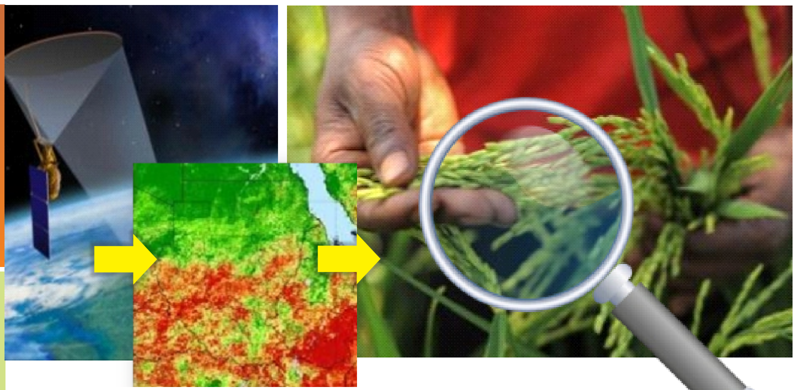
SPAEL
SPACE APPLICATIONS AND ENVIRONMENTAL SCIENCE LABORATORY,
INSTITUTE OF ECOLOGY AND ENVIRONMENTAL STUDIES,
OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE, OSUN STATE, NIGERIA

MESA
MONITORING FOR ENVIRONMENT AND SECURITY IN AFRICA

LAND THEMA MONTHLY BULLETIN Volume 1: Issue 7 -October, 2017





## DEFINITIONS OF ACRONYMS

RFE = Rainfall Estimate
NDVI = Normalized Difference Vegetation Index
SDVI = Standardized Difference Vegetation Index
ADVI = Absolute Difference Vegetation Index
LTA = Long Term Average (Historical Mean from 2000 - 2016)
Dekad = 10-day period

## HIGHLIGHTS

- RFE was highest in Imo, Cross-River and Ebonyi States during the three dekads of September, 2017. Lowest RFE was recorded in Jigawa, Yobe and Sokoto States
- NDVI was highest in Kaduna, Taraba and Adamawa Sates during September, 2017. Poor vegetation development was observed in Akwa-Ibom, Lagos and Bayelsa States
- Negative NDVI anomaly observed in Kiri-Kasama LGA of Jigawa State may have negative implications for crop yield and pastoral development in the area.

## Nigeria RFE and RFE Anomaly (September, 2017)

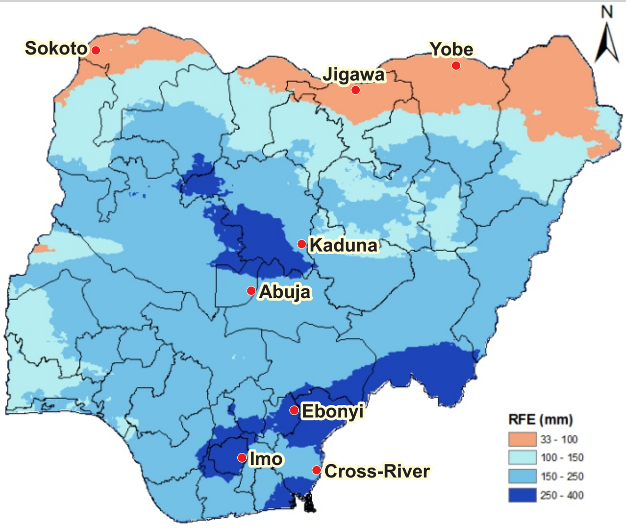



**Figure 1:** Nigeria Rainfall Estimate (September, 2017)

The Rainfall Estimate (RFE) data of Nigeria extracted from satellite images for the month of September, 2017 indicated that relatively high rainfall was prominent across the southeastern and north-central parts of the country (Figure 1).

The highest rainfall amount were observed in Imo (278.60 mm), Cross- River (271.84 mm) and Ebonyi (254.67 mm) States during the three dekads of the month respectively (Figures 2a-2c). It was also observed that Kaduna State and Abuja (FCT) received significantly higher rainfall than the neighbouring States.

