THE SAHEL

CLIMATE VARIABILITY

THE SAHEL


MAURITANIA
MALI
NIGER
SENEGAL
SAHEL
ERITREA
CHAD
SUDAN
ETHIOPIA
NIGERIA
BURKINA FASO

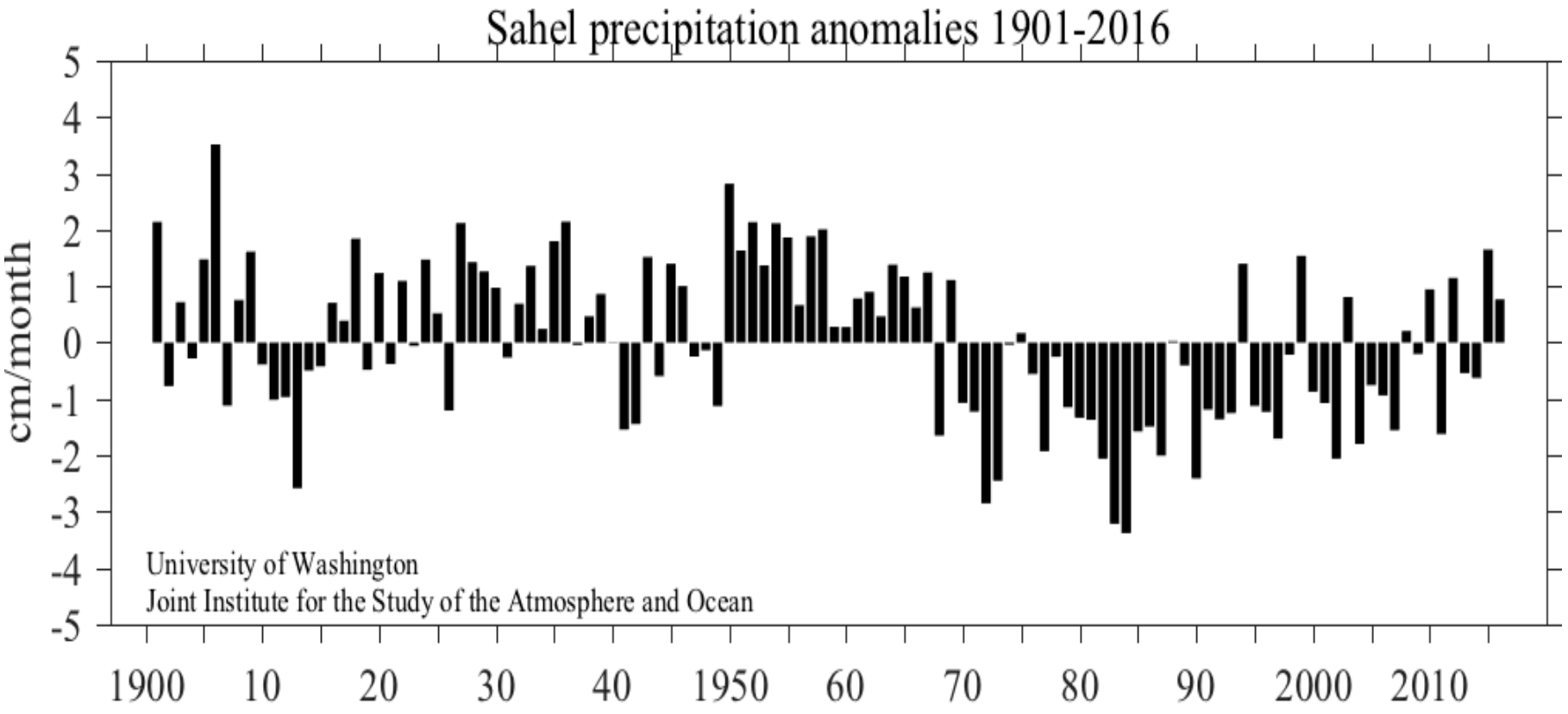
What is Climate Variability?

- Brainstorm in small groups what do you think this means.
  - List words and short phrases that help describe what do you think it means.

DEFINING THE PROBLEM

Severe drought in the Sahel due to Climate Variability and has Severely Impacted the Region.

