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MESA
Monitoring for Environment and Security in Africa

LAND THEMA MONTHLY BULLETIN Volume 1: Issue 1 -March, 2017

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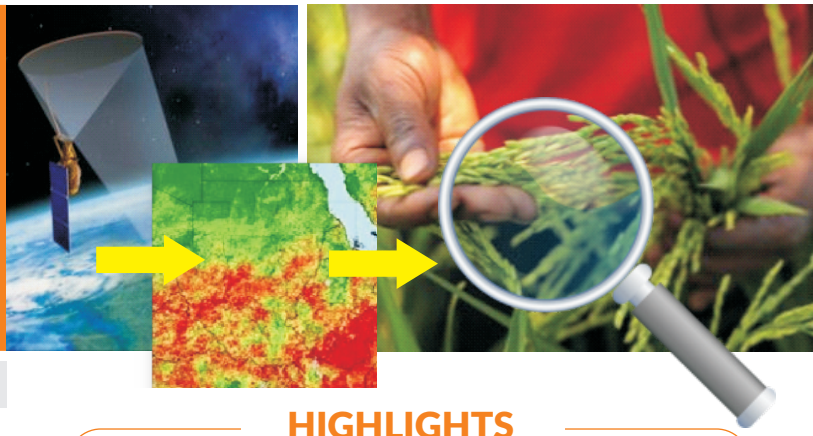

Background

Monitoring for Environment and Security in Africa (MESA) is a programme borne out of the strategic cooperation between Africa and Europe in order to increase information management, decision-making and planning capacity of African continental, regional and national institutions mandated for environment, climate, food security and related responsibilities by enhancing access to and exploitation of relevant Earth Observation data and applications in Africa.

The programme is funded by the European Union and it is a follow-up initiative to the African Monitoring of the Environment for Sustainable Development (AMESD) – a similar programme but with a narrower coverage.

The MESA programme rivets on six major themes, which include:

- Monitoring Land Degradation, Natural Habitat Conservation and Forests
- Agricultural and Environmental Resource Management
- Water Management for Cropland and Rangeland Management
- Marine and Coastal Management
- Water Resource Management in Central Africa
- Climate Services for Disaster Risks Reduction in Africa

A regional implementation approach is adopted for the programme whereby the themes also known as Regional Thematic Actions (THEMA), one per Regional Economic Community (REC), are being established by the Regional Implementation Centres (RICs) to develop appropriate information services. The ECOWAS Land-THEMA, which is the Water Management for Cropland and Rangeland Management, is implemented from the AGRHYMET RIC with information services provided by the SPAEL station and other MESA stations under the RIC.

HIGHLIGHTS

- Southwestern Nigeria experienced highest rainfall compared to other regions in March, 2016
- Above average vegetation development observed in large parts of Southwestern and North-central Nigeria from March-April, 2016
- Delay in rainfall at season onset resulted in reduced vegetation development for parts of Akwa-Ibom area in April, 2016

Crop services provided by the SPAEL station are namely:

- Start of growing season (vegetation, rainfall);
- Drought indicators during various phenological phases (vegetation, rainfall);
- Crop yield assessment; as well as
- Support to risk prevention and management (information bulletins).

The purpose of this bulletin is to increase the information management, decision-making and planning capacity of African continental, regional and national institutions mandated for environment, climate, food security and related responsibilities. Under the Monitoring for Environment and Security in Africa (MESA) and ECOWAS, this bulletin is expected to provide products and tools for water management for cropland and rangeland management.

