Liberia, highlighting areas likely to experience rainfall surpluses or deficits. It further assesses the potential implications of these patterns for farming activities and offers targeted advisories to help mitigate associated risks.

Through this forecast, stakeholders are encouraged to adopt proactive and climate-resilient strategies that align with anticipated seasonal conditions, thereby enhancing food security, resource management, and national preparedness.

EXECUTIVE SUMMARY

The Liberia Meteorological Service (LMS) is charged with the responsibility of providing weather information to the public. This 2025 Seasonal forecast provide climate, Agrometeorological information and advisories on the rainy season, which entails cumulative rainfall amount, onset and cessation of the cropping season, dry spells length at the start and end of the cropping season in the support of decision-making, policy formulation and planning for weather sensitive sectors such as agriculture, environment, disaster risk management, water resources, energy, transportation and health.

The 2025 Seasonal rainfall forecast employs the teleconnection between the El-Nino Southern Oscillation (ENSO) observed atmospheric condition over land and ocean, Sea Surface Temperature (SST) anomalies, Mean Sea Level Pressure (MSLP) anomalies, Madden Julian Oscillation (MJO), Inter-Tropical Convergence Zone (ITCZ), climatic data from LMS observatories across the country which covers a minimum period of 30 years.

This Forecast has been agreed upon by the Consensus from Continental Centre ACMAD, Regional Climate Centre (RCC) during the Agro-hydro-climatic characteristics of the rainy season for Sudanian and Sahelian zones of West Africa (PRESASS), together with the expertise and downscaled models output from the Liberia Meteorological Service (LMS).

The highlights of the 2025 May, June, and July Seasonal Forecast are: The central and Southeast parts of the country are anticipated to receive above average to extreme rainfall including parts of Grand Cape Mount, Bomi, and Gbarpolu in the western region. However, northern Gbarpolu and Lofa are expected to receive below average rainfall.

For the period June, July and August, the central region and parts of the south as well as the southeast are anticipated to receive above average rainfall while the northwestern and parts of the south are expected to receive average rainfall. However, northern Gbarpolu and Lofa are also expected to receive below average rainfall.

For the period July, August and September, the central parts of the country are anticipated to receive above average and extreme rainfall while the northern part of Lofa is anticipated to receive below average rainfall. All other parts of the country are expected to receive average

rainfall.

The 2025 rainy season across the northern, southwestern and western part of the country is anticipating a normal start of the cropping season while across the central to southeast an early start is anticipated.

During the start of the season, the Northwest to Western Region of the country is expected to have a short dry spell while the central to the southern region is expected to have a long dry spell. However, the entire country is anticipated to experience a longer dry spell at the end of the season.

For the end of the 2025 cropping season, most parts of the country are anticipated to have an early end of the reason. Notwithstanding, Bomi, South of Gbarpolu, central and South of Bong County, central Nimba, north of Montserrado, Margibi and Grand Bassa are anticipated to have a late end of the season.

CHAPTER ONE: GLOBAL SEA SURFACE TEMPERATURE

ENSO refers to the periodic warming and cooling of sea surface temperatures in the central and eastern tropical Pacific Ocean, influencing global weather patterns. Global sea surface temperature is a measure of the average temperature of the ocean surface worldwide and is influenced by various factors, including ENSO. The chief driver of year-to-year variability is the El Niño Southern Oscillation (ENSO) periods of warmer (El Niño) or cooler (La Niña) than average SSTs in the central and eastern tropical Pacific. El Niños temporarily increase the global average SST while, La Niñas temporarily decrease it. Below is an ENSO prediction plume displaying the ENSO projection for the year 2025.

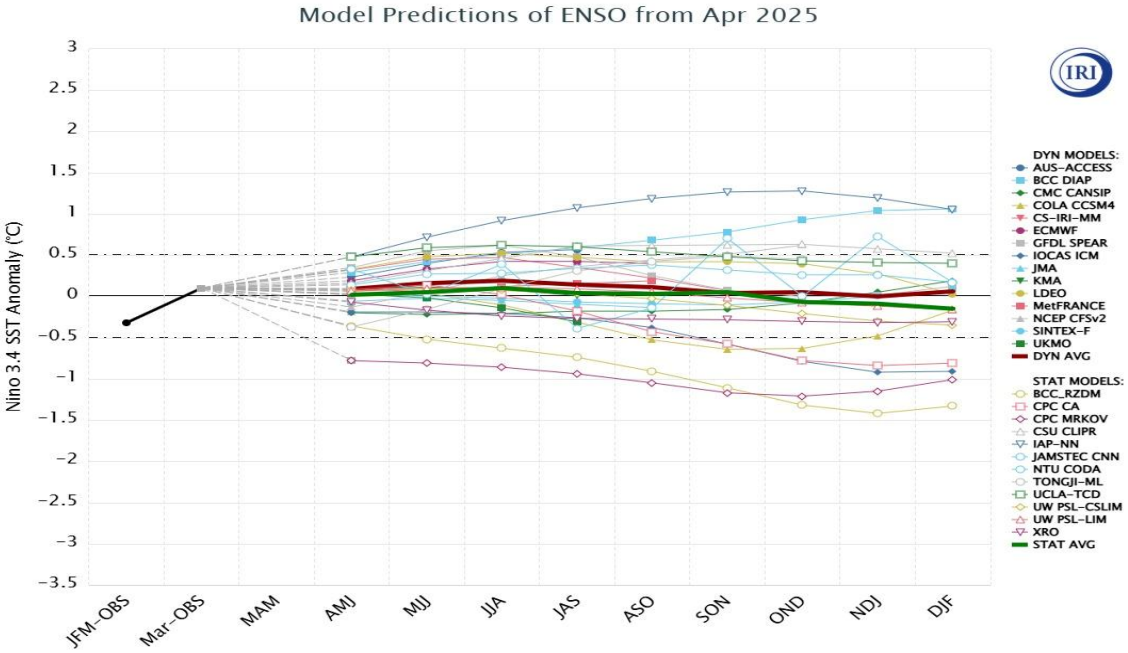

Figure 1: ENSO projection for 2025. On the right are the models used for the prediction DYN = Dynamical Models and STAT = Statistical models. Right of the plume indicate the temperature level ranging from -3.5 ^{O}C to +3^{0}C. Below are the climatical seasons ranging. Source: International Research Institute of Climate and Research.