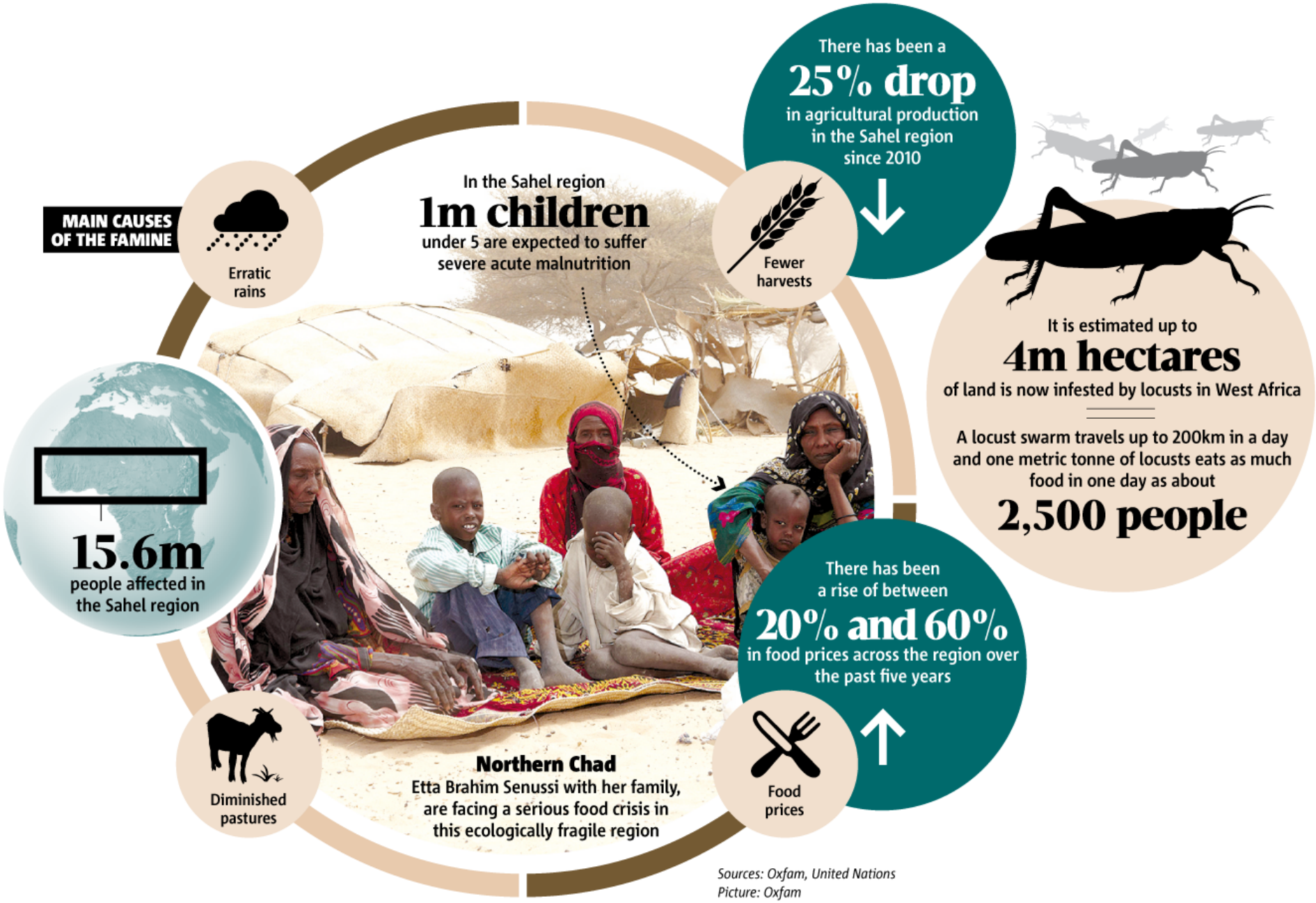
Sahel Precipitation Anomalies



June through October averages over 20-10°N, 20°W-10°E. 1900-2016 climatology
Deutscher Wetterdienst Global Precipitation Climatology Centre data

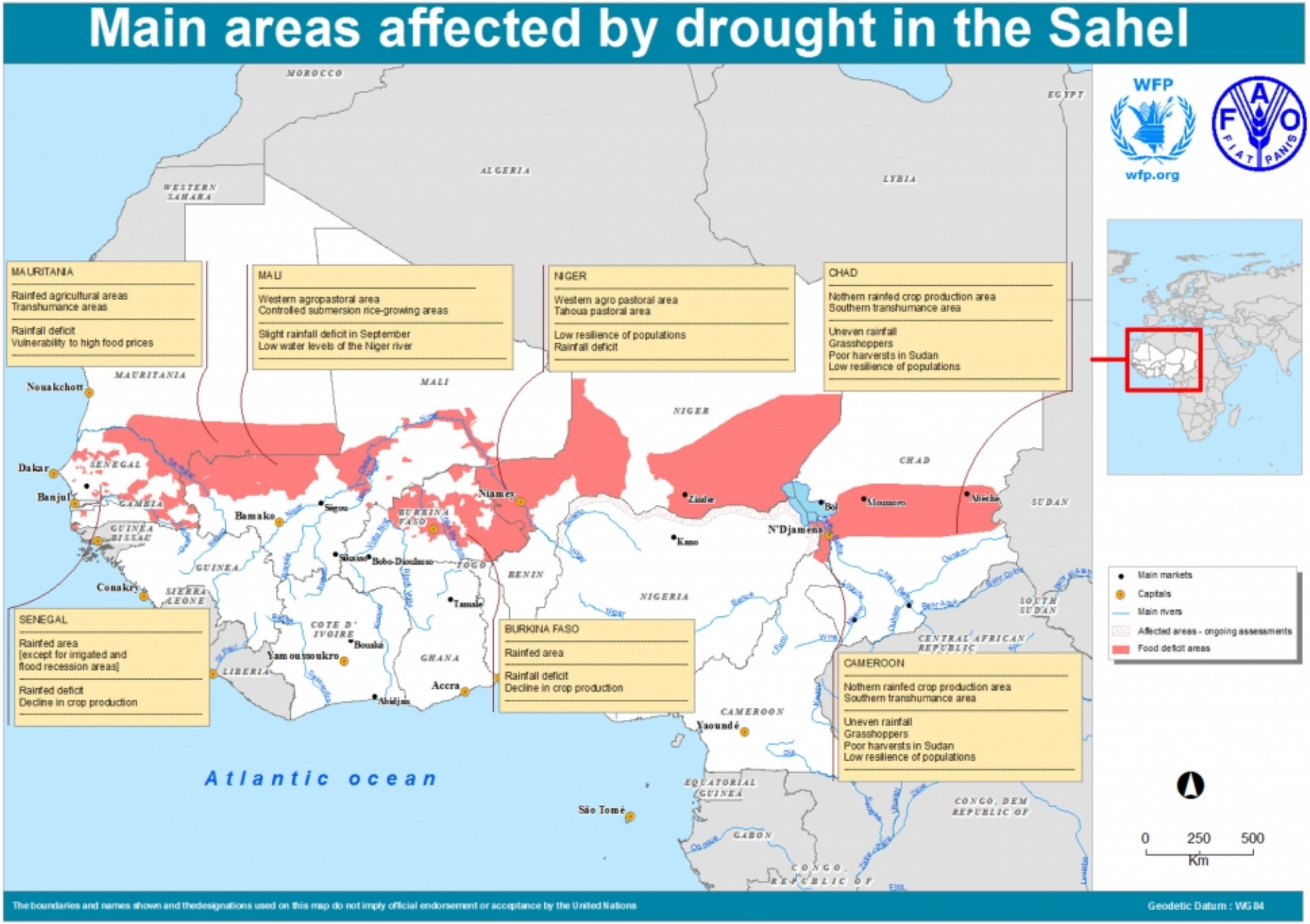
30 Years of Sustained Drought In The Sahel Affects Millions

- 30.1 Million – Food Insecure People
- 5 Million – Displace People
- 6 Million – Malnourished
- 70% of All Diseases are Caused by Unsafe Water and Poor Sanitation
- The Main Cause of Deaf of Children Under the Age of 5 Is Water Borne Diseases



