



Phase III GLOBE ENSO (El Niño Southern Oscillation)
Student Research
Campaign Science and Research
Webinar: "Connections and Collaboration."













**Nigeria: Ethnic Groups** 

- Nigeria is inhabited by seven major Ethnic Groups and 27 minor Ethnic Groups.
- While the North is dominated by the Hausa-Fulani the South is dominated by the Yoruba and Igbo











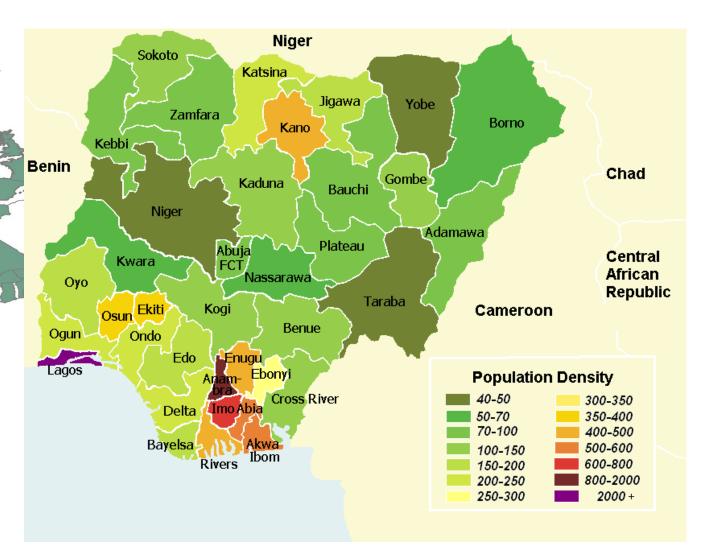






#### **Nigeria: Population Distribution**

- Population Density decreases from the south to the north.
- Arguably, Lagos is the most populous City in Nigeria with population density of over 2,000











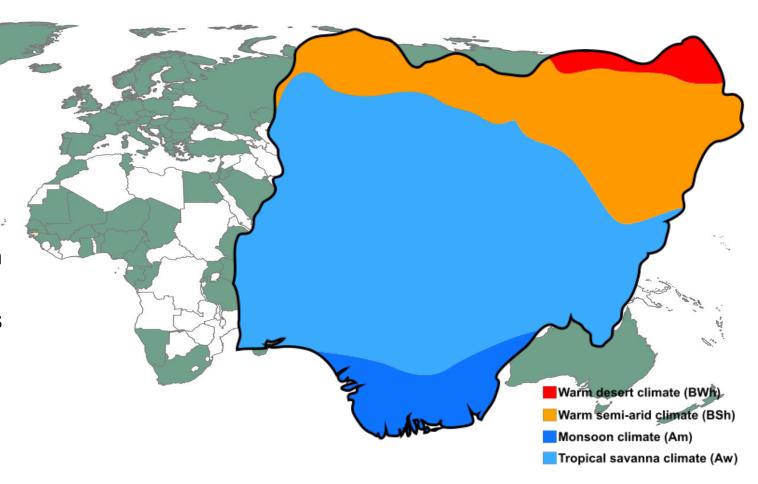




**Nigeria: Climatic Region** 

Nigeria map of Köppen climate classification

- Nigeria is characterized by four climatic zones with the wettest climate in the southern costal region and the warm dry climate in extreme north-eastern part.
- While Nigeria is loosing more lands to desertification in the north much of the rainforests have disappeared.