The interior nothern parts of the country experienced notable dryness during the same period, with minimal rainfall recorded in Jigawa (97.68 mm), Sokoto (107.67 mm), and Yobe (108.57 mm) States. This may have negative implications for crop yield in the affected states, as a number of crops in the area at this time are either fruiting or nearing maturation, according to the Nigeria crop calendar.

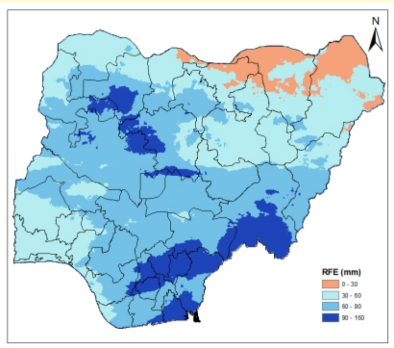


**Figure 2a:** Nigeria Rainfall Estimate- September, 2017 1st dekad (September 01-10)

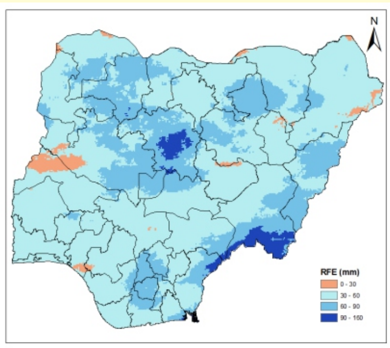


**Figure 2b:** Nigeria Rainfall Estimate- September, 2017 2nd dekad (September 11-20)

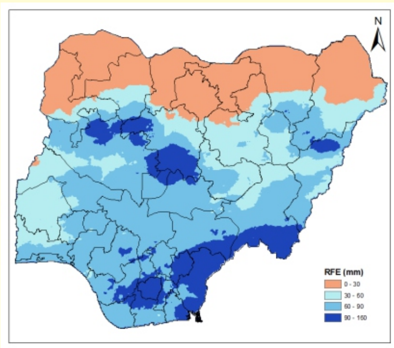


**Figure 2c:** Nigeria Rainfall Estimate- September, 2017 3rd dekad (September 21-30)

Highly positive anomaly for September, 2017 RFE (Figures 3a-3c) was observed in many parts of Abuja (FCT), Niger, Kaduna and Nassarawa States in the Northern part of the country. This suggests favorable vegetation development of these areas in the long-term, with consequential benefits for rainfed agriculture and overall cropland productivity.

On the other hand, negative deviation from historical mean RFE was recorded in parts of Ogun and Lagos States in the southwestern part of the country as well as in Jigawa and Bayelsa States. Prolonged negative RFE anomaly has been linked to persistent drought and hence, may be detrimental to healthy vegetation development.