Sources: Oxfam, United Nations
Picture: Oxfam

Main areas affected by drought in the Sahel

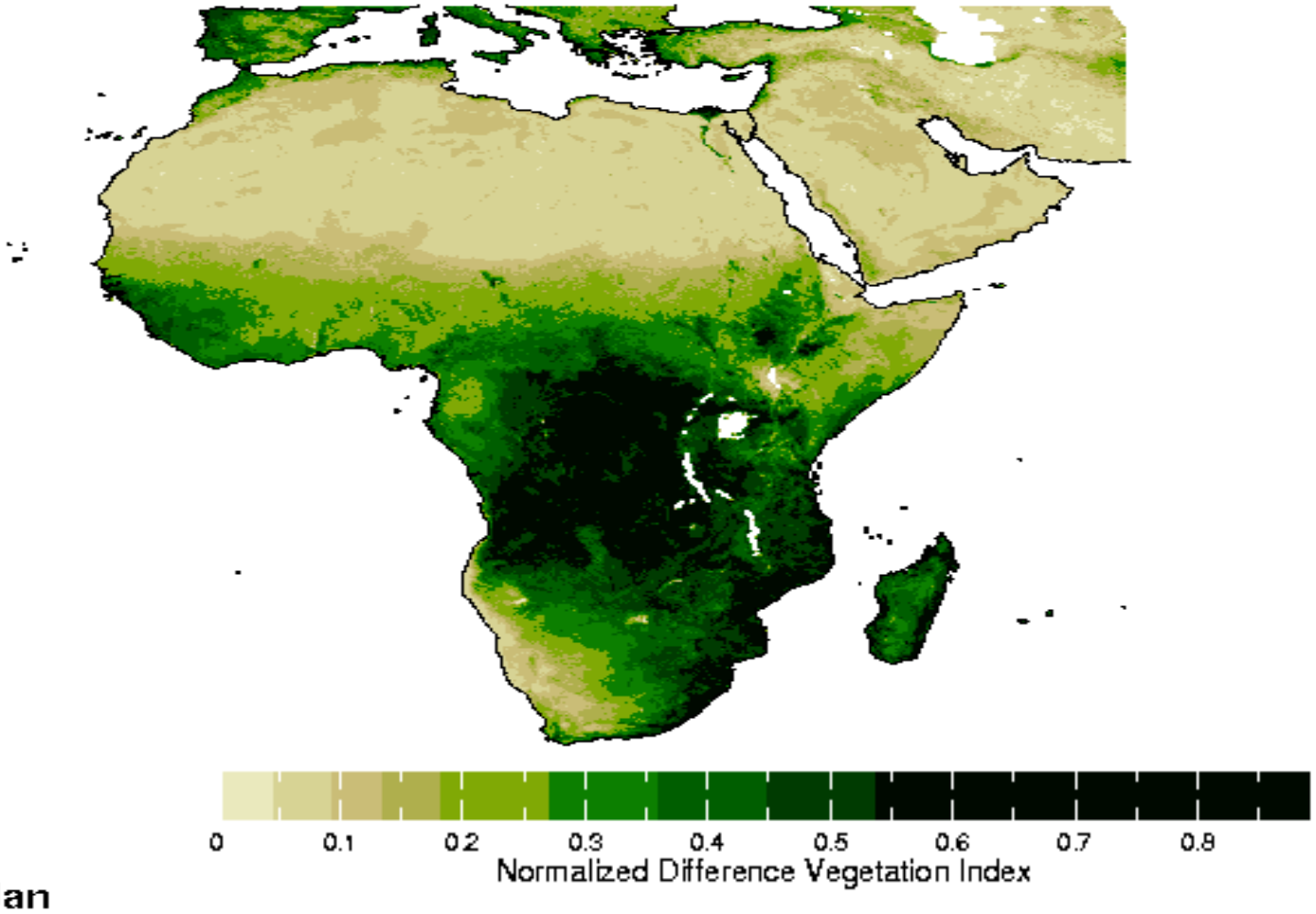


IS THE CLIMATE CHANGING IN THE SAHEL?

The consensus among scientists is yes.