The IRI ENSO prediction plume indicates a high likelihood of ENSO-neutral conditions during Apr–Jun 2025. The multi-model mean of statistical and dynamical models shows ENSO-neutral conditions remaining above 50% probability through August–October 2025, then decreasing to the 40% range for the remainder of the forecast period. These forecasts show no preference for either El Niño or La Niña, both of which remain in the 20% probability range throughout the forecast period

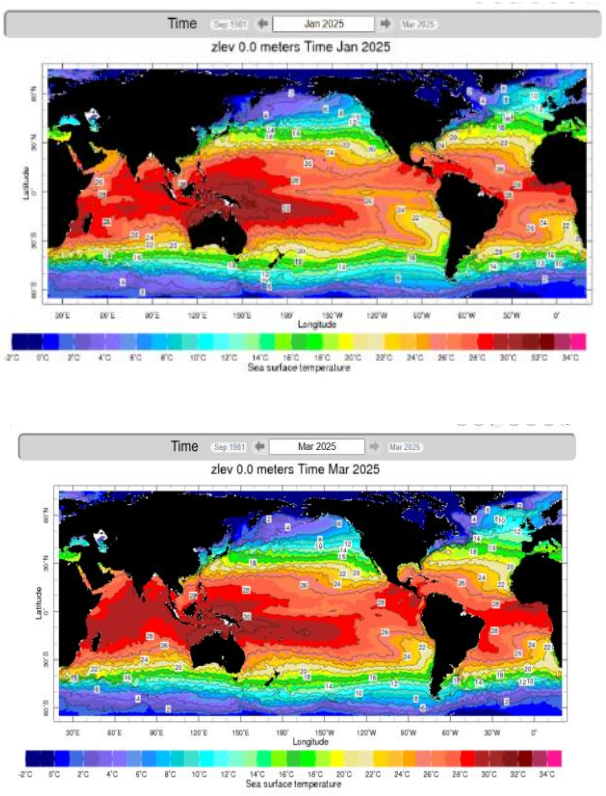

Figure 2: This map displays monthly sea surface temperatures for the globe. Monthly sea surface temperatures are from the Reynolds and Smith OISST version 2 sea surface temperature dataset. Shading indicates the monthly average sea surface temperature in °C for the month indicate. Contours are drawn at an interval of 2.0 °C. Source: NOAA/CPC.

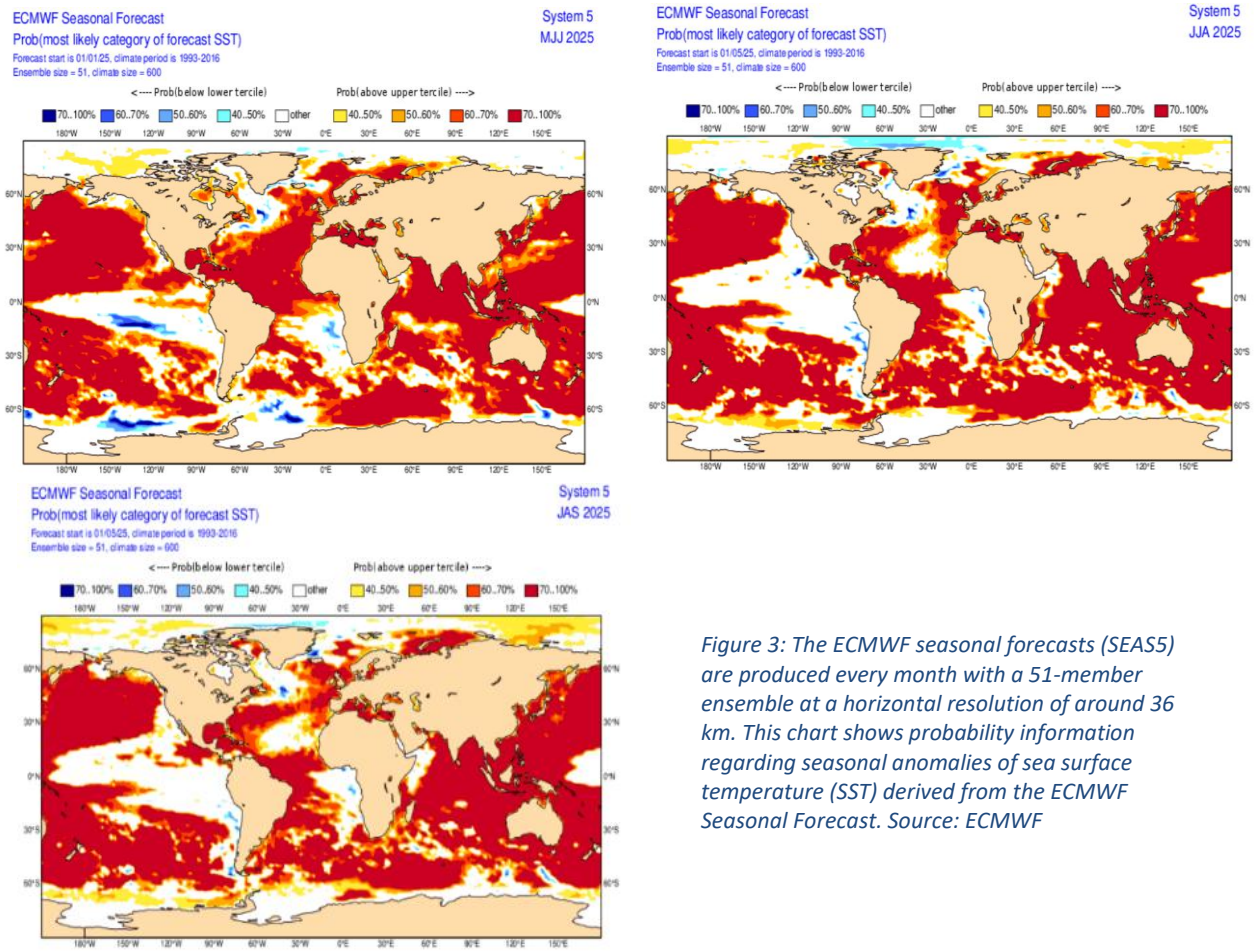

Figure 3: The ECMWF seasonal forecasts (SEAS5) are produced every month with a 51-member ensemble at a horizontal resolution of around 36 km. This chart shows probability information regarding seasonal anomalies of sea surface temperature (SST) derived from the ECMWF Seasonal Forecast. Source: ECMWF

Global Sea Surface Temperature for the period January, February and March is warm. As indicated in the graph above. However, a neutral condition climatic is projected for MJJ, JJA and JAS.