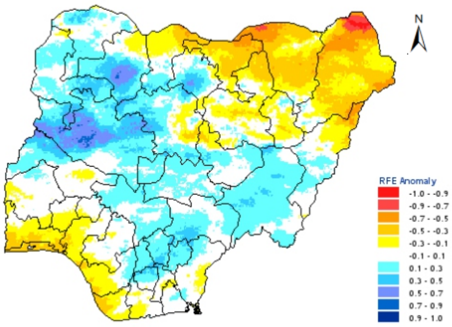


**Figure 3a:** Nigeria RFE Anomaly- September, 2017
1st dekad (September 01-10)

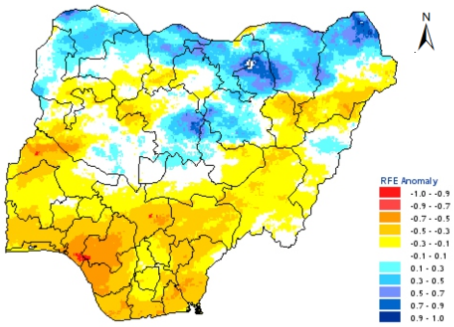


**Figure 3b:** Nigeria RFE Anomaly- September, 2017
2nd dekad (September 11-20)

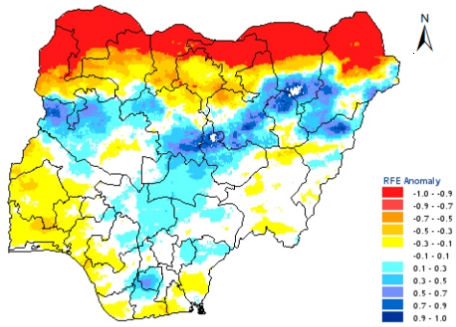


**Figure 3c:** Nigeria RFE Anomaly- September, 2017
3rd dekad (September 21-30)

## Nigeria NDVI and NDVI Anomaly (September, 2017)

NDVI from satellite images showed Nigeria vegetation development for September, 2017 (Figure 4) to be higher in the northern part of the country than the South. Greenness was observed to be especially high in Kaduna, Taraba, Adamawa, Kano and Bauchi States. Zamfara and Plateau States, also in the North, showed impressive expanse of greenness as well. Good vegetation development in these mentioned areas, which might be indicative of crop viability, may cause us to expect bountiful yield for different crops during the harvest period. The observed greenness is also reflective of a successfully progressing typical crop growing season in the area. At the same time, during the three dekads of the month (Figures 5a-5c), sparse greenness dotted most of the southwestern and southeastern States, with extreme conditions in several parts of Akwa-Ibom, Lagos, Bayelsa, Rivers and Delta States. It is worth mentioning, however, that most of the areas with poor vegetation development during this period have either commenced or are fast approaching the crop harvest season.