The seasonal cycle in vegetation cover from satellite

NDVI = Normalized Difference Vegetation Index



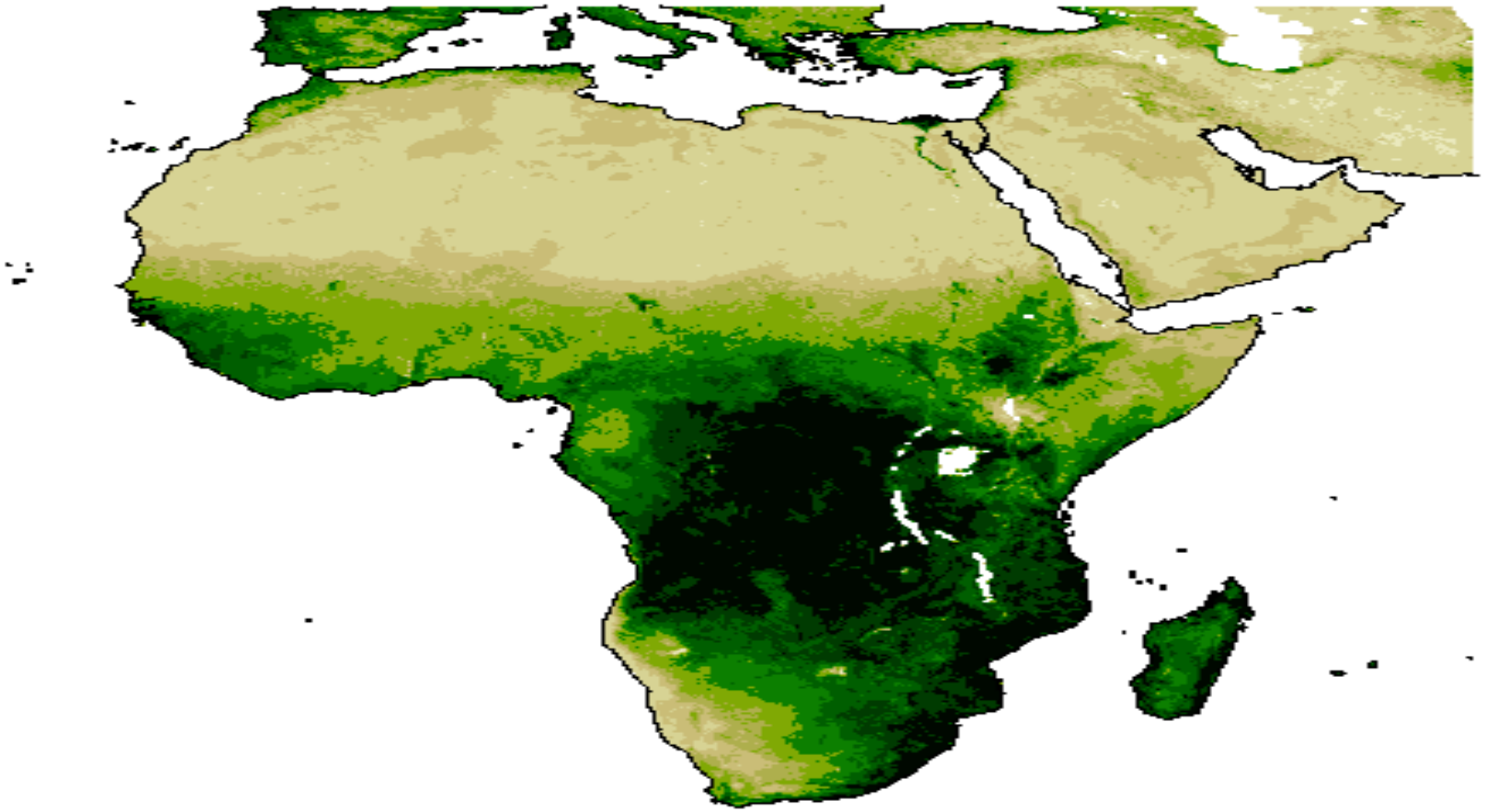
Animation

Seasonal Cycle in Vegetation Cover from Satellite Questions

1. What changes if any did you notice throughout the animation?
2. Pay close attention to the Sahel region. What changes did you notice throughout the Sahel?
3. What time of the year was there a significant change in the vegetation cover in the northern boundary?
4. What do you think may have caused those changes?
5. Do you think this is a normal occurrence or an anomaly?
6. Throughout what time frame did the change occur?

Animation:

The seasonal cycle in vegetation cover from satellite

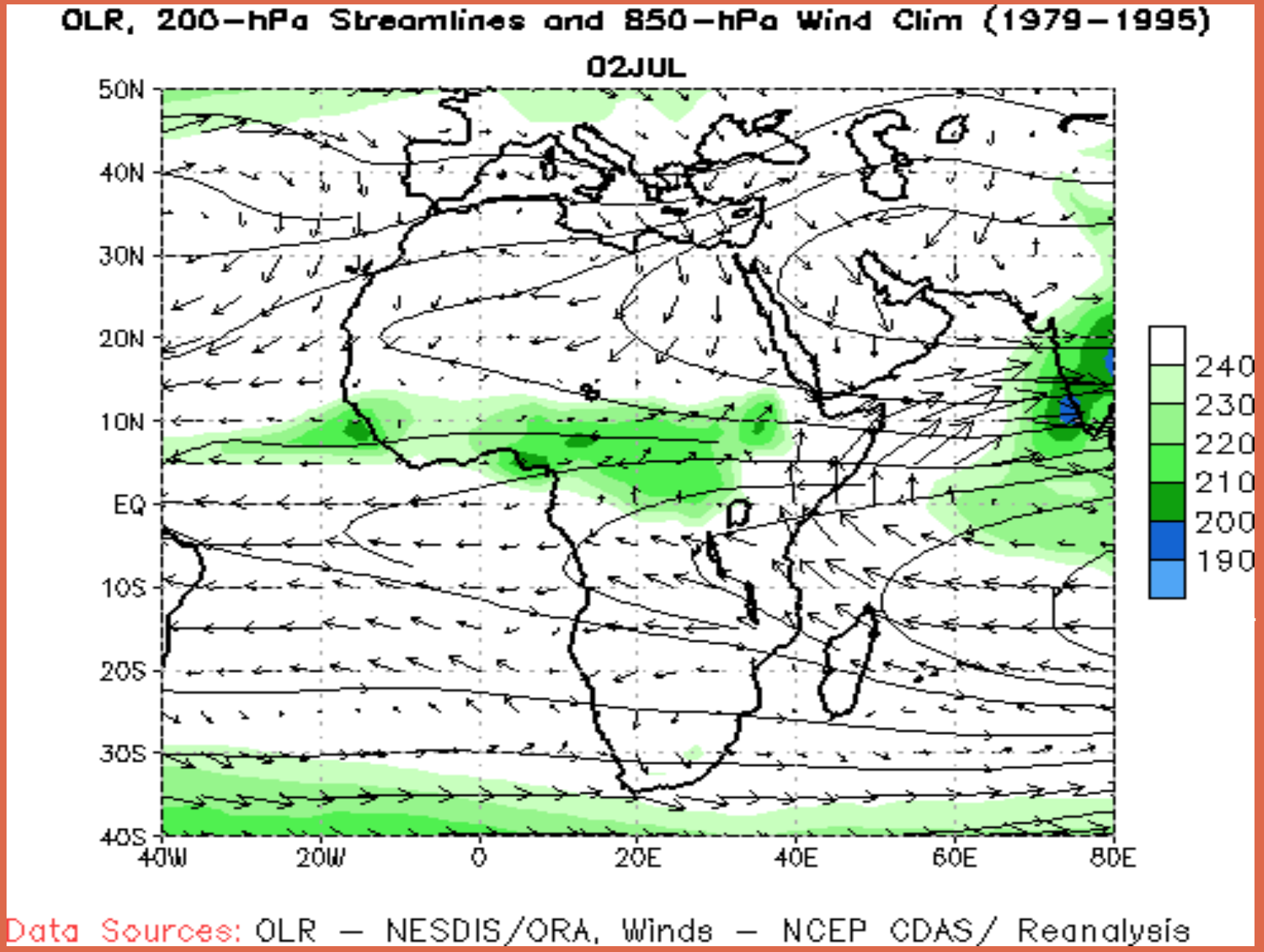


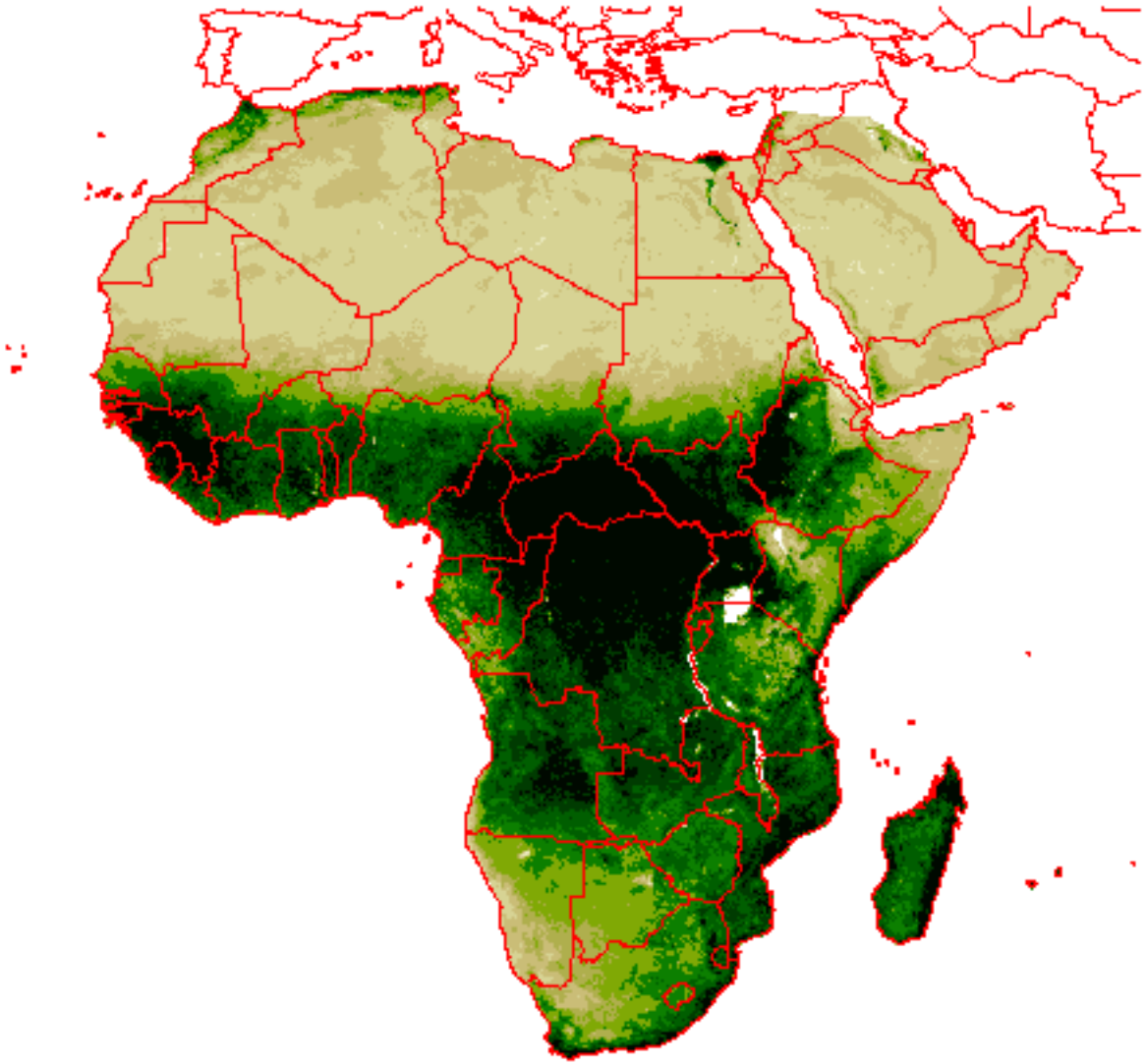
1–10 Jan

Seasonal Cycle in Vegetation Cover from Satellite Questions

- What time of the year was there a significant change in the vegetation cover in the northern boundary?

- From this animation can you tell during what seasons is there more precipitation?


OLR, 200-hPa Streamlines and 850-hPa Wind Clim (1979-1995)
02JUL
50N
40N
30N
20N
10N
EQ
10S
20S
30S
40S
40W
20W
0
20E
40E
60E
80E
240
230
220
210
200
190
Data Sources: OLR - NESDIS/ORA, Winds - NCEP CDAS/ Reanalysis

