
GIS/REMOTE SENSING
MONTHLY REVIEW
BULLETIN FOR OCTOBER
2024

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Monthly Review

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PREAMBLE

The GIS/Remote Sensing Monthly Review Bulletin for October 2024 shows the levels of susceptibility of various parts of Nigeria to flood. This assessment relies on both meteorological and remote sensing data such as monthly rainfall, soil moisture index, relative humidity, amongst others. Geospatial interpolation techniques including inverse distance weighted (IDW), kriging, Digital Elevation Model (DEM) overlay are used to carry out necessary geospatial analysis.

1.0 RAINFALL DISTRIBUTION

1.1 RAINFALL DISTRIBUTION OVER NIGERIA IN OCTOBER 2024

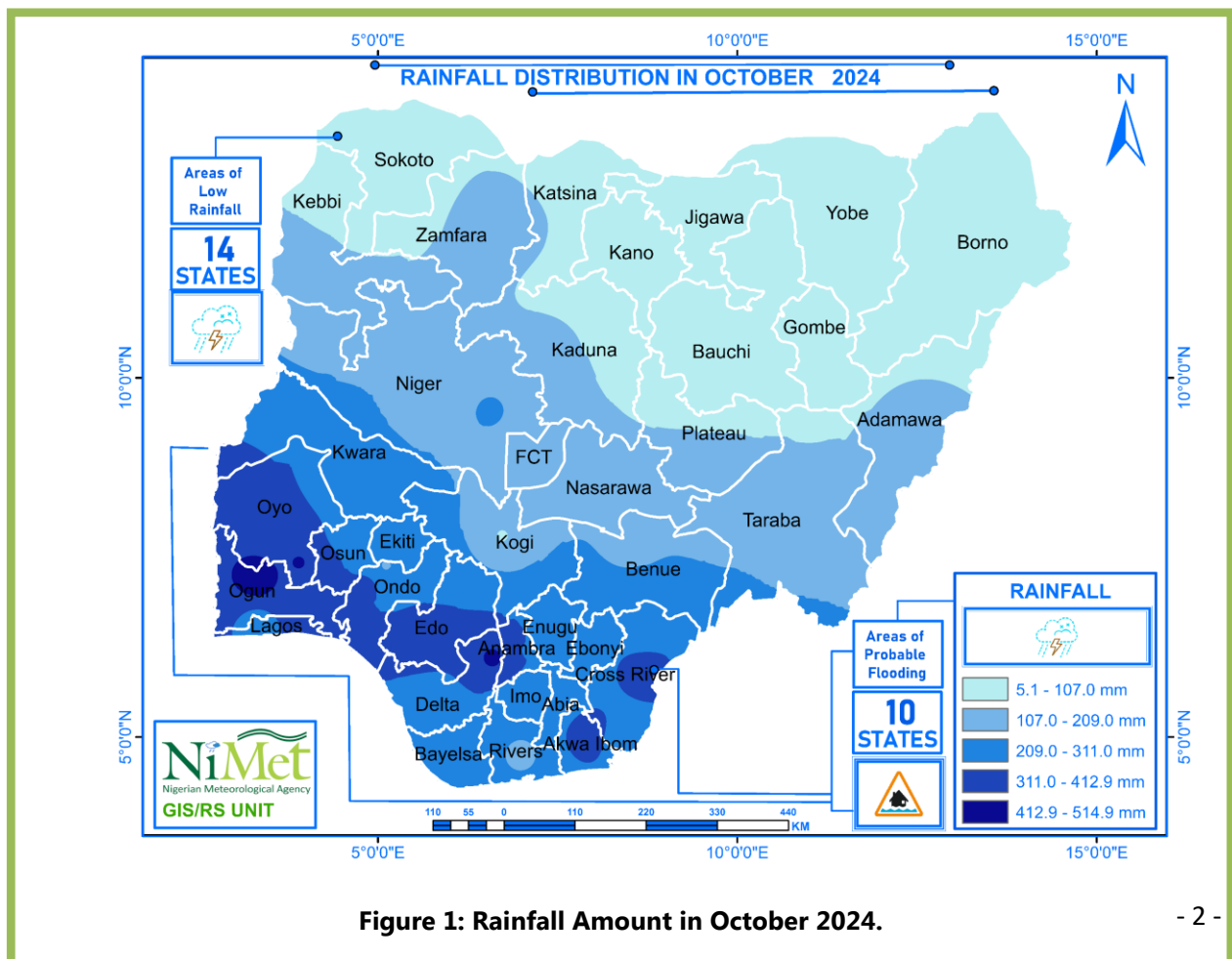


Figure 1: Rainfall Amount in October 2024.

1.1.1 OBSERVED FEATURES: The rainfall distribution in October 2024 shows significant rainfall activities across Nigeria. The northern and central states experienced rainfall amounts ranging between 5.1mm and 107mm, except parts of Kebbi, Zamfara Plateau, Kaduna, Taraba and Adamawa, states where the amount of rainfall recorded was between 107mm and 209mm. Also, rainfall amounts ranging from 209mm to 311mm were recorded over parts of Kwara, Niger and Benue states. The South-West, South-East and South-South regions recorded rainfall amounts ranging between 311mm and 514.9mm.