Introduction to the Nigerian Climate

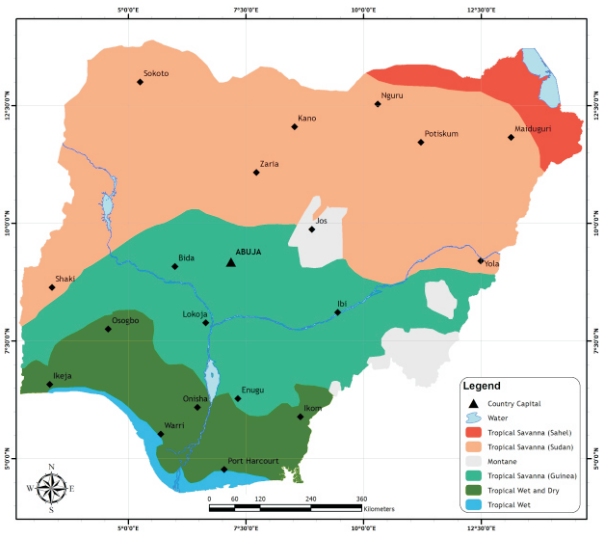

Figure 1: Nigerian Climatic Zones

The Nigerian climate is dominated by the influence of three major atmospheric phenomena, namely: the maritime tropical (mT) air mass, the continental tropical (cT) air mass and the equatorial easterlies. The mT air mass originates from the southern high-pressure belt located off the coast of Namibia, and in its trajectory it picks up moisture from over the Atlantic Ocean, crosses the equator and enters Nigeria. The cT air mass originates from the high-pressure belt north of the Tropic of Cancer. It picks up little moisture along its path, and thus is dry. The two air masses (mT and cT) meet along a slanting surface called the intertropical discontinuity (ITD). The equatorial easterlies are rather erratic, cool air masses that come from the east and flow in the upper atmosphere along the ITD. Occasionally, however, the air mass dives down, undercuts the mT or cT air mass and gives rise to a line of squalls or dust devils.

In Nigeria, like any other tropical country, rainfall is the principal controlling element in agriculture. It is often the only input that varies markedly from year to year, so the predicted variability in crop index or water balance is due only to the variability in rainfall. The southern two-thirds of the country has a double peak in rainfall, whereas the northern third has a single peak. Rainfall generally begins first in the south, spreading through the middle belt, and eventually reaching the northern part. The rains may be unduly prolonged in some years, and their onset may be delayed by as much as a month.

In this tropical situation of a marked seasonal rainfall regime, variability of the onset and retreat of rain is highly signiflcant, and its estimation and prediction are necessary. A delay of 1 or 2 weeks in the onset is sufflcient to lead to crop failure. A false start of planting, encouraged by false start of rainfall, may be followed by prolonged dry spells whose duration of 2 weeks or more may be critical to plant germination and/or growth.

Thus, the rainfall distribution characteristics during the course of a year in a typical wet-and-dry climate region like Nigeria dictate the schedule of agricultural activities from the land preparation, through the crop variety selection and planting, to the time of harvesting. In other words, reliable prediction of rainfall onset and cessation times, and thus the length of the growing season, will greatly assist on-time preparation of farmlands, mobilization of seed/crops, manpower, and equipment and will also reduce the risk involved in planting/sowing too early or too late.

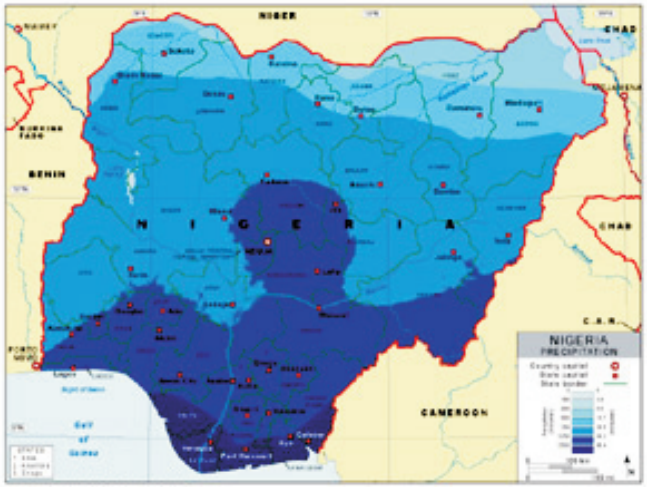

Figure 2: Precipitation Map of Nigeria

Nigerian Rainfall Estimates (RFE) (February-March, 2016)