Source: *Columbia Climate School International Research Institute for Climate and Society.*

CHAPTER TWO: 2025 REGIONAL SEASONAL FORECAST FOR WEST AFRICA AND THE SAHEL REGION

2.1 CLIMATE

PRESASS 2025 was organized, from 5 to 9 May 2025 in Bamako, Mali, by the AGRHYMET Regional Climate Center for West Africa and the Sahel (AGRHYMET RCC-WAS) of CILSS, in collaboration with ACMAD, the National Meteorological and Hydrological Services (SNMHs), the WMO and West African River Basin Organizations. The Seasonal forecasts were developed based on analyses of the current situation, likely changes in Sea Surface Temperatures (SSTs), statistical models derived from SNMHs data, expert knowledge of climate characteristics in the region and forecasts of the major world climate centers. The analyses made it possible to make the following predictions, in relation to the average values of each parameter over the 1991-2020 reference period.

MJJ

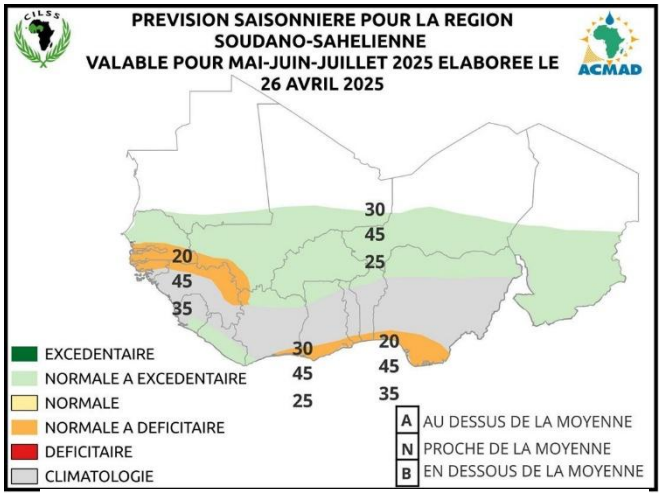

Figure 4: Summary of cumulative rainfall forecasts (MJJ).

Summary of cumulative rainfall forecasts

Normal to excess accumulations are expected from **May-June-July** in the Sahelian strip, from north-central Senegal to central Chad, as well as in the north of the Gulf of Guinea countries, Sierra Leone and **Liberia**. On the other hand, normal to deficit accumulations are expected in Gambia, in the south of Senegal, in the far west of Mali, as well as on the eastern coast of Ivory Coast, Ghana, Togo, Benin and Nigeria.

JJA

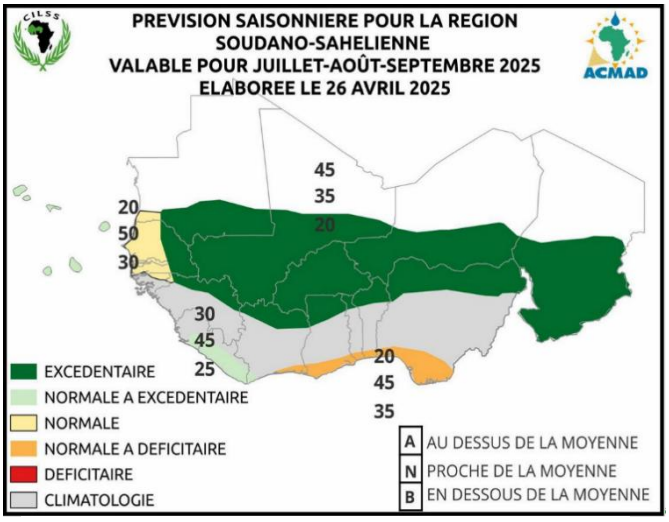

Figure 5: Summary of cumulative rainfall forecasts (JJA)

For the month **June-July-August**, a similar configuration is expected: normal to excess rainfall in the Sahel countries, the north of the Gulf of Guinea countries, as well as on the coasts of Sierra Leone and **Liberia**.

On the other hand, deficit to normal accumulations is expected on the Cabo Verde islands and the coastal areas of the Gulf of Guinea countries. On the Atlantic coast of southern Mauritania and Senegal, precipitation will be close to normal. Elsewhere, the climatology is expected.

JAS

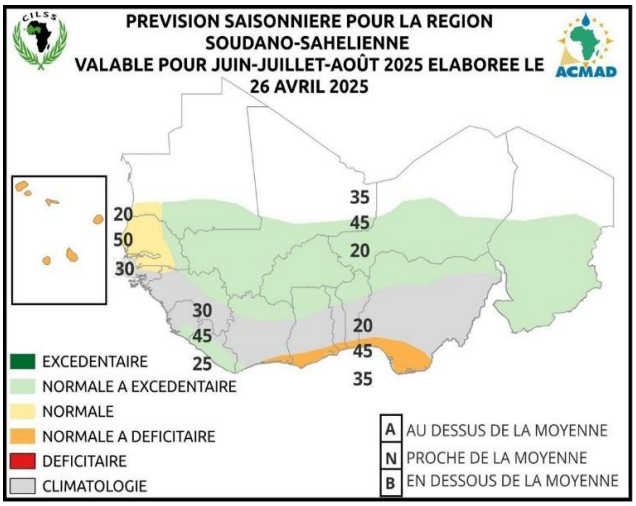

Figure 6: Summary of cumulative rainfall forecasts (JAS).

During the period **July-August-September**, humility will increase in the Sahelian strip, from western Senegal to Chad, as well as in the north of the Gulf of Guinea countries. Furthermore, precipitation should remain close to seasonal norms on the Atlantic coast to the south of Mauritania and Senegal. Normal to excess rainfall totals are also expected over Cape Verde, while the coastal areas of the Gulf of Guinea countries are expected to record deficit rainfall. Elsewhere, the climatology is expected.