1.1.2 ADVISORIES:

State Emergency Management Agencies in the North-Central and Southern states of the country are advised to access and disseminate NiMet's rainfall forecasts. The forecasts are helpful for identifying vulnerable and flood-prone communities and enable them mitigate the impacts of potential flooding especially the release of water from Lagdo Dam. This proactive approach can significantly reduce the risk to lives and property in these regions.

1.2 DIGITAL ELEVATION MODEL OF NIGERIA

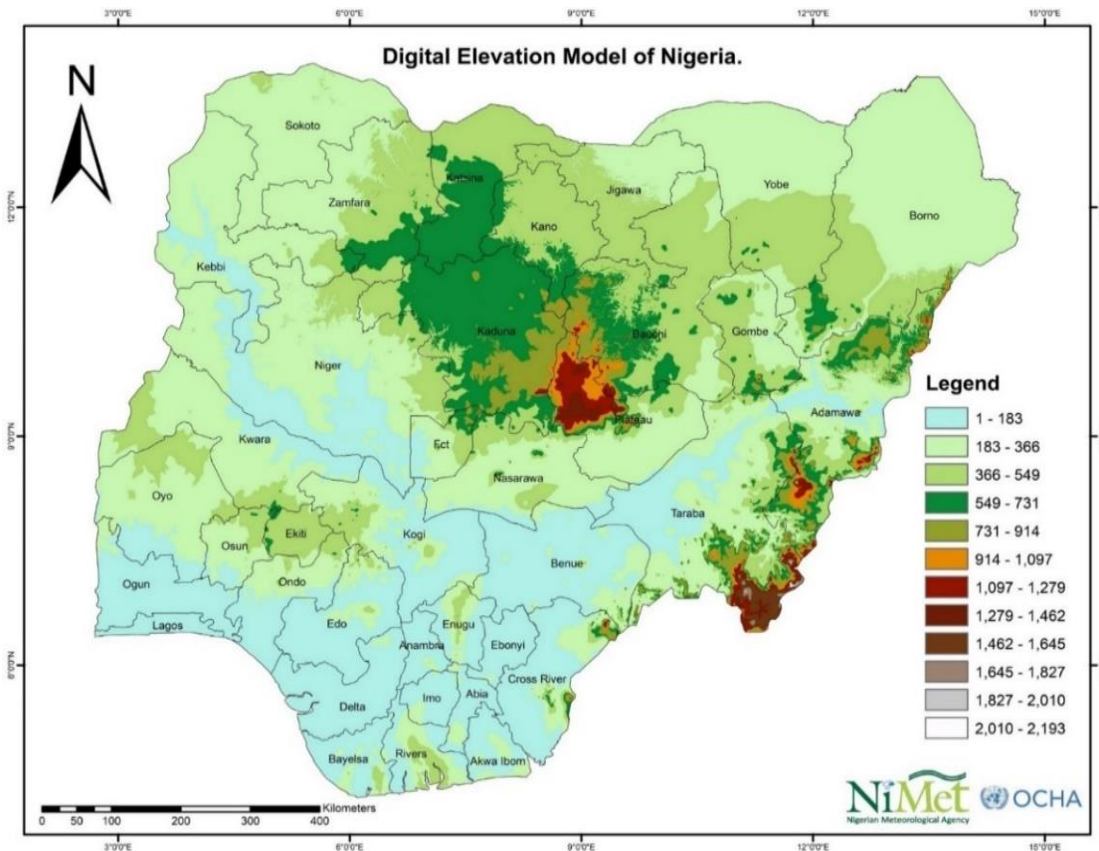


Figure 2: Digital Elevation Model for Nigeria, depicting the Geographical positions of high and low areas

1.2.1 OBSERVED FEATURES:

A Digital Elevation Model (DEM) represents the Earth's topographic surface devoid of vegetation, buildings, and other surface structures. DEMs are widely utilized to show the natural terrain without plant cover and human-made features. They consist of a grid of elevation values referenced to a common vertical datum, typically measured in meters, providing a continuous depiction of elevation across a topographic area as illustrated in Figure 2. Elevations across Nigeria range from 1 meter to 2193 meters. The highest elevations are found in parts of Bauchi, Plateau, Kaduna, Taraba, Adamawa, and Cross River States, while the lowest points are located in Lagos, Delta, and sections of Ondo, Edo, Bayelsa, Rivers, and Akwa Ibom states.

1.2.2 ADVISORIES:

Elevated areas above sea level and areas with steep slopes are susceptible to erosion and landslides. In the event of heavy rainfall, local authorities and residents in these regions are advised to be mindful of these potential risks and take proactive actions to reduce the risks.

Flooding: Areas with low elevation are naturally susceptible to flooding in Nigeria. Lagos, Delta, and portions of Ondo, Edo, Bayelsa, Rivers, and Akwa Ibom states have low elevation and therefore vulnerable to flooding. Preparedness for potential flooding and construction of effective drainage systems are important adaptation measures in such areas.

Infrastructure Development: Thorough planning is crucial when constructing physical infrastructure in areas with varying elevations. In hilly and mountainous terrains, it is imperative to implement adequate engineering measures to ensure stability such as appropriate strength of materials and soil profile analysis.