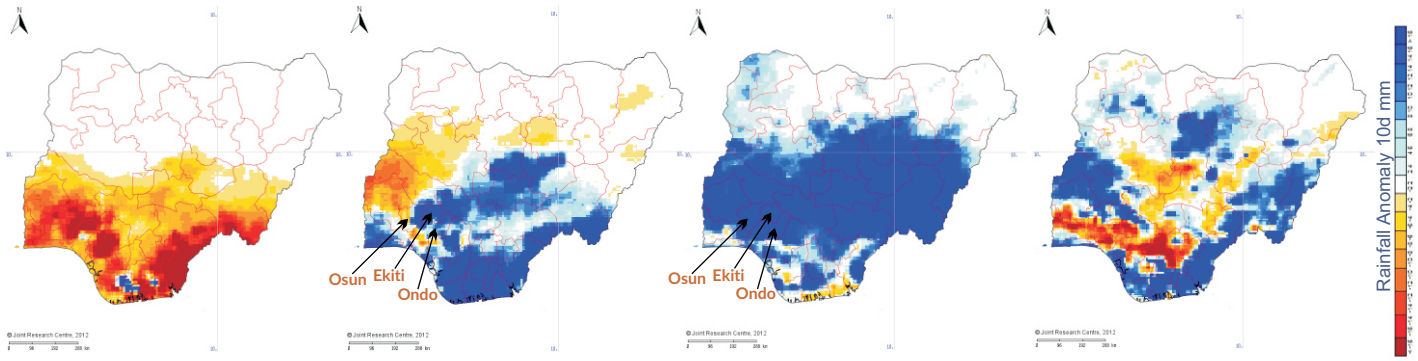

Figure 3a: RFE Anomaly Map for Nigeria February 21, 2016

Figure 3b: RFE Anomaly Map for Nigeria March 01, 2016

Figure 3c: RFE Anomaly Map for Nigeria March 11, 2016

Figure 3d: RFE Anomaly Map for Nigeria March 21, 2016

The Rainfall estimate (RFE) derived from satellites (**Figures 3a-3d**), shows higher rainfall amounts over the Southwestern region in March with parts of Osun, Ekiti and Ondo States receiving the highest rainfall. Vegetation takes time to respond to rainfall, hence an improvement in vegetation is expected during the first dekad of April (which signifies the beginning of the growing season in this region) due to the rainfall that was received in March. Vegetation is therefore expected to be healthy in most parts of South-west and South-east in April.

Vegetation Development (NDVI) in Nigeria (February-April, 2016)