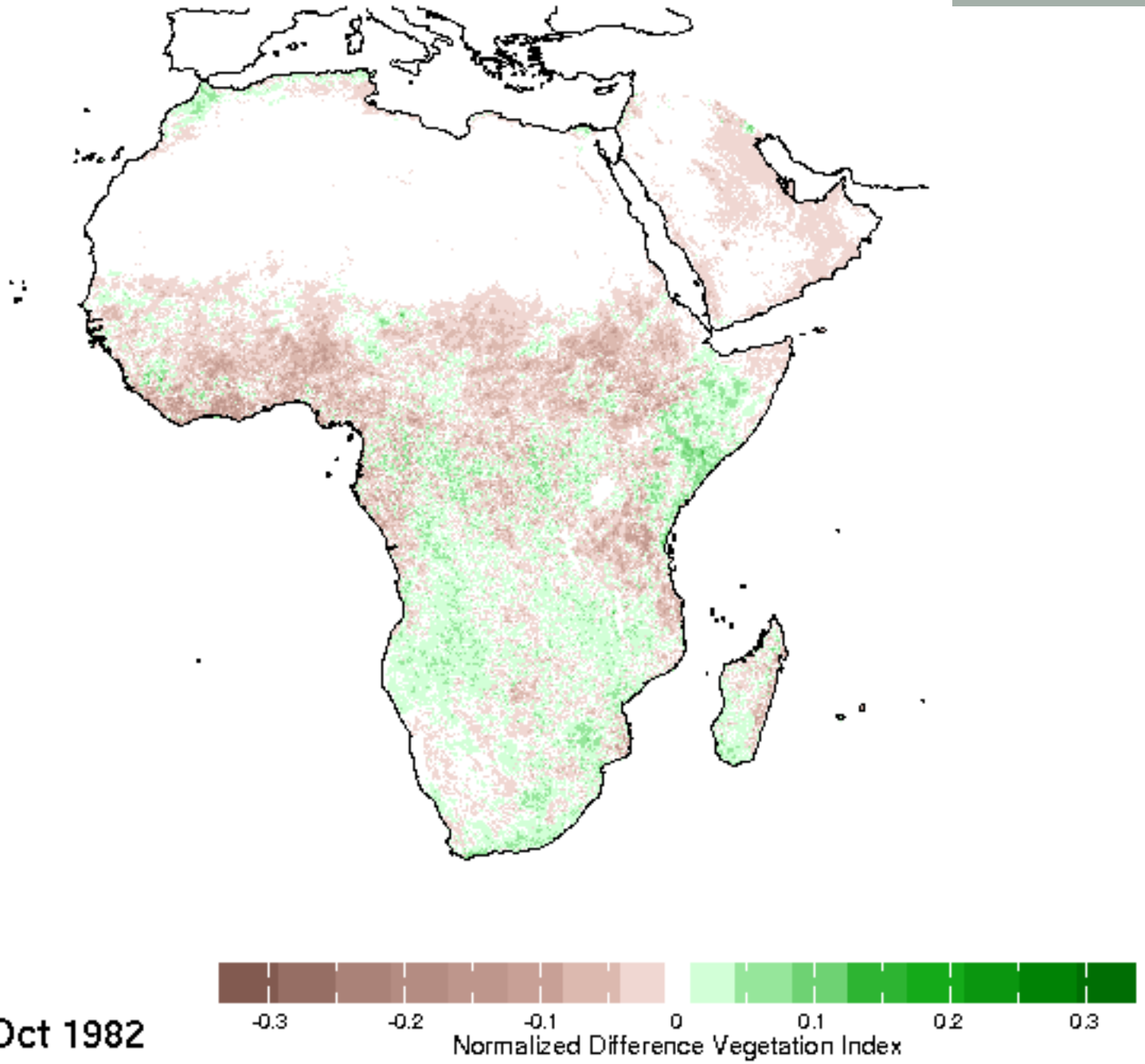


Year-to-year variations in vegetation cover

May–Oct 1982

Year to Year Variation in Vegetation Cover from Satellite

- What geographical areas have the most variability?
- Is there any particular year where you saw more variability?

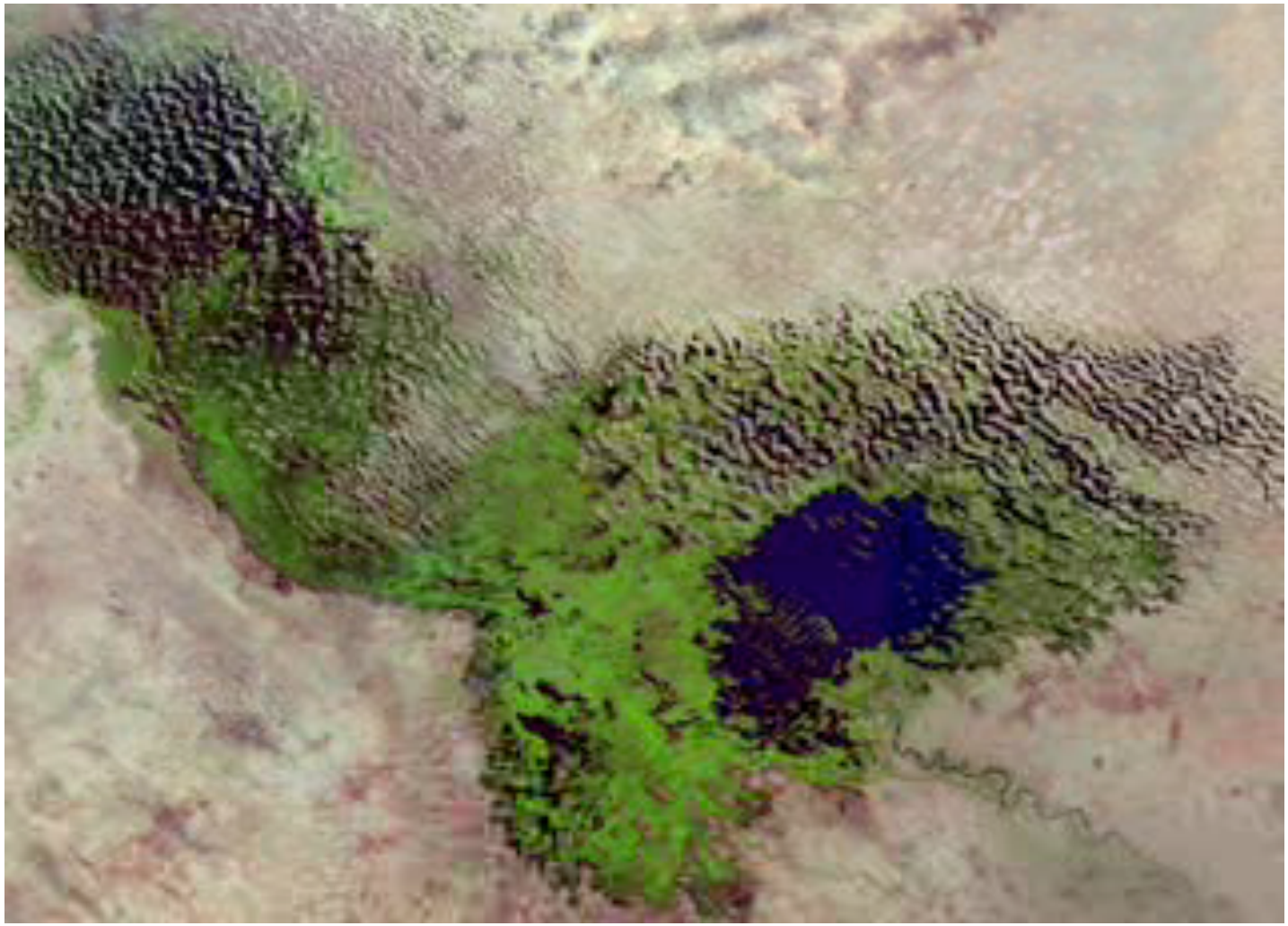


May–Oct 1982

Year to Year Variation in Vegetation Cover from Satellite Questions

- Using the map identify the countries that you think had the most vegetation variability.