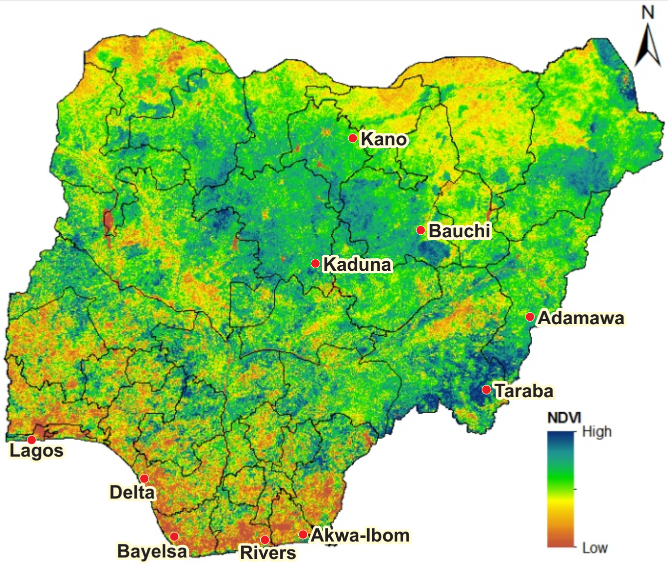



**Figure 4:** Nigeria NDVI (September, 2017)

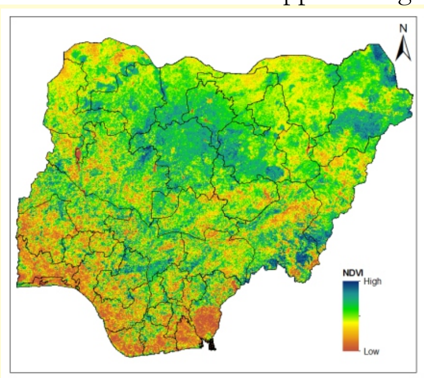


**Figure 5a:** NDVI of Nigeria- September, 2017
1st dekad (September 01-10)

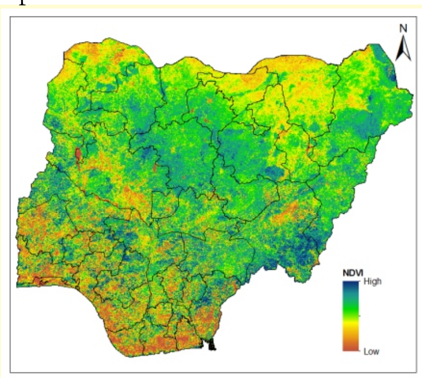


**Figure 5b:** NDVI of Nigeria- September, 2017
2nd dekad (September 11-20)

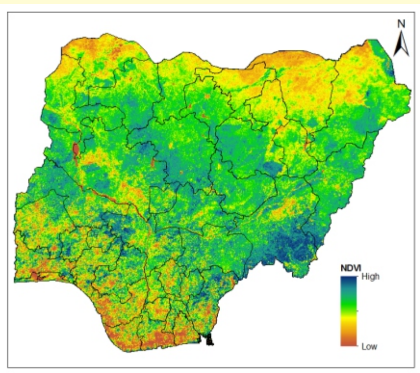


**Figure 5c:** NDVI of Nigeria- September, 2017
3rd dekad (September 21-30)

Highly positive NDVI anomaly was observed in Bayelsa and Rivers States during the three dekads of September, 2017 (Figures 6a-6c). Other areas with significant positive anomaly during the period include parts of Anambra, Kano and Katsina States. However, negative departure from historical mean NDVI (2000-2016) was recorded in Ekiti, Cross-River, Oyo and Lagos States. Prolonged negative anomaly in observed NDVI may adversely affect cropland output over a long period of time, and might be indicative of impending drought over affected areas.

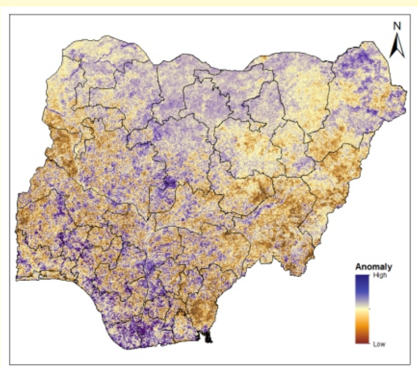


**Figure 6a:** Nigeria NDVI Anomaly- September, 2017
1st dekad (September 01-10)

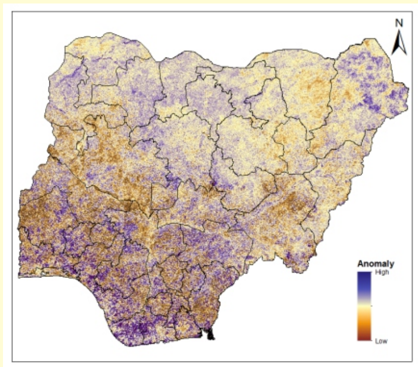


**Figure 6b:** Nigeria NDVI Anomaly- September, 2017
2nd dekad (September 11-20)

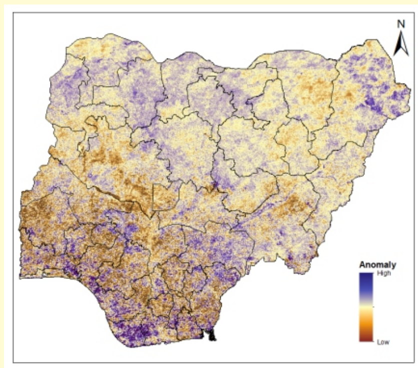


**Figure 6c:** Nigeria NDVI Anomaly- September, 2017
3rd dekad (September 21-30)

# Rice and Yam Yields Forecast (2017)

The crop yield forecast was performed in **four** stages:

**1.** Extraction of specific crop regions of Nigeria with a global hybrid crop-dominance mask,

**2.** Performance of most-similar year analysis (NDVI and phenology), in which historical years with most similar NDVI pixel attributes to the current season were assigned class values. These were later used as indicators for yield projection.

**3.** Retrieval of yield data for major Nigerian crops (1961-2014) from the FAO crop-yield portal. The yield data was extrapolated through regression analysis with NDVI as predictive variable to 2016, and

**4.** The yield forecast analysis for different crops was run in SPIRITS software environment.

This issue presents the forecast for rice (North) and yam.