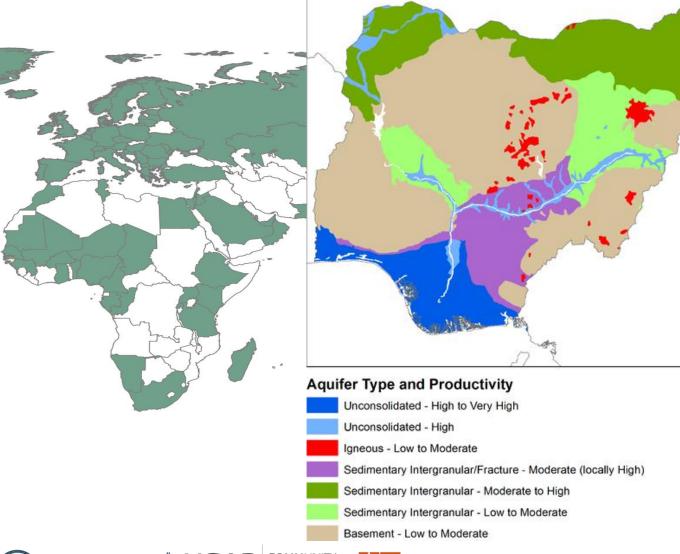




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#### **Water Availability**

- Largest volume of domestic water comes from the ground in form of well water and borehole water.
- Potable water supply is grossly inadequate.
- Groundwater is being depleted due to reduced recharge and increase groundwater abstraction













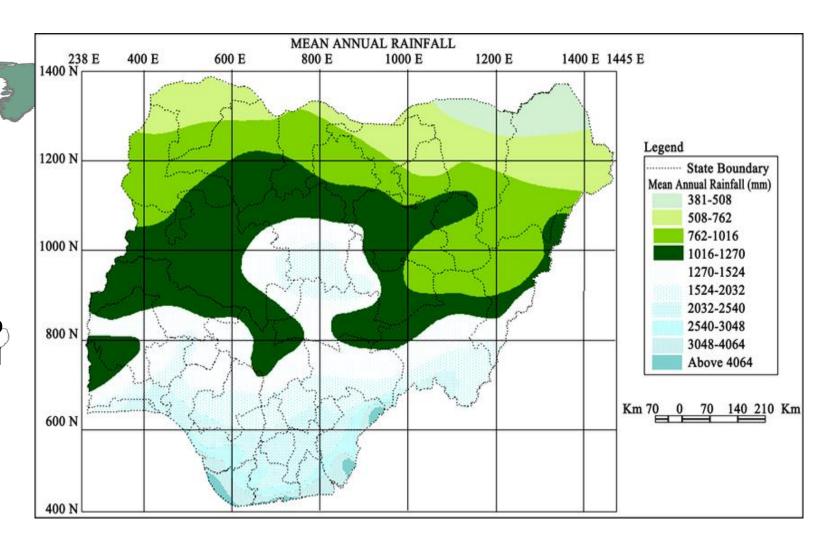






**Climate: Rainfall** 

- Rainfall decreases from the coast in the south to the north the lowest annual value occurring in the northeast.
- Relatively high rainfall in the northcentral (Jos Plateau) is attributed to orographic effect in Jos Plateau and the concentration of artificial lakes.
- Since year 2000, rainfall characteristics (onset, cessation, intensity and duration) have been observed to vary significantly.











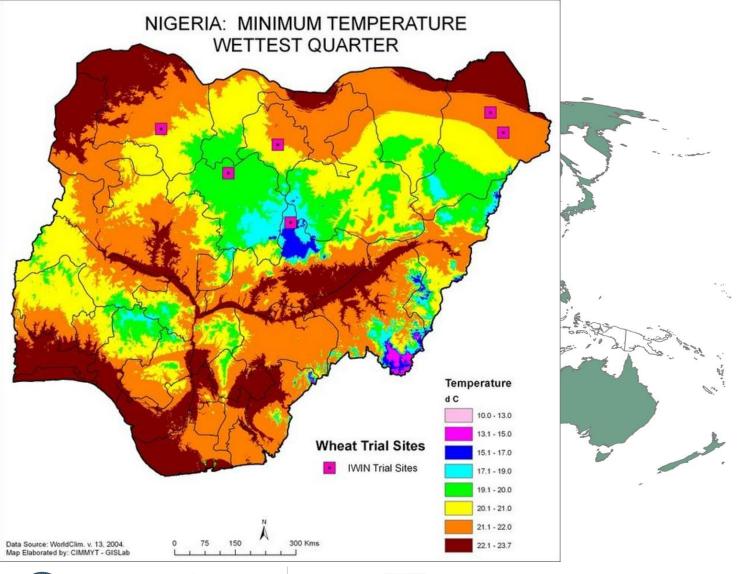




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**Climate: Temperature** 

- Recently, increase in temperature (both in the dry and wet seasons) has been noticed across the country.
- Thus, urban heat island is a common phenomenon in the Nigerian cities nowadays.





















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FUTA Campus, Akure Nigeria.