2.2 AGRICULTURE

Start dates of the agricultural season in West Africa and the Sahel.

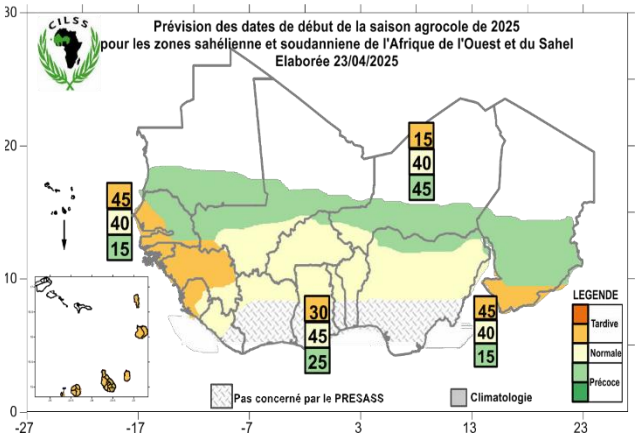

Figure 7: Start dates of the agricultural season in West Africa and the Sahel.

End date of the agricultural season in West Africa and the Sahel

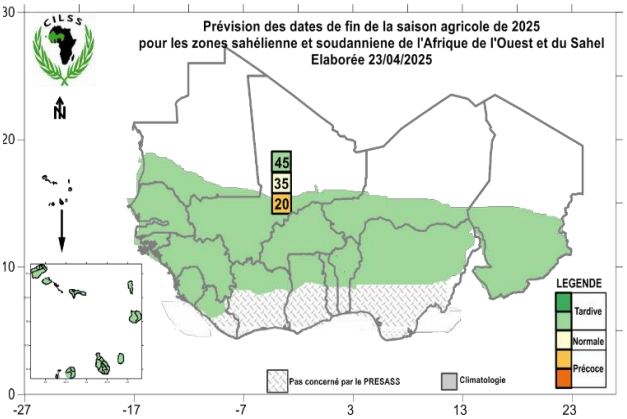

Figure 8: End date of the agricultural season in West Africa and the Sahel.

Summary of the forecast of the start dates of the agricultural season

• Early to average start dates of the season is expected in the Sahelian strip, including southern Mauritania, northern and eastern Senegal, central Mali, Southern Niger, the extreme north of Burkina Faso and central Chard.

• On almost all the Cape Verde Islands, western Senegal, Gambia, Guinea Bissau, Guinea, northern Sierra Leone and the extreme south of Chad, late to average start dates for the season are expected.

• Elsewhere, in the south of Guinea, the north of the Ivory Coast, the south of Sierra Leone, the northern half of **Liberia**, almost all of Burkina Faso, the extreme southwest of Niger, the north of the Ivory Coast, Ghana, Togo, Benin and Nigeria, medium to late season start dates are forecasted.

Summary of the forecast on the end dates of the agricultural season

Over almost the entire region concerned by PRESASS, notably the Sahelian and Sudan of West Africa and the Sahel, end of season dates are expected to be late or equivalent to the averages for the reference period

Dry spell at the start of the agriculture season in West Africa and the Sahel

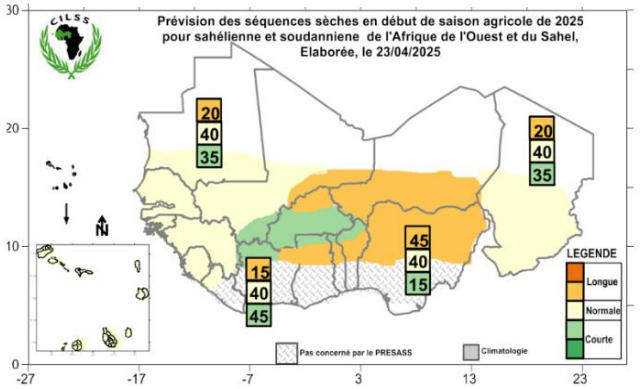

Figure 10: Dry spell at the start of the agriculture season in West Africa and the Sahel.

Dry spell toward the end agriculture season in West Africa and the Sahel

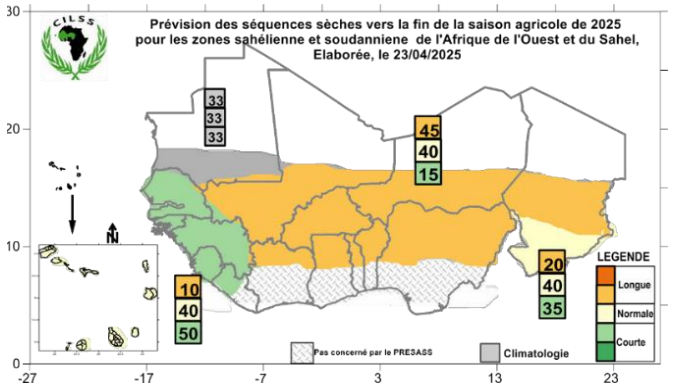

Figure 9: Dry spell toward the end agriculture season in West Africa and the Sahel.

Summary of the lengths of dry spell at the start of the agricultural season

At the start of the season, it is forecasted that:

- Short average dry sequence lengths in the west and east of the Sahelian strip (southern Mauritania, Senegal, Gambia, Guinea, Guinea Bissau, Sierra Leone, northern Liberia, south-west and central Mali, as well as southern Chad).
- Short to medium dry sequence lengths are expected in the extreme south of Mali, the north of Ivory Coast, the center and south of Burkina Faso, as well as the extreme north of Ghana, Togo and Benin.
- Elsewhere, in the south of Niger, the extreme north of Burkina Faso, the north-east of Ivory Coast, the north-central Ghana, Togo, Benin and the north of Nigeria, long to medium dry sequences are expected.

Summary of the forecast of the lengths of dry spell at the end of the agricultural season

Towards the end of the season:

- Short to medium dry spell are expected on the west- ern coast of the Atlantic, particularly in Senegal, Gambia, Guinea Bissau, Guinea, Sierra Leone and northern Liberia.
- In the Center and East of the Sahel as well as in the North of the Gulf of Guinea countries, long to medium dry sequence durations are likely.
- Furthermore, in the extreme south of Chad and the south of Mauritania, medium to short dry sequence durations and equal probability between categories are expected respectively.