Ecological Concerns: Mountainous regions often host unique ecological systems. To protect these natural environments, it is essential to implement good ecological practices such as, biodiversity conservation, climate change adaptation and adopt other sustainable environmental practices such as afforestation.

1.3 PROBABLE FLOOD RISK IN OCTOBER 2024

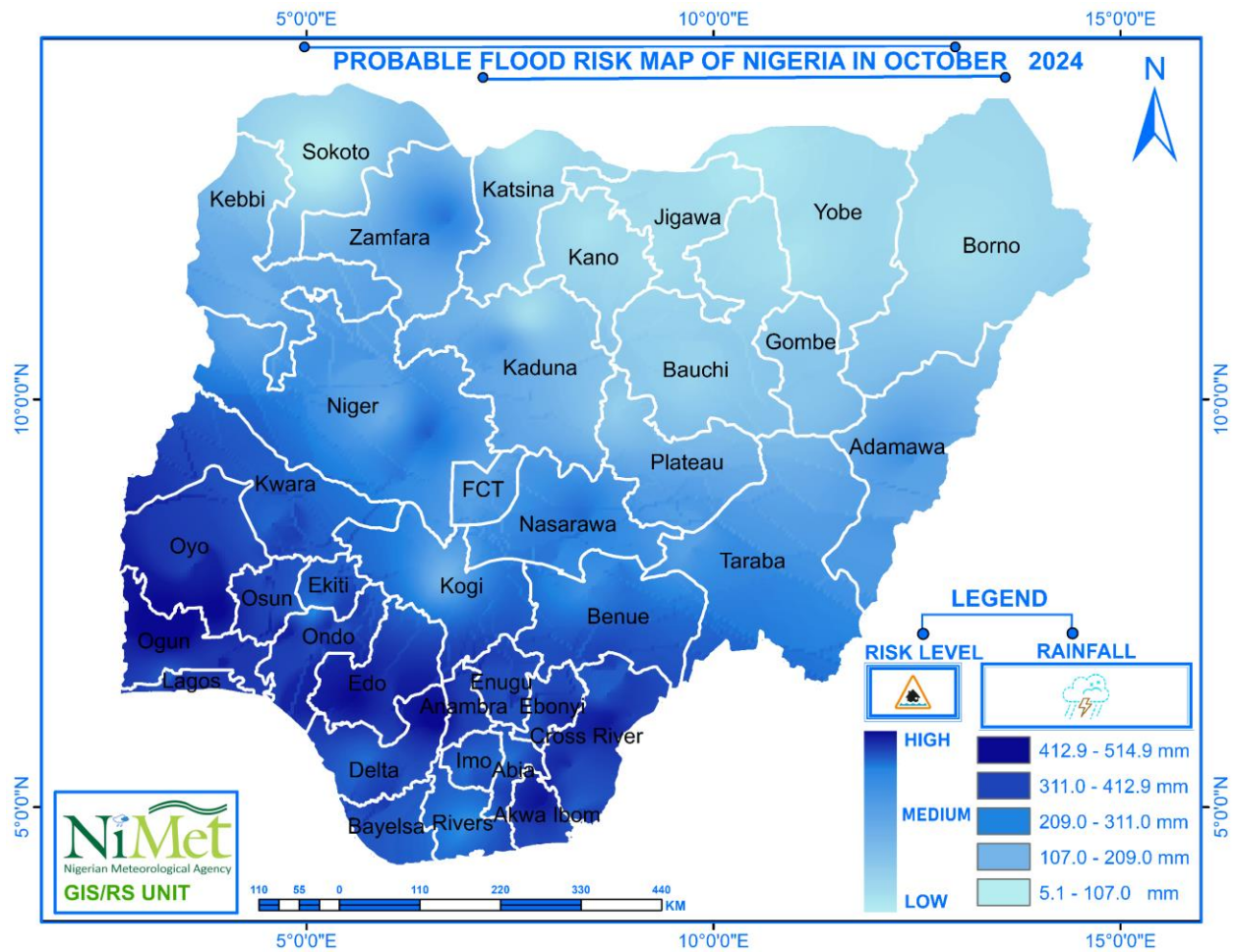


Figure 3: Map indicating Areas of high, medium and low wetness in October 2024

Table 1: Classification of flood Risk According to Geopolitical zones

S/N	Geo-political Zones	States	Risk Level
South West			
1		Ogun	High Risk
2		Lagos	High Risk
3		Osun	Medium High Risk
4		Ondo	Medium High Risk
5		Oyo	Medium High Risk
6		Ekiti	Medium High Risk
South East			
		Imo	Medium-High Risk
1		Ebonyi	Medium-High Risk
2		Anambra	Medium High Risk
3		Abia	Medium-High Risk
4		Enugu	Medium-High Risk
South South			
		Delta	High Risk
1		Rivers	High Risk
2		Akwa Ibom	High Risk
3		Bayelsa	Medium High Risk
4		Edo	High Risk
5		Cross River	High Risk
North Central			
1		Kwara	Medium High Risk
2		Benue	Medium Risk
3		Kogi	Low Risk
4		Kaduna	Low Risk
5		Plateau	Low Risk
6		Niger	Medium Low Risk
7		Abuja	Low Risk
8		Nasarawa	Medium Low Risk

North East			
1		Taraba	Low Risk
2		Borno	Low Risk
3		Yobe	Low Risk
4		Bauchi	Low Risk
5		Gombe	Low Risk
North West			
1		Jigawa	Low Risk
2		Kano	Low Risk
3		Kebbi	Low Risk
4		Katsina	Low Risk
5		Sokoto	Low Risk
6		Zamfara	Low Risk

Table 2: States Showing High Risk of Flooding in October 2024.