GLOBE Scientist: Space Science & Environmental Education, over 40 students











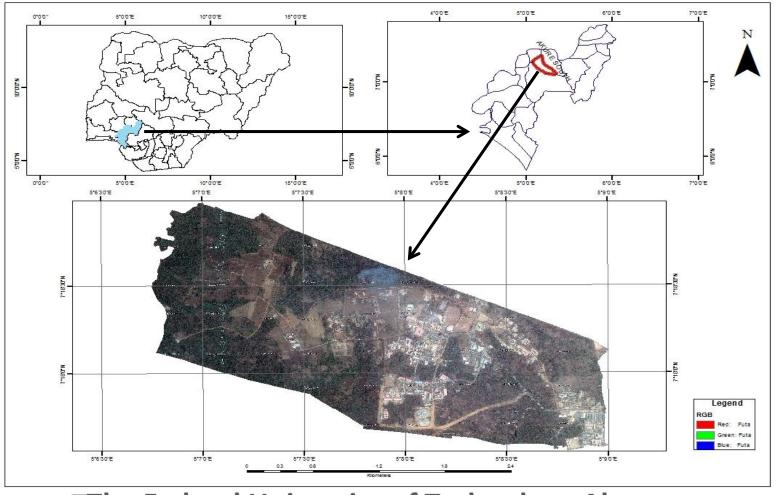




#### **Our Study Area: FUTA Campus**



 Our Study Area is located in the South-western Nigeria.





PMB 704 Akure, Ondo state.









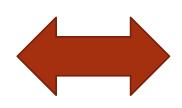




## THE FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE







Mission

To be a world class
University of
Technology and a
centre of excellence in
training, research and
service delivery

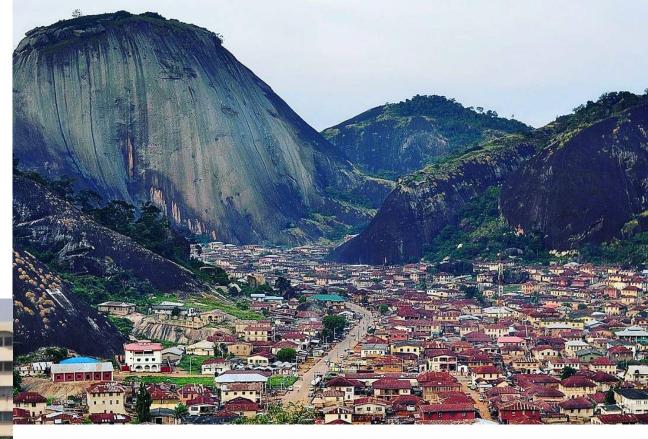
stablished

To promote technological advancement by providing conducive environment for research, teaching and learning engenders development of products that are technologically oriented, self-reliant and relevant to society

1981

#### **Akure City Centre**





Idanre Hill (the nearest tourist centre)





### The University Auditorium



Students in Lecture Theatre

## THE GLOBE PROGRAM FUTA-RSG Globe Group















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### THE **GLOBE** PROGRAM

### **Our Involvement in The Globe Program**

Using FUTA campus as a case study, the surface temperature of some specific surfaces: (i.e., ground, tarred road, forests, grassland, pavement and wetlands) are taken at four different time of the day: 7:30a.m, 12:30p.m, 5:30p.m and 7:30pm.