## Rice (North)

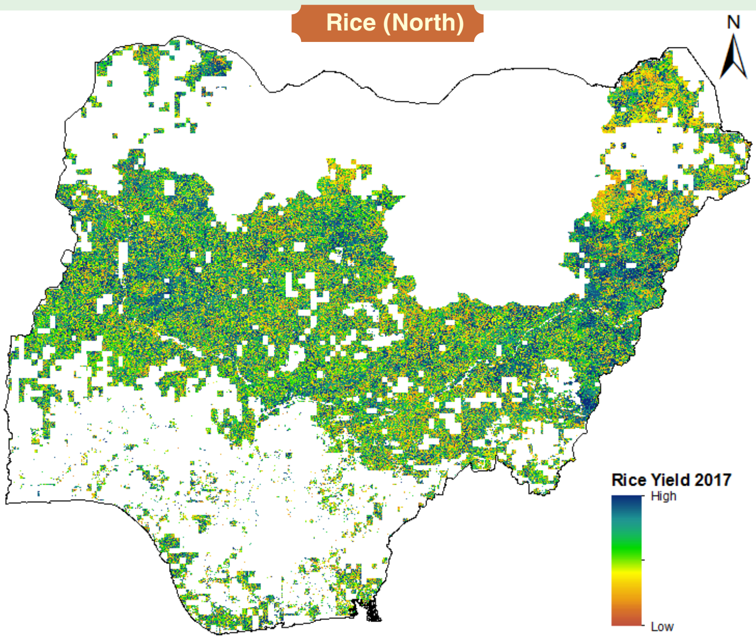



**Figure 7:** Rice (North) Yield Forecast over Nigeria (2017)

## Yam

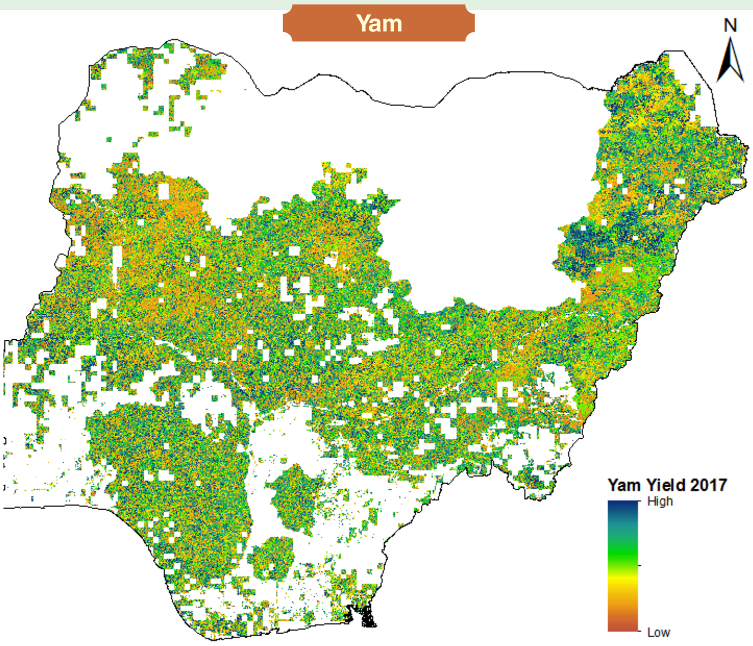



**Figure 8:** Yam Yield Forecast over Nigeria (2017)

Based on the forecast, maximum rice output for the 2017 Northern Nigeria planting season (Figure 7) is to be expected for States like Kaduna, Adamawa, Bauchi, Taraba and Benue States. In consonance with vegetation development indicators, high rice yield could be expected in: Zaria LGA (1.88 ton/ha), Kubau LGA (1.88 ton/ha) and Soba LGA (1.88 ton/ha) of Kaduna State; Maiha LGA (1.88 ton/ha), Yola-North LGA (1.88 ton/ha), Mubi-North LGA (1.87 ton/ha) and Song LGA (1.86 ton/ha) of Adamawa State; as well as in Mushishi LGA (1.86 ton/ha) of Niger State and Jalingo LGA (1.85 ton/ha) of Taraba State.

Also, maximum yam yield for the 2017 Nigeria crop year was projected in Benue, Niger, Bauchi, Ekiti, Nassarawa, Kaduna, Adamawa, Edo, Ebonyi and Kwara States of the country. Specific areas where yam output may turn out to be exceptionally good include: Efon (9.82 ton/ha), Ekiti-East (9.55 ton/ha) and Moba (9.63 ton/ha) Local Government Areas of Ekiti State; Kudan (9.45 ton/ha), Sabon-Gari (9.45 ton/ha) and Jaba (9.80 ton/ha) Local Government Areas of Kaduna Sate; Keffi (9.41 ton/ha) Local Government Area of Nassarawa State, Ilorin-South (9.60 ton/ha) of Kwara State, Mayo-Belwa (9.53 ton/ha) LGA of Adamawa State and Akoko-Southeast (9.53 ton/ha) LGA of Ondo State. Other notable areas where high yam yield were predicted are Gurara (9.29 ton/ha) Local Government Area of Niger State and Yoro (9.19 ton/ha) Local Government Area of Taraba State.