S/N	STATE	SUSCEPTIBILITY LEVEL (%)
1.	ABIA	41.5
2.	AKWA IBOM	50.3
3.	ANAMBRA	60.1
4.	BAYELSA	40.9
5.	BENUE	26.2
6.	CROSS RIVER	39.7
7.	DELTA	68.23
8.	EBONYI	54.30

9.	EDO	70.40
10.	EKITI	55.1
11.	ENUGU	45.0
12.	IMO	40.45
13.	KOGI	20.34
14.	KWARA	44.2
15.	LAGOS	79.78
16.	NIGER	12.90
17.	OGUN	81.5
18.	ONDO	45.54
19.	OSUN	39.21
20.	OYO	66.6
21.	RIVERS	36.02
22.	TARABA	12.42

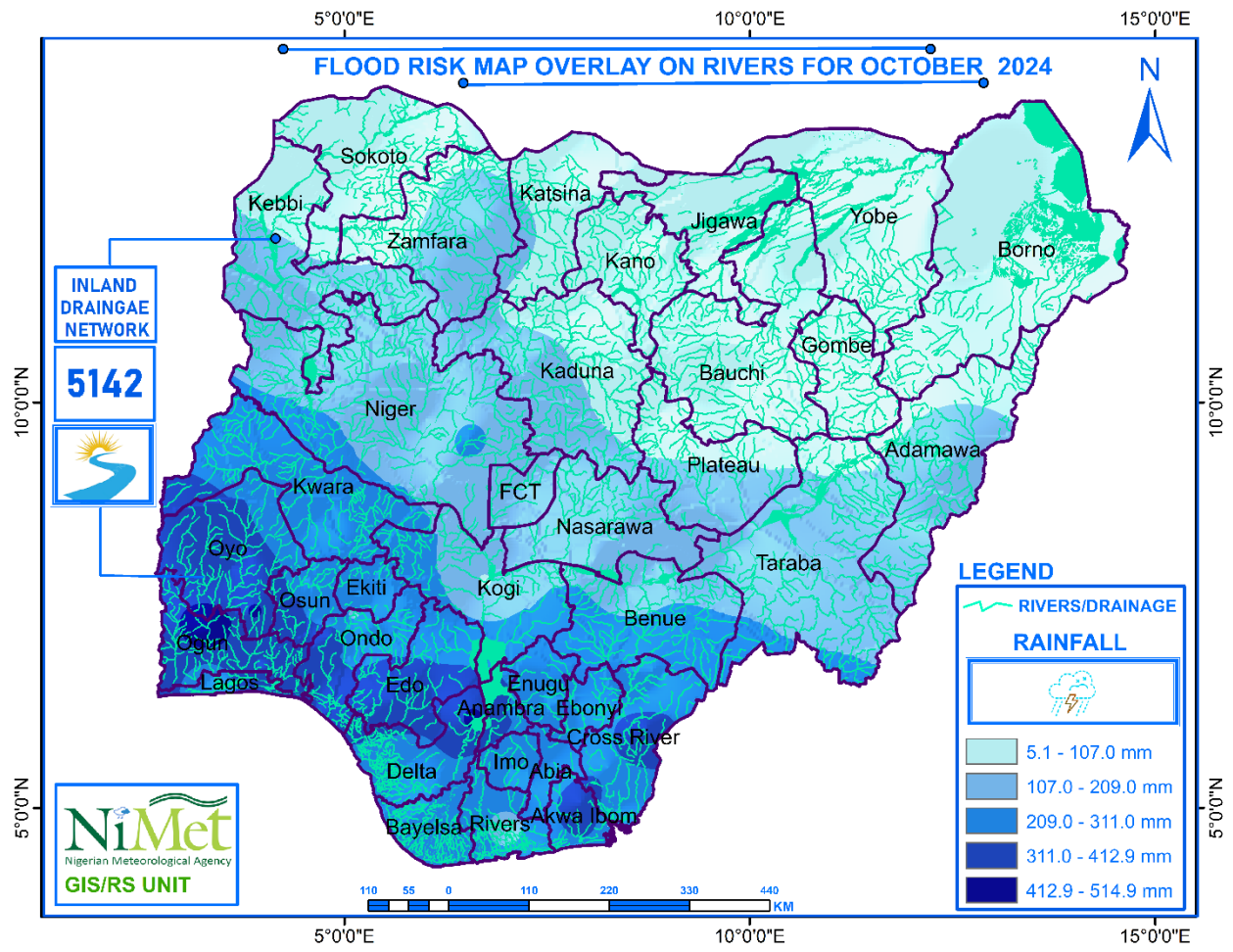


Figure 4: Map of River Overlay with Flood Risk Areas of October 2024.