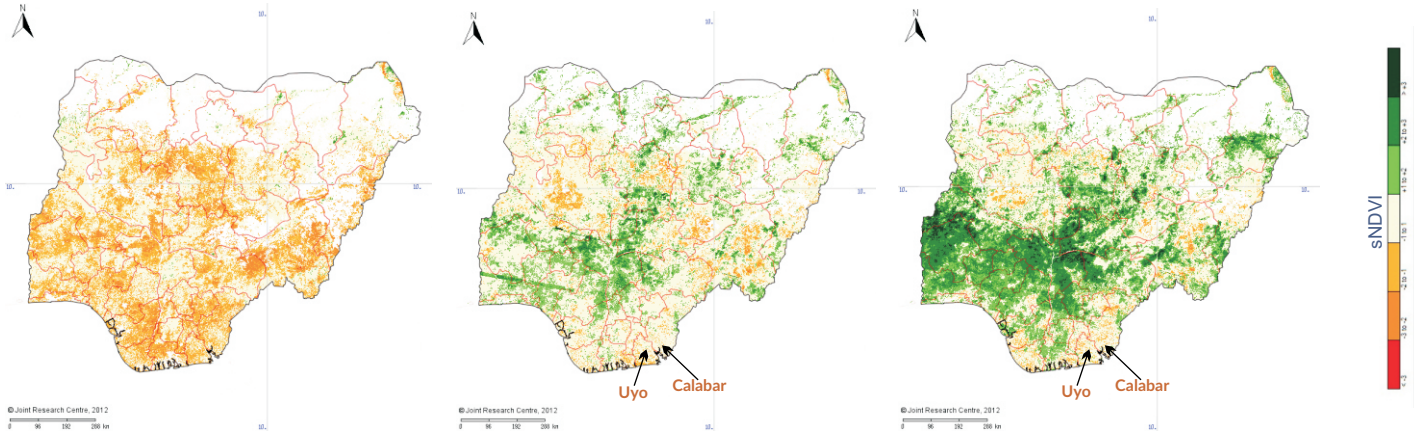

Figure 4a: sNDVI Anomaly Map for Nigeria February 21, 2016

Figure 4b: sNDVI Anomaly Map for Nigeria March 21, 2016

Figure 4c: sNDVI Anomaly Map for Nigeria April 01, 2016

Simple difference NDVI (sNDVI) anomaly maps from the SPOT- VEGETATION (VGT) satellite for Nigeria in February, March and April 2016 (**Figures 4a, 4b**, and 4**c** respectively) show for example that vegetation development was generally above average for large parts of Southwestern and North-central regions. Although, areas showing vegetation development below normal conditions are evident in the North-east, North-west and South-east. Specific areas, including croplands along the coasts were also affected by dryness in early 2016. However in some parts of South-east where vegetation shows dry conditions at the beginning of the planting season, an improvement in vegetation development is expected before the end of April due to the rainfall received in the month of March. Otherwise this situation may lead to delays in the onset of the rainy season in areas like Uyo and Calabar which may also negatively affect crop growth, and pastures available for livestock.