CHAPTER THREE: 2025 SEASONAL FORECAST FOR LIBERIA

3.1 CLIMATE

SUMMARY OF MAY-JUNE-JULY (MJJ)

During the period May June and July most parts of the country covering Maryland, Grand Kru, Sinoe, Rivergee, Grand Gedeh, Central and Southern part of Nimba, Rivercess, Grand Bassa, Margibi, Montserrado, Southern and Central parts of Bong County, Northern Bomi, Southern Gbarpolu, and central Cape Mount are expected to receive sixty percent (60%) above average rainfall. Additionally, northeast of Grand Bassa, north of Rivercess, South of Nimba, Southern patches of Grand Gedeh, North of Sinoe, South and southwest of Rivergee, north of Grand Kru and Northwest of Maryland are expected to receive seventy percent (70%) above average rainfall. All other areas are expected to receive average rainfall. However, Northern Gbarpolu and southern are expected to receive sixty percent (60%) below average rainfall while central and northern Lofa are expected to receive thirty percent (30%) below average rainfall.

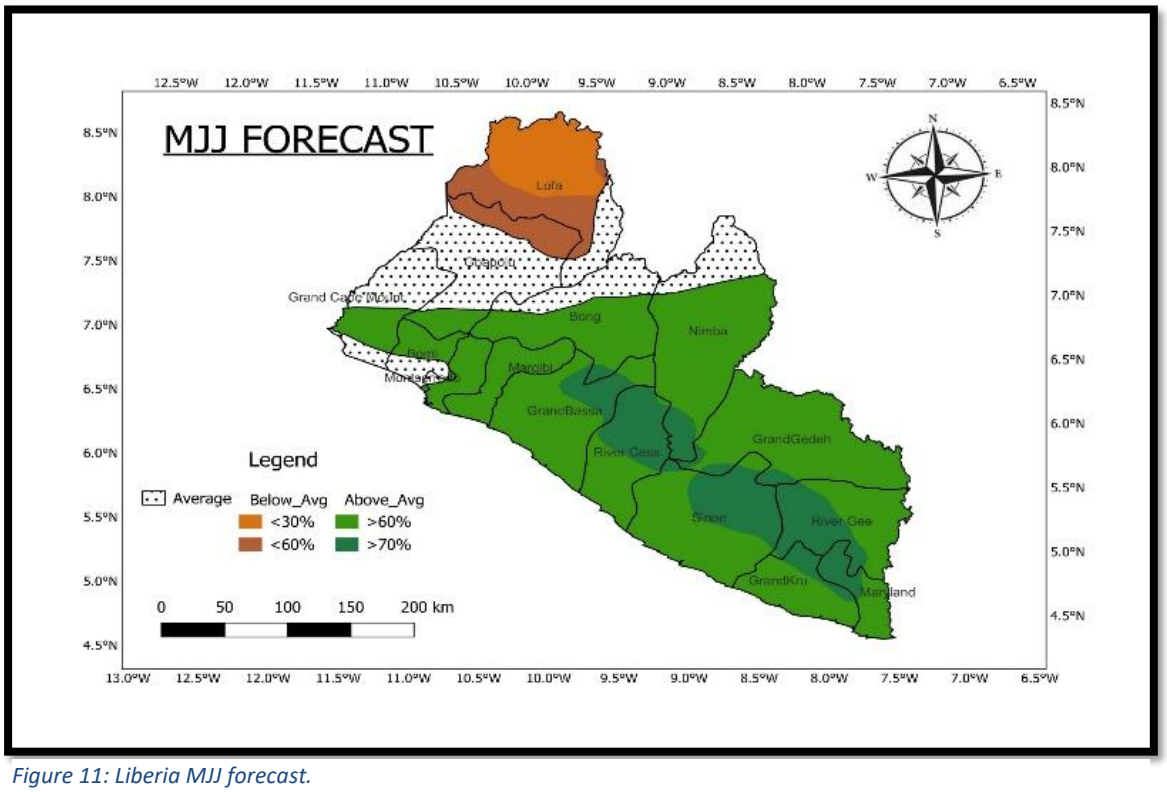

Figure 11: Liberia MJJ forecast.

SUMMARY OF JUNE-JULY-AUGUST (JJA)

During the period June, July and August East of Gbarpolu, Bomi, South East of Lofa, Bong, Northeast of Bomi, Southeast central and North of Montserrado, Southwest central and North Margibi, North West Northeast central and South of Grand Bassa, Central and north of Rivercess, South of Nimba, Southwest, South and East of Grand Gedeh, South, Northwest North and East of Sinoe, Rivergee, Grand Kru and Maryland are expected to receive sixty percent (60%) above average rainfall while Northeast Maryland, Central to West of Rivergee, Northeast Sinoe, Southwest Grand Gedeh, North of Margibi, Northeast of Grand Bassa, South of Bong are expected to receive seventy percent (70%) above average rainfall. All other areas are expected to receive average rainfall. However, Central to Northern Lofa is expected to receive thirty percent (30%) below average while southern Lofa and Northern Gbarpolu are expected to receive sixty percent (60%) below average rainfall.