1.3.1 OBSERVED FEATURES:

Flood risk map overlay on major rivers in Nigeria indicating potential flooding activities in and around rivers in the country. Also, climatic features such as rainfall, rivers shape file are used to determine these environmental hazards. This is used for identifying rivers that are prone to flooding. Figure 4 shows that in the Southern and some western parts of Nigeria, Ogun, Oyo, Edo, parts of Osun Anambra, Akwa Ibom and Cross Rivers state are mostly at risk of river flooding during the month.

Considering topographic landscape and rainfall characteristics, Figure 4 indicates the south-west, south-east and south-south regions are prone to river flooding

1.3.2 ADVISORIES:

Plans for Evacuation: Local authorities are advised to formulate and share evacuation protocols with residents in vulnerable areas along river banks, identifying secure shelter locations and escape routes. Also, people living in flood-prone areas should ensure proper clearing of debris in and around rivers and other water channels.

1.4 AREAS IN NIGERIA AT HIGH RISK OF FLOODING IN OCTOBER 2024

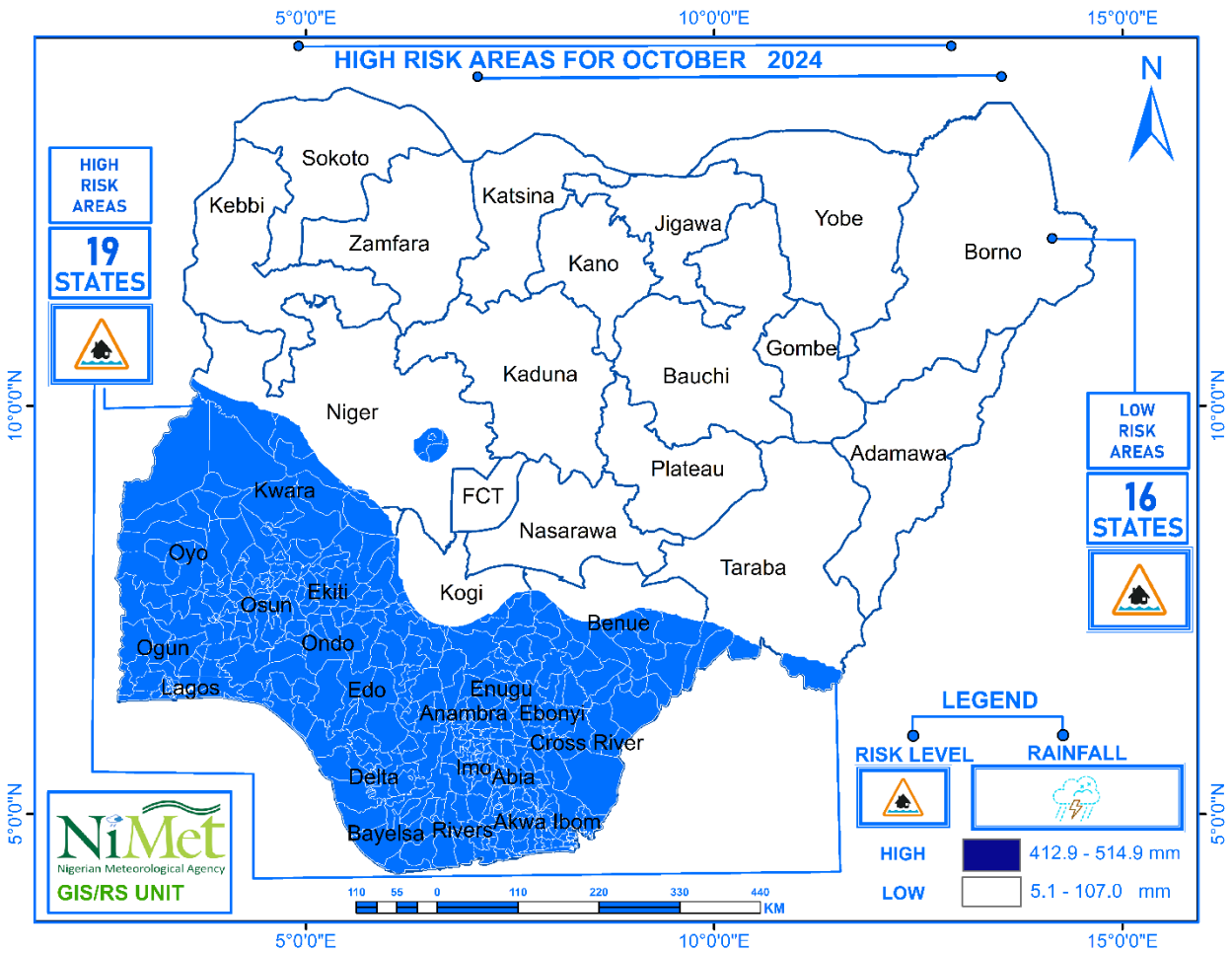


Figure 5: Map Depicting Location of High and Low Risk Areas in October 2024

1.4.1 OBSERVED FEATURES:

With further examination of potential flood risk zones as shown in Figure 5, states with likelihood of flood occurrence have been identified. Kwara, Oyo, Ogun, Lagos, Osun, Ondo, Edo, Delta, Bayelsa, Enugu, Ebonyi, Cross River, Akwa Ibom, Imo, Abia, Rivers including parts of Benue, Kogi and Niger states are at high risk areas. The flood risk levels in term of percentage is outlined in Table 2.