Lake Chad A Profile



Use Google Earth to Examine the changes to the Water Table of Lake Chad.

Manipulate and overlay images from the Landsat Satellite to observe changes over time.

Use the links provided to further research various aspects about this important resource.

Animation of Lake Chad Water Table 1963, 1973, 1987 and 1997

MITIGATION AND SUSTAINABLE PRACTICES

How the Sahel is coping with drought.

Human Impact

Changing Agricultural Practices in Burkina Faso

- It rains only 3 to 4 months of the Year
- It's a challenge for farming
- 80% of the Inhabitants depend on Agriculture for their livelihood and for food.
- Reintroducing simple affordable practices to mitigate drought and improve water management.

ROOTS OF RECOVERY

Trees, people and regeneration of the Sahel

ACCESS TO CLEAN WATER

Remains a challenge

Lack of Clean Water and Sanitation

Sustainable Design Research Project

Design Challenge:

Design and Build a Portable Water Filtration System out of recycled and affordable materials for a Global Community.

The filtration system design will eliminate sediments from water. The water will mimic some of the conditions that are found in countries with vulnerable populations.

Portable Water Filtration Design Project: First Steps

Identify Community

1. Identify a community within a country in Africa or elsewhere that doesn't have access to clean water

Develop Proposal

- Describe the water access challenges facing the community.
- Describe Geography and Geology
- Describe the watershed of the community (where does the community obtain water from – lake, river, ground water, etc.)
- What access if any do they have to water
- Rainfall statistics
- Sanitation Conditions
- Food Security
- Diet
- Local Economy

Engaging in Sustainable Design

Design Engineers us the steps illustrated in the image to guide their design process.

In your design groups you should keep these eight steps accessible.

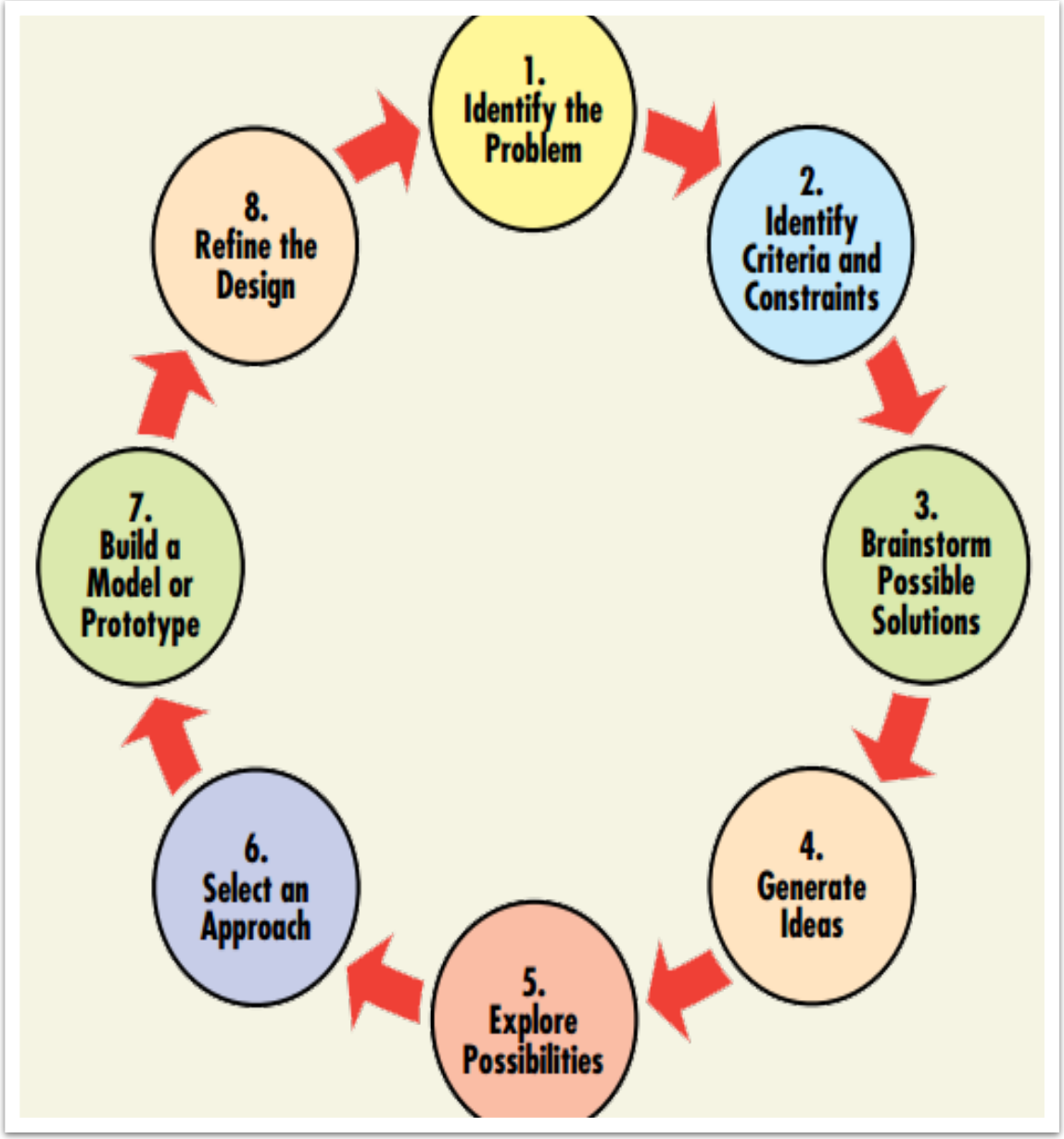
Document all of your ideas.