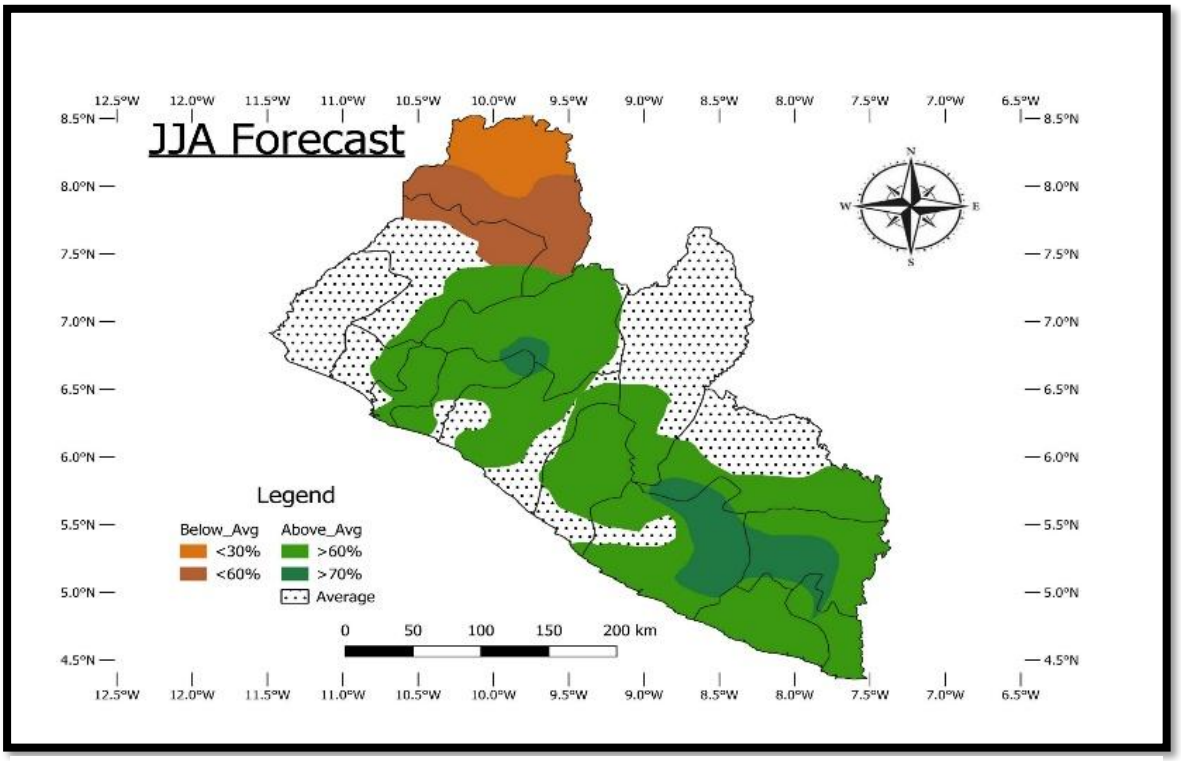

Figure 12: Liberia JJA Forecast.

SUMMARY Of JULY-AUGUST-SEPTEMBER (JAS)

During the period July, August and September Southeast of Gbarpolu, North east of BomiNorth of Montserrado, Margibi, Southwest and southeast Bong, Central and Northeast Grand Bassa, Central and southern Nimba, Central and North of Rivercess, North of Sinoe, Central and Western Grand Gedeh are expected to receive sixty percent (60%) above average rainfall while Southeast Bong, Northeast Grand Bassa, North Rivercess, Central and south Nimba, West Grand Gedeh and Northwest Sinoe are expected to receive seventy percent (70%) above average rainfall. All other areas are expected to receive average rainfall. However, Northern `Lofa is expected to receive sixty percent (60%) below average rainfall.

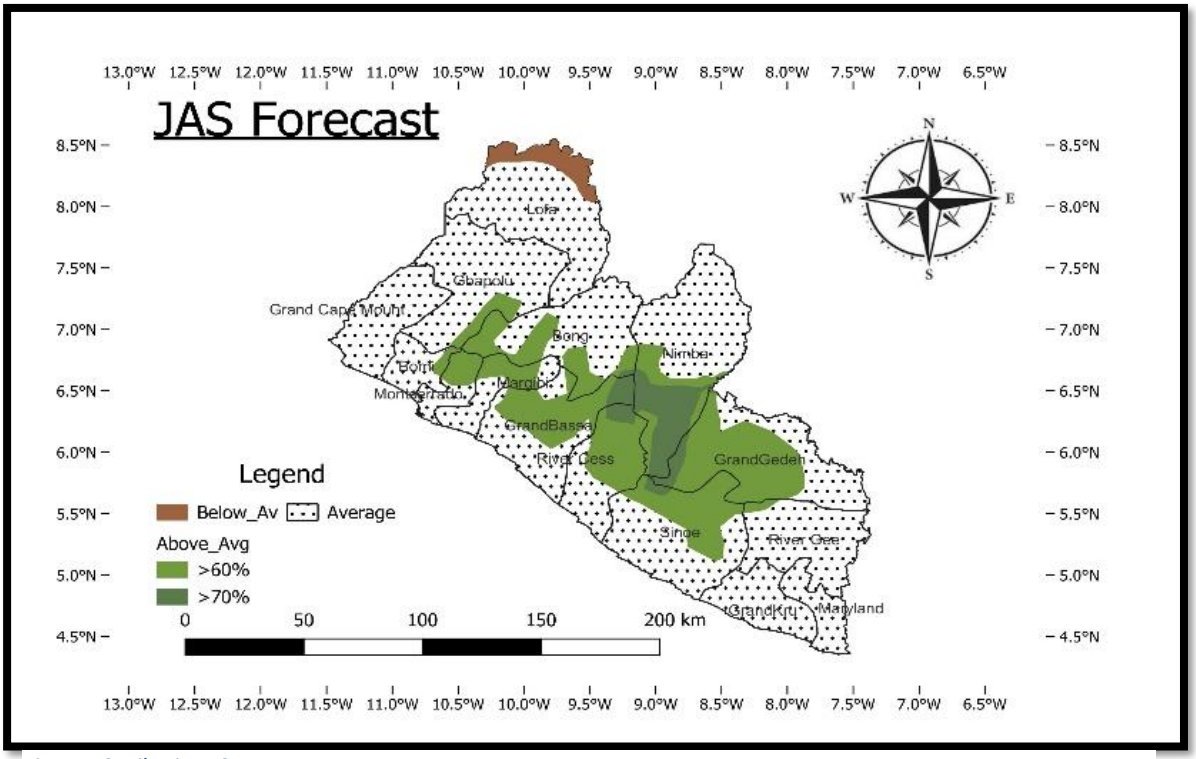

Figure 13: Liberia JAS Forecast.

3.2 Agriculture

Start of the cropping season.