1.4.2 ADVISORIES:

Plans for Evacuation: Local authorities are advised to formulate and share evacuation protocols with residents in vulnerable areas, identifying secure shelter locations and escape routes.

Promoting Community Awareness: Residents are encouraged to follow guidance from local authorities and stay informed about weather forecasts. State Meteorological Inspectors (SMI) should effectively disseminate weather information, ensuring that emergency contact details for local response teams and services are easily accessible to the public.

Residents in high-risk areas should take precautionary measures to protect lives and valuable properties.

Keep Up with the News: Monitor local news and weather reports regularly, paying attention to guidance provided by emergency services and local authorities. It is important to stay updated on weather and flood information from NiMet and Nigeria Hydrological Service Agency (NIHSA). Local authorities should initiate and communicate evacuation plans for vulnerable areas, identifying safe shelters and evacuation routes before flooding occurs.

1.5 SOIL MOISTURE INDEX ACROSS NIGERIA IN OCTOBER 2024

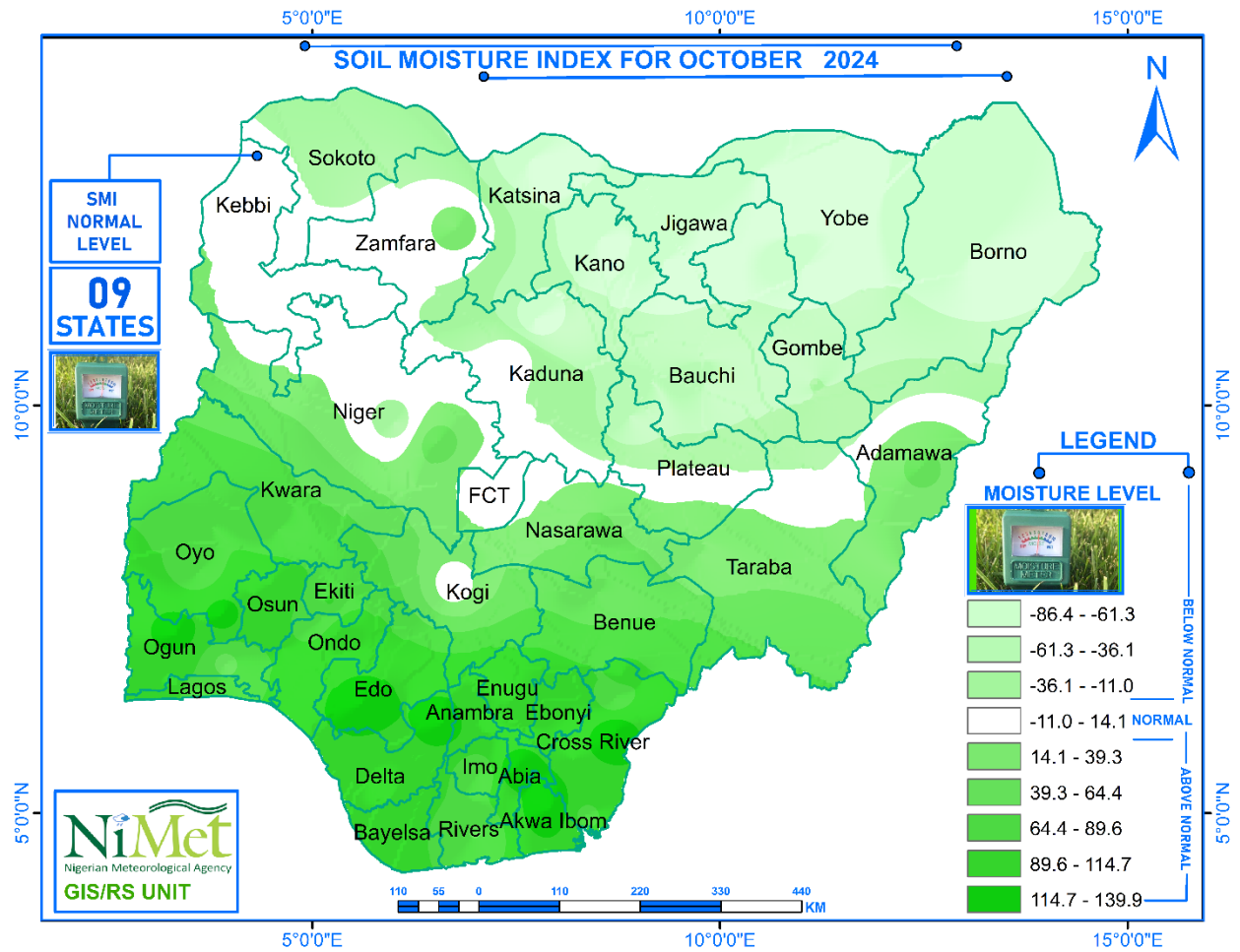


Figure 6: The Soil Moisture Index across Nigeria depicting areas of soil moisture saturation that may be prone to flood in October 2024.

1.5.1 OBSERVED FEATURES:

The soil moisture conditions across the country in October 2024 is illustrated in the Soil Moisture Index (SMI) map (Figure 6). As shown in the map, the soil moisture over most parts of the country was above normal except in Kebbi, Zamfara, parts of Niger, Plateau, FCT, Adamawa, Kaduna, Kogi, states where normal soil moisture condition was recorded during the period under consideration. Below normal soil moisture was observed mainly over parts of Katsina, Kano, Jigawa, Yobe , Borno, Gombe , Bauchi, part of Zamfara and Niger States.