Keep track of you design decisions and changes.

Keep track of materials and test results.

Save water samples as they improve.

Make schematic sketches of your prototypes.



Brainstorm

- What types of materials do you think can be used to filter water that are easily accessible?

Task: Discuss in your design groups.

- Make a list of the suggested materials
- Describe the properties that make those materials subtle for the task.

Water Filtration Materials

- 1 lt. Clear Soda (Several per group)
- Coffee Filters
- Nylon Stockings
- Screen Mesh
- Sock
- Acrylic Pillow Filler
- Cotton
- T-Shirt or Fabric
- Gravel
- Clear plastic cups for dispensing ”muddy water”
- Small water bottles with caps to store water samples.
- Big bucket of muddy water for testing

Characteristics that may make a material suitable for filtration

- Filtration Capacity
- Texture (Coarse, Smooth, Fine)
- Porosity
- Absorption
- Particle Flow
- Size of weaving in material (visible, barely visible, not visible)

Describe the Properties that these materials have that might be useful for filtration.

- Please make a chart to list your observations and descriptions of the materials.

Building Prototype

- Before beginning cut bottles.
- Use gloves, although are plastic they can be sharp when cut. Cover edges with masking tape.
- You can same cap and melt or drill holes through them as well. (Always use protective gear)
- Ask you teacher or adult for help.

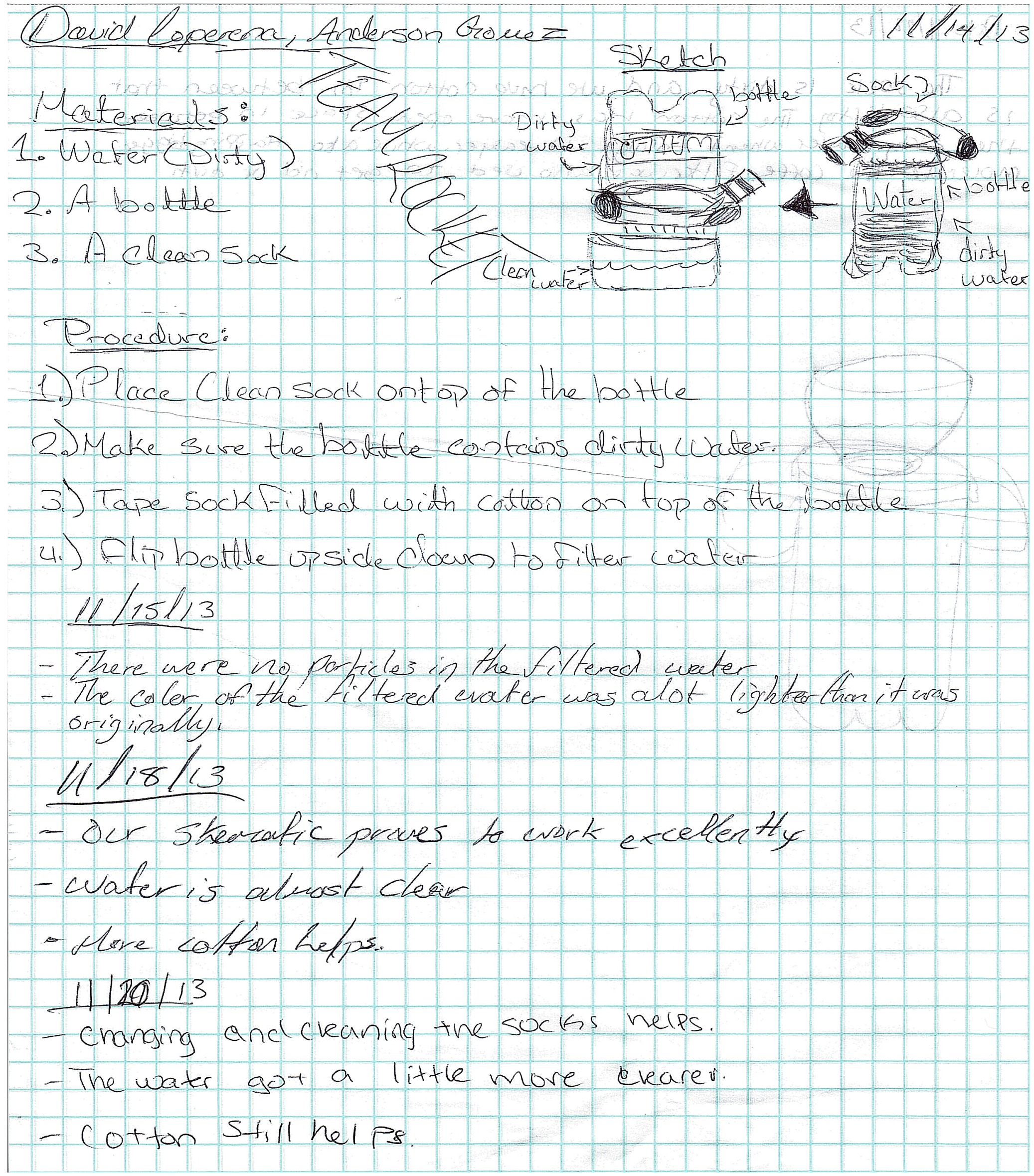
Document all Your Changes

Keep Track of all of the different reiterations of the design.

Make sketches and label to keep track of design and prototypes.

Write down procedures.

Date comments, observations and changes to your prototype.



David Loperena, Anderson Gomez — 11/14/13

TEAM ROCKET

Materials:
1. Water (Dirty)
2. A bottle
3. A clean Sock

Procedure:
1.) Place Clean Sock ontop of the bottle
2.) Make sure the bottle contains dirty water.
3.) Tape sock filled with cotton on top of the bottle
4.) Flip bottle upside down to filter water

11/15/13
- There were no particles in the filtered water
- The color of the filtered water was alot lighter than it was originally.

11/18/13
- Our schematic proves to work excellently
- water is almost clear
- More cotton helps.

11/20/13
- changing and cleaning the socks helps.
- The water got a little more clearer.
- Cotton still helps.

Build a Working Prototype