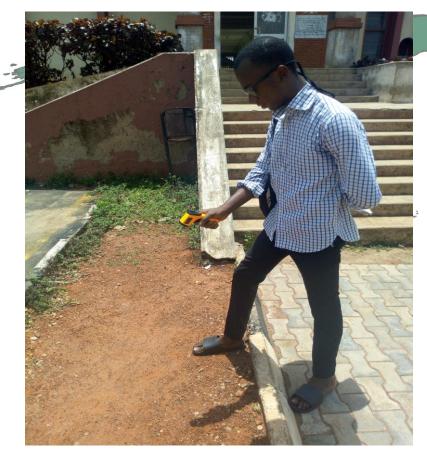






### THE **GLOBE** PROGRAM

## Our Involvement in The Globe Program

















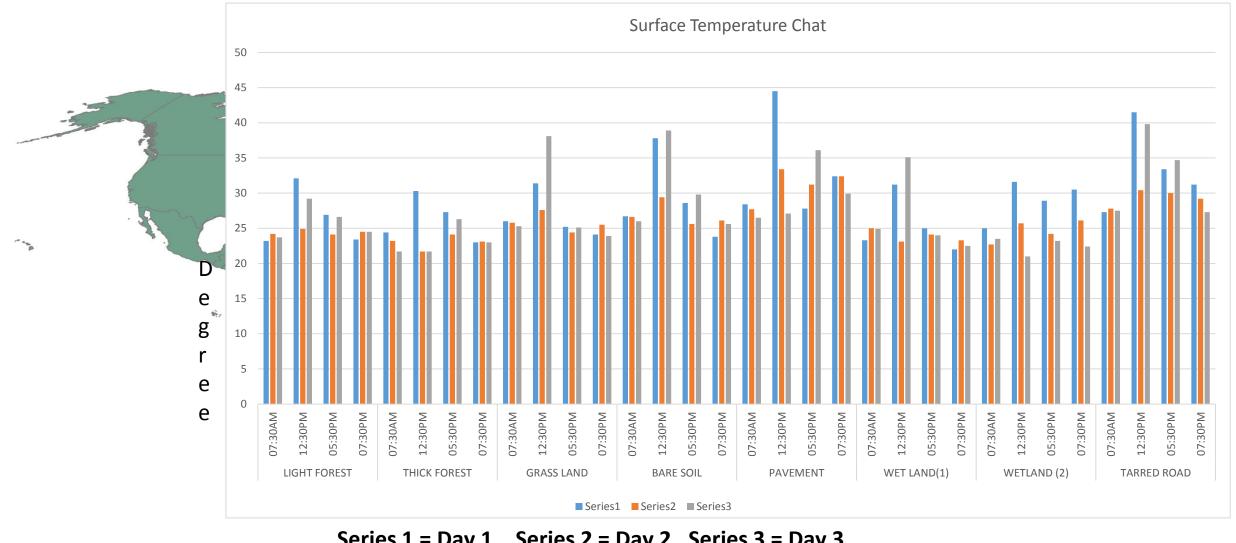












Series 1 = Day 1, Series 2 = Day 2, Series 3 = Day 3















- Paved surface has the highest surface temperature
- Surface temperature is generally high by noon period across all surfaces.
- Surface temperatures of wetland and vegetated area are observed to be lower than that of tarred, paved and bare ground surfaces.
- Thus, developed areas are characterized by extremely high surface temperature.
- The longer it takes to absorb heat, the longer it takes to release the heat.
- This in turn affects the micro-climate within that location late in the evening. **Example** is the paved areas.















### Our Goal: Acquiring Data From More Locations Using Automated Devices

- We found out that we would need to acquire Hourly surface temperature data and also over a longer duration of time.
- Therefore, we decided to create a low cost device which would:
  - > Be stationed at each observation point
  - > Acquire multiple data (such as surface temperature, ambient temperature and humidity)
  - > Send the acquired data to a cloud storage along side with the time and date of acquisition.
- Thus, we can easily monitor the variability of these climatic parameters across all the landuses/covers
- And compare the field-based measured data with satellite-based climatic data.















### Progress so far on automated data acquisition

- ✓ A prototype has been designed using.
- ✓ An Infrared thermometer sensor for temperature acquisition.
- ✓ An Ardruino development board for connecting all component.
- ✓ An Atmeg chip, where programming codes where uploaded onto.
- ✓ A GSM Module for data upload to cloud storage.
- ✓ A rechargeable battery for powering device.
- ✓ Device prototype has been designed, coupled and tested.
- ✓ The Prototype worked as desired.

Our next aim is to couple as many devices as possible, station them in more spots across all landuses/covers and acquire the climatic data remotely.















### **Our Research Objectives**

- ✓ Monitor the nexus between spatio-temporal variability of wetland extent and groundwater level fluctuation in FUTA.
- Surface- and groundwater quality monitoring.
  - ✓ Short- and Long-term monitoring of the variability of weather variables across FUTA Campus.















### **Outreach Objectives**

- √ Take Globe Program Campaign to 40 secondary schools in Akure City.
- ✓ Have Globe Students in at least 50% of the schools.
- ✓ Enlist more Undergraduates into the Globe Scientific Exercise