It is expected that some parts of the south east and south-south regions of the country, especially Delta, Bayelsa, Akwa Ibom, Rivers, Cross River, Imo, Abia, Anambra, Enugu and Ebonyi, Osun, Lagos states are likely to experience flood within the period.

1.5.2 ADVISORIES:

Adequate precautions and mitigation measures to reduce the impact of flooding in the South-South, South-East and North-Central region and areas that have above normal soil moisture should be implemented.

1.6 RELATIVE HUMIDITY DISTRIBUTION ACROSS NIGERIA IN OCTOBER 2024

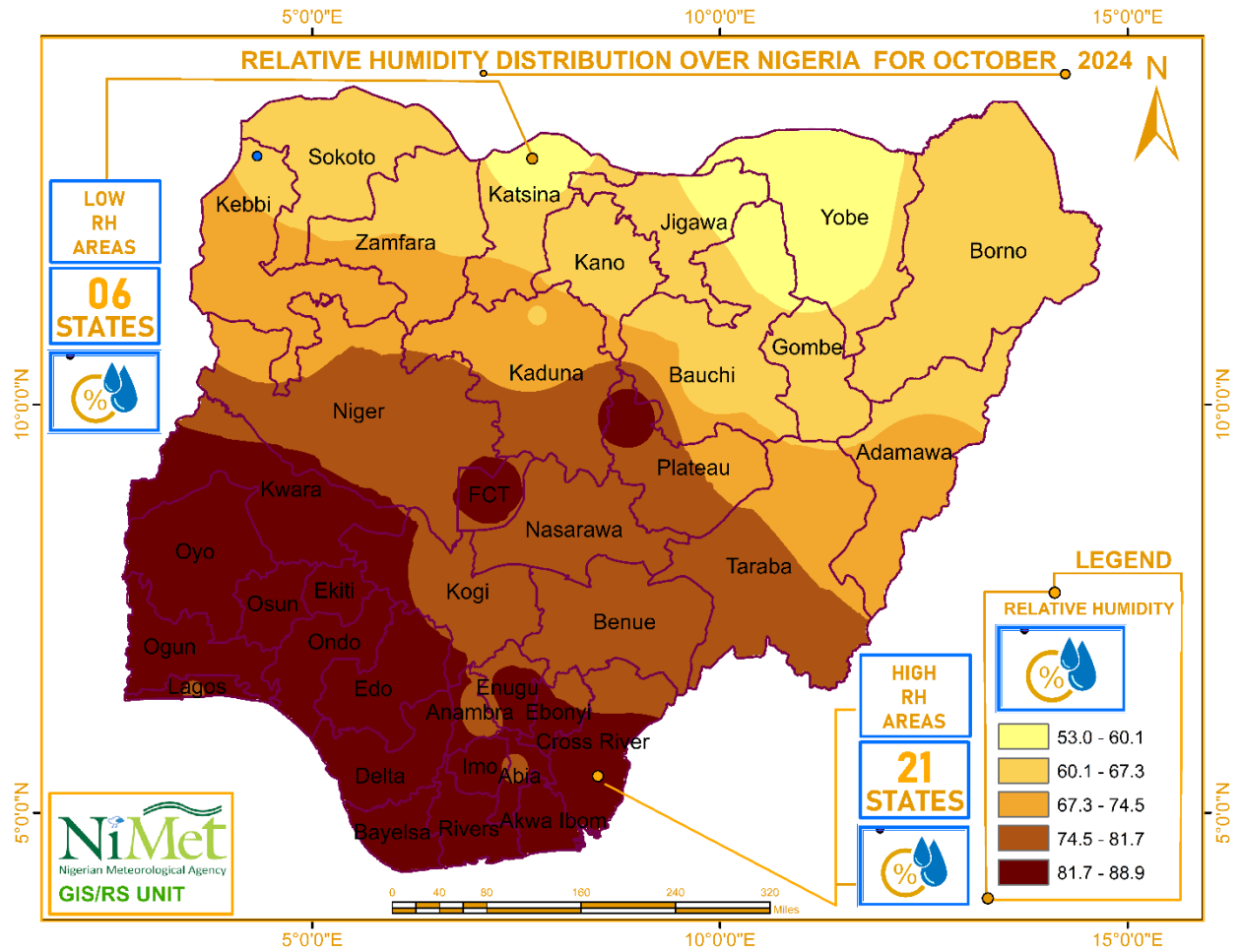


Figure 7: The Relative Humidity Distribution over Nigeria in October 2024

1.6.1 OBSERVED FEATURES:

Figure 6: shows the relative humidity over Nigeria in October 2024. The distribution across the country is characterized by the following features:

- The Relative Humidity (RH) over the north-eastern part of the country range between 60.1% and 67.3%, except for parts of Katsina, Jigawa and Yobe states which recorded 53% to 60.1%.
- The North-western region including parts of Bauchi, Adamawa and Plateau experienced relative humidity ranging between 67.3% and 74.5% during the period.
- Relative humidity ranges between 74.5% and 81.7% was observed majorly over Nasarawa, Kogi, Benue, parts of Taraba, Plateau, and Kaduna states.
- High Relative Humidity ranges between 81.7% and 88.9% was observed mainly over most places in the South- Western, South – Eastern and South-South region apart from parts of Anambra, Abia and Enugu states which experience relative humidity ranges between 74.5% and 81.7%.