### Crop Calendar

| Rice (North) | Yam |
|---|---|
| **Planting:** June-July | **Planting:** February-April |
| **Growing:** August-October | **Growing:** May-September |
| **Harvesting:** November-December | **Harvesting:** October-December |

### CURRENT PRICES OF AGRICULTURAL COMMODITIES

**October 25 - November 1, 2017**

| Commodity | Market | Price |
|---|---|---|
| Rice (50 kg) | Alaba, Lagos | N13,800 |
| | Dawanau, Kano | N13,400 |
| | Gombe, Gombe | N16,500 |
| | Ogbete, Enugu | N16,000 |
| Maize (100 kg) | Alaba, Lagos | N11,500 |
| | Dawanau, Kano | N9,400 |
| | Gombe, Gombe | N10,500 |
| | Ogbete, Enugu | N18,500 |
| Garri (55 kg) | Alaba, Lagos | N7,000 |
| Garri (50 kg) | Maikarifi, Kaduna | N15,500 |
| Garri (100 kg) | Gombe, Gombe | N17,000 |
| Garri (100 kg) | Ogbete, Enugu | N13,000 |
| Groundnut (100 kg) | Alaba, Lagos | N23,750 |
| | Dawanau, Kano | N21,300 |
| | Ogbete, Enugu | N30,500 |
| Soybeans (100 kg) | Alaba, Lagos | N17,000 |
| | Dawanau, Kano | N14,000 |
| | Gombe, Gombe | N15,000 |
| | Maikarifi, Kaduna | N12,000 |
| | Ogbete, Enugu | N19,000 |

Source: www.novusagro.com

## RFE and NDVI Anomalies in Selected Local Council Areas (September, 2017)

### (1) Abua Local Government Area, Rivers State

Long-term RFE and NDVI analyses for the three dekads of September, 2017 (Figure 9) indicated that Abua Local Government Area of Cross-River State recorded highly positive NDVI anomaly during the period. This observation is found to be adequately explained by prolonged periods of rainfall in which most RFE values were higher than Long-Term RFE to a large extent in the previous dekads of 2017. The implication of the observed positive long-term NDVI anomaly in the area majorly borders on crop yield. In this regard, crop output in the Local Government area for the current season is also expected to exceed the historical crop yield average.