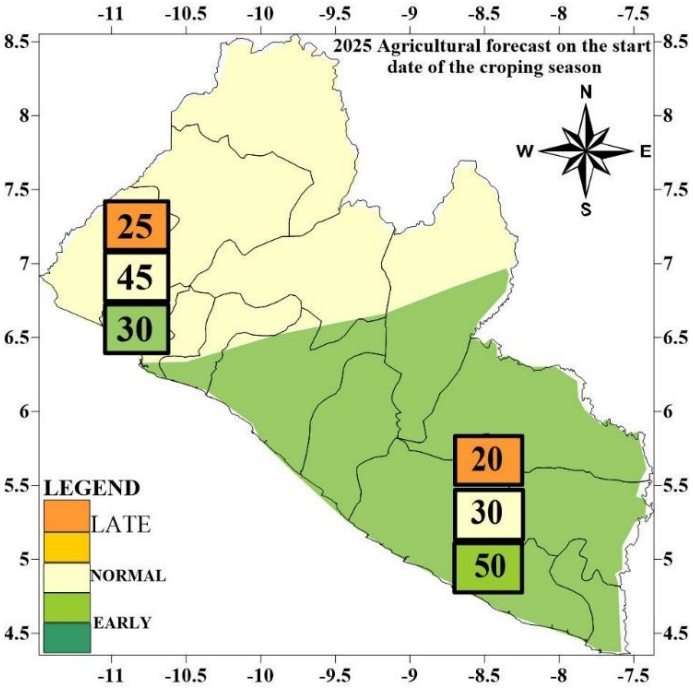

Figure 14: Start of the cropping season.

Summary of the start dates of the cropping

Across the northern, Southwestern, and western part of Liberia, particularly in counties such as: Lofa, Gbarpolu, Grand Cape Mount, Bomi, Montserrado, Margibi, Bong, and the upper region of Nimba are expecting normal start of the cropping season.

Nevertheless, an early onset of the cropping season is anticipated in the Central, Northeast, South and southeastern regions, including parts of Montserrado, Margibi, Bong and Nimba counties. Additionally, Grand Gedeh, River Gee, Maryland, Sinoe, Grand Kru, Rivercess, and Grand Bassa counties are also expected to have an early onset of the cropping season.

End of the cropping season.

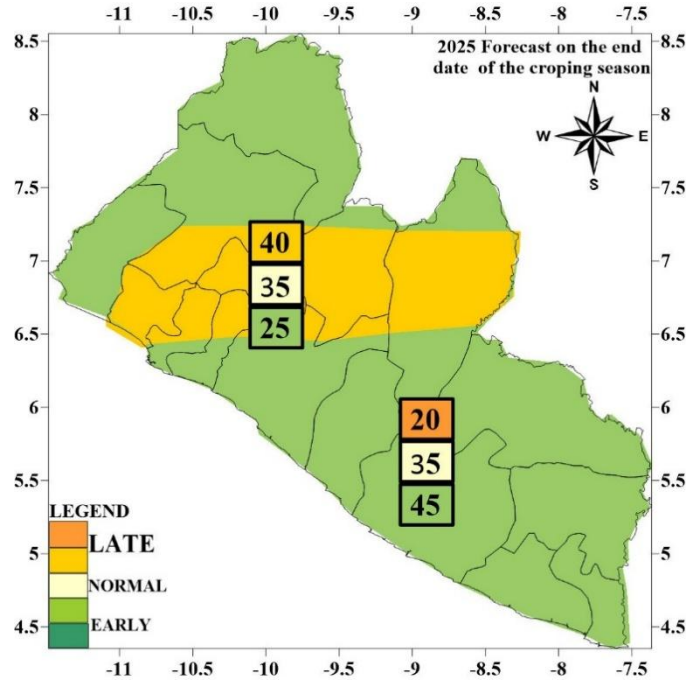

Figure 15: End of the cropping season.

Summary of the end dates of the cropping season of Liberia

The 2025 cropping season in Liberia is expected to end earlier than usual in most parts of the country, particularly across the western, southern, and southeastern regions.

However, a delayed (late) end of the cropping season is anticipated in specific counties, including Bomi, Montserrado, Bong, and parts of Gbarpolu, Margibi, Grand Bassa and Nimba.

Dry spell at the start of the cropping season.

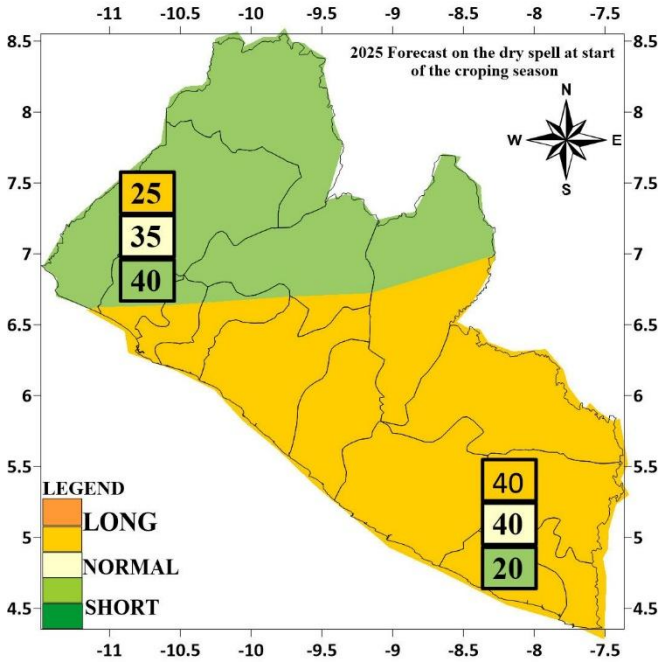

Figure 16: Dry spell at the start of the cropping season.

Summary of dry spell at the start of the cropping season in Liberia

At the start of the 2025 cropping season, a short dry spell is expected in the northern and western regions of Liberia affecting Lofa, Gbarpolu, Grand Cape Mount, and parts of Bomi, Montserrado, Margibi, Bong and Nimba.

Nevertheless, a prolonged (long) dry spell is anticipated in the Central, southern and southeastern regions that includes Grand Gedeh, River Gee, Maryland, Sinoe, Grand Kru, Rivercess, and Grand Bassa counties. Moreover, parts of Bomi, Montserrado, Margibi, Bong and Nimba are also expected to experience long dry conditions.