sNDVI and RFE Anomalies for Selected Areas

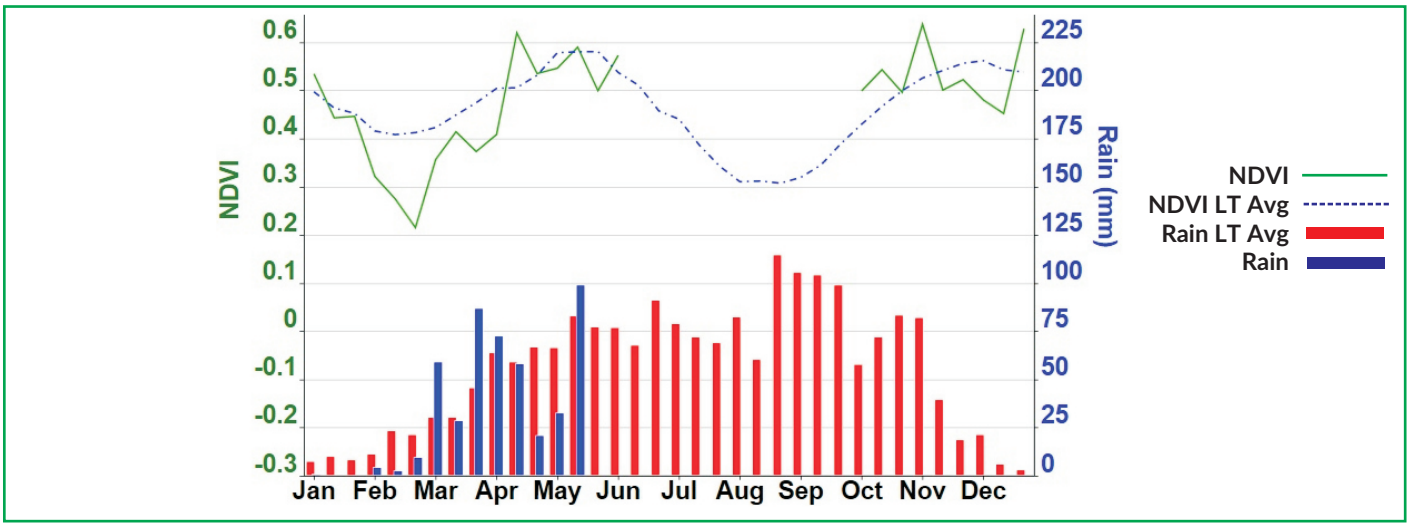

Figure 5: sNDVI and RFE Anomalies for Akwa-Ibom Area

Figure 5 indicates a negative deviation from normal conditions in the current season rainfall estimate and NDVI in April at the beginning of the growing season when compared to historical average. For both cropland and rangeland, irregular and below average rainfall has characterized the month of April and resulted in a clearly reduced vegetation development in Uyo and some other parts Akwa-Ibom state.

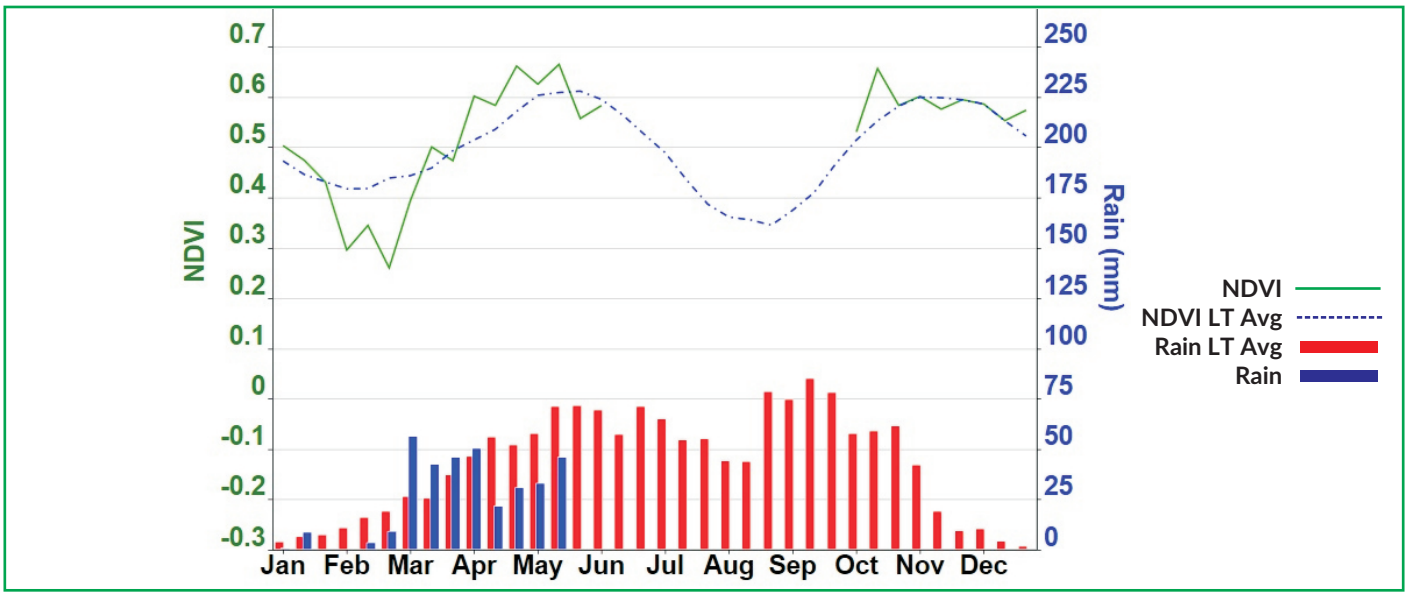

Figure 6: sNDVI and RFE Anomalies for Ekiti and Kogi Area

Figure 6 Indicates a positive deviation from normal conditions in Ado Ekiti due to the abundant rainfall received in the month of March before the start of the growing season when compared to historical average. For both cropland and rangeland, irregular and above average vegetation development therefore characterized the month of April and resulted in a clearly increased vegetation development in some parts of Ekiti (Ado Ekiti) and Kogi states.

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