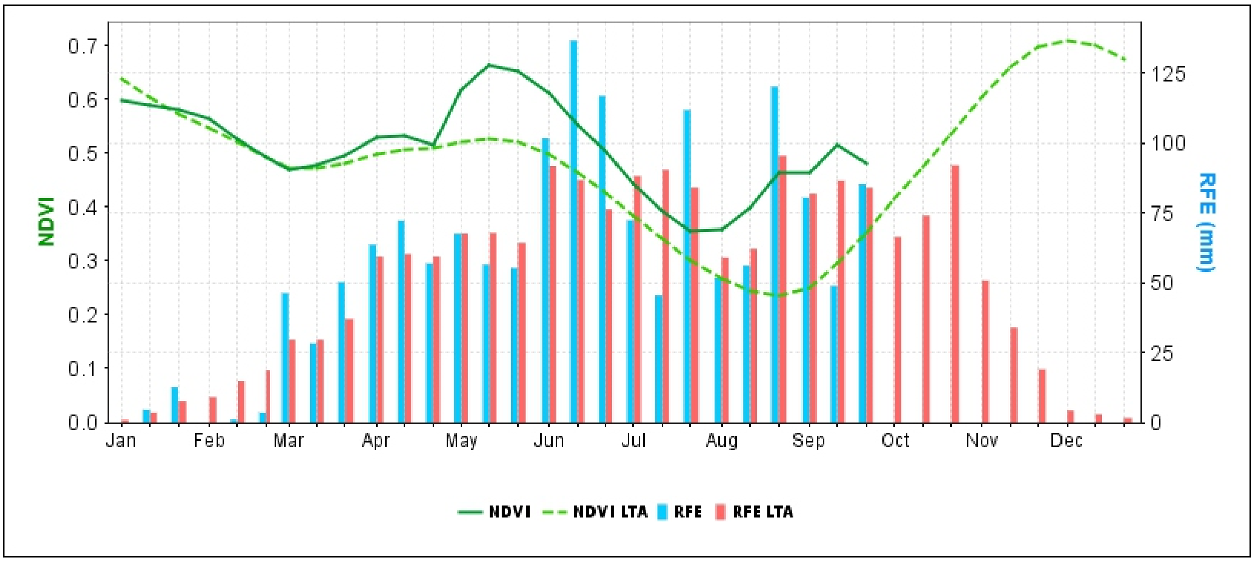



**Figure 9**: NDVI and RFE Anomalies of Abua LGA, Rivers State

### (2) Kiri-Kasama Local Government Area, Jigawa State

On the other hand, negative NDVI anomaly was recorded in Kiri Kasama Local Government Area of Jigawa State during this period (Figure 10). The area was observed to have received lower rainfall compared to the long-term average in most of the preceding dekads from July to August, 2017. This may imply poor crop development in the area for the current planting season. This could have negative implications for pastoral development, with severe consequences like diminished grazing landscapes for livestock such as cattle.

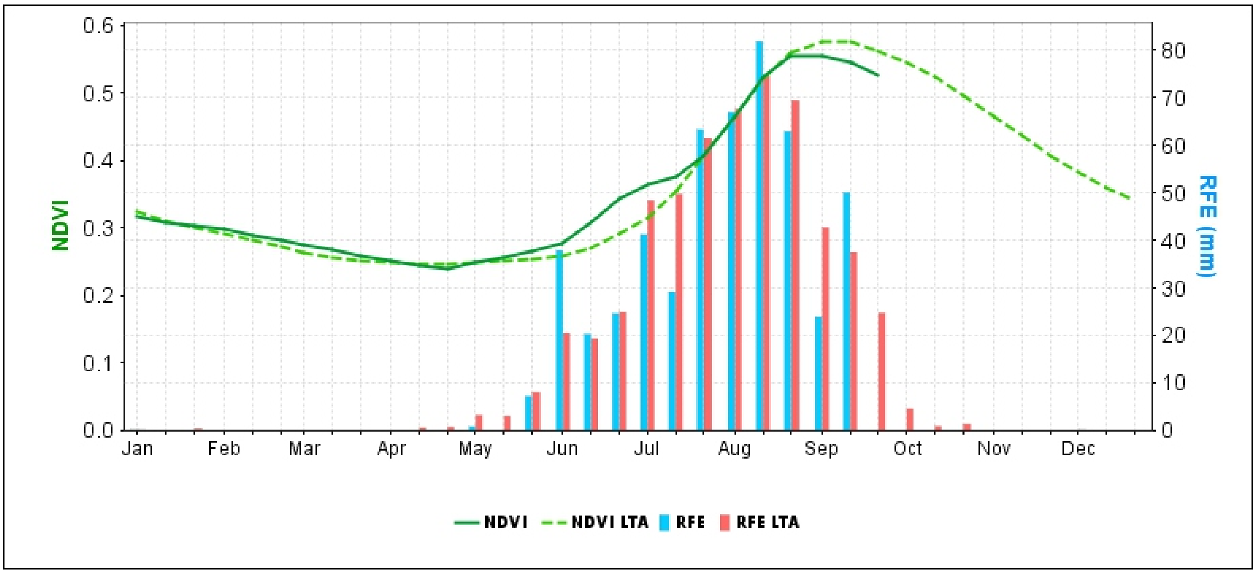



**Figure 10**: NDVI and RFE Anomalies of Kiri-Kasama LGA, Jigawa

Space Applications and Environmental Science Laboratory,
Institute of Ecology and Environmental Studies,
Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria
+234 803 376 1041
head@spael.org
www.spael.org