Dry spell at the end of the cropping season.

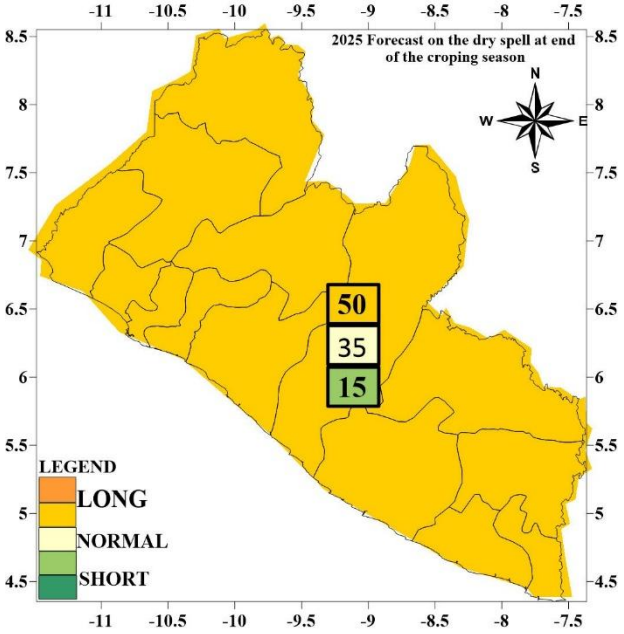

Figure 17: Dry spell at the end of the cropping season.

Summary of dry spell at the end of the cropping season in Liberia.

The 2025 cropping season in Liberia is expected to experience a prolonged dry spell toward the end of the season across the entire country.

CHAPTER FOUR: IMPLICATION AND ADVISORY FOR THE 2025 SEASONAL FORECAST FOR KEY SECTORS

4.1 Agriculture

The 2025 seasonal forecast indicates short farming season, long dry spells, and increased prevalence of crop and livestock diseases that may significantly impact agricultural productivity. These challenges pose risks to food security and farmer livelihoods.

Farmers and agricultural stakeholders are advised to take the following precautionary measures to maximize production.

- Adjust planting schedules that will align with the short cropping season forecast.
- Choose crops with short gestation to align with the short season.
- Cultivate drought tolerant crop varieties that can better withstand prolonged dry periods.
- Choose flood resilient varieties.
- In case of flooding, relocate animals to higher ground.
- Monitor your crops and animals for any disease outbreak
- Strengthen pest and disease monitoring unit to enable timely intervention.
- Coordinate with the Liberia Meteorological Service (LMS) and other stakeholder for guidance and support**.**

4.2 Energy

The 2025 seasonal forecast anticipates periods of intense rainfall, which are likely to be accompanied by thunderstorms, lightning, and flooding. These extreme weather events pose a significant threat to energy infrastructure and potentially resulting to: Widespread power outages, damage to power lines, substations, and transmission infrastructure, damaged light poles and delays in response and repair operations due to continued weather event.

Pre-season inspection and maintenance of critical energy infrastructure particularly power lines, substations, and poles should be prioritized in areas vulnerable to flooding or lightning strikes.

Reinforcement of vulnerable structures and ensuring proper drainage management around facilities in flood prone areas can significantly reduce the likelihood of weather-related damage.

The installation of lightning protection systems is also recommended to safeguard electrical

components and reduce the risk of outages caused by lightning. The LEC and other electricity providers should establish, and train rapid response teams equipped to conduct emergency repairs during and after severe weather events.
LEC and other electricity providers should coordinate with the LMS by providing alerts for weather-related hazards.

4.3 Infrastructure

The seasonal forecast projects heavy downpours of rain accompanied by intense thunderstorms, which are expected to have a significant impact on infrastructure. These extreme weather events may result in damage to buildings, including deroofing, as well as the collapse of weak structures. In addition, falling trees and debris caused by strong winds and saturated soil may lead to the obstruction or destruction of roads, bridges, and drainage systems, further disrupting transportation and emergency response efforts.

Infrastructure and properties owners are advised to reinforce the roof of buildings. Regular pruning and removal of trees near roads, power lines, and critical infrastructure should also be prioritized to prevent damage from falling trees during storms.

4.4 Public Health

Widespread flooding expected because of heavy downpours is likely to have a serious impact on public health in Liberia. This will lead to the contamination of drinking water sources, significantly increasing the risk of waterborne diseases such as cholera, typhoid, dysentery, and hepatitis A. Additionally, stagnant water may contribute to the proliferation of mosquito-borne diseases such as malaria and dengue fever.

Public health authorities are urged to strengthen surveillance and response systems to quickly detect and manage outbreaks of water-related diseases. Communities should be educated on safe water practices, including the treatment of drinking water and proper sanitary conditions. The distribution of water purification tablets, oral rehydration salts (ORS), and emergency hygiene kits should be prioritized in flood prone areas.
Efforts should also focus on improving waste disposal and ensuring that latrines and sewage systems are protected or relocated away from areas vulnerable to flooding. Collaboration between health agencies, local governments, and humanitarian partners will be essential to coordinate effective public health interventions and protect vulnerable populations.

Strengthening coordination with LMS, health authorities, and other government institutions in providing alerts for weather related hazards is highly recommended.

4.5 Transportation

Movement from one place to another is expected to be significantly affected due to the anticipated heavy rainfall and thunderstorms during the season. These weather conditions are likely to result in damage to roads, bridges, and transport infrastructure, making travel difficult or even hazardous. Flooding and road washouts may render key transportation routes impassable, especially in low lying and poorly drained areas. Additionally, slippery road surfaces caused by continuous rain will increase the risk of traffic accidents, particularly for motorists and motorcyclists. Reduced visibility during heavy downpours and thunderstorms will further compound the risk of collisions and delays.

The public is encouraged to limit non-essential travel during extreme weather events, and drivers should exercise caution, maintain safe speeds, and ensure vehicles are in good working condition, particularly regarding brakes and tires. Emergency services should be on standby to respond to accidents or stranded travelers in affected areas.

Taking early precautions will help minimize disruptions of transportation, reduce accidents, and maintain safer mobility during the rainy season.

Motorists and travelers are advised to follow LMS for weather updates before travelling.