1.6.2 RECOMMENDATIONS:

Maintaining **optimal RH levels** ??? Prevents issues like mold, corrosion, dehydration, and structural damage, so it's crucial to monitor and adjust RH according to specific needs.

1.7 POST FLOOD LAND USE COVER MAP OF MAIDUGURI IN OCTOBER 2024

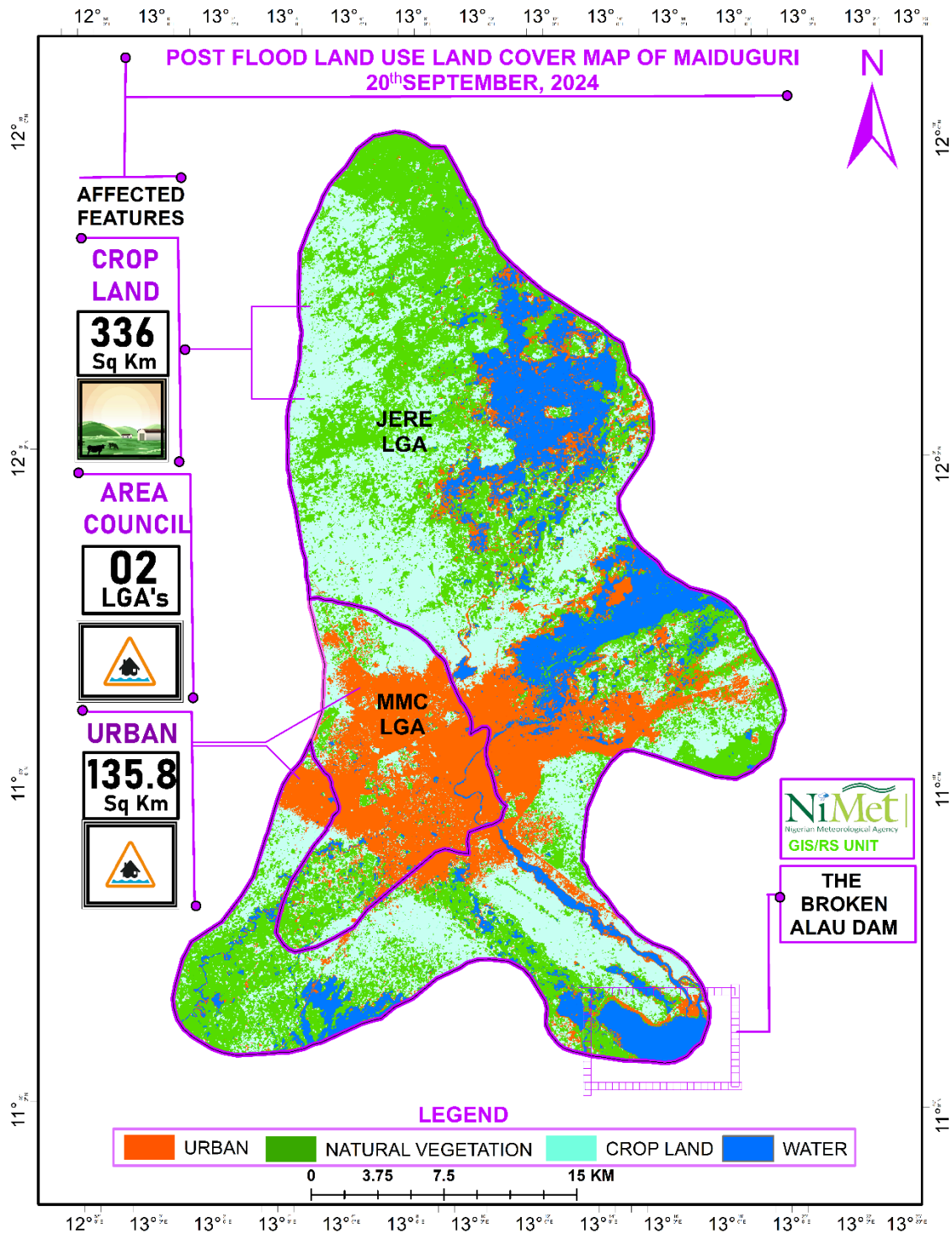


Figure 8: Post Flood Land Use Cover Map of Maiduguri in 20th September 2024

1.7.1 OBSERVED FEATURES: The post-flood land use map of Maiduguri from September 20, 2024, reveals the following key features and areas impacted by the flooding:

Urban and Agricultural Land Cover:

Urban Areas: The map shows urban areas (highlighted in orange), primarily concentrated in the Maiduguri Metropolitan Council (MMC) Local Government Area (LGA). The total urban area affected is

1.7.2 ADVISORIES:

The advisories for post-flood recovery in Maiduguri focus on five key areas:

1. **Urban and Infrastructure Recovery:** Plan reconstruction with flood-resistant designs and address debris management to restore urban areas effectively.
2. **Agricultural Restoration:** Support cropland recovery through soil treatments, resilient crops, and

