

# **IMPACTS OF CLIMATE CHANGE ON WATERSHED MANAGEMENT IN NIGERIA**

**BY**

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# Presentation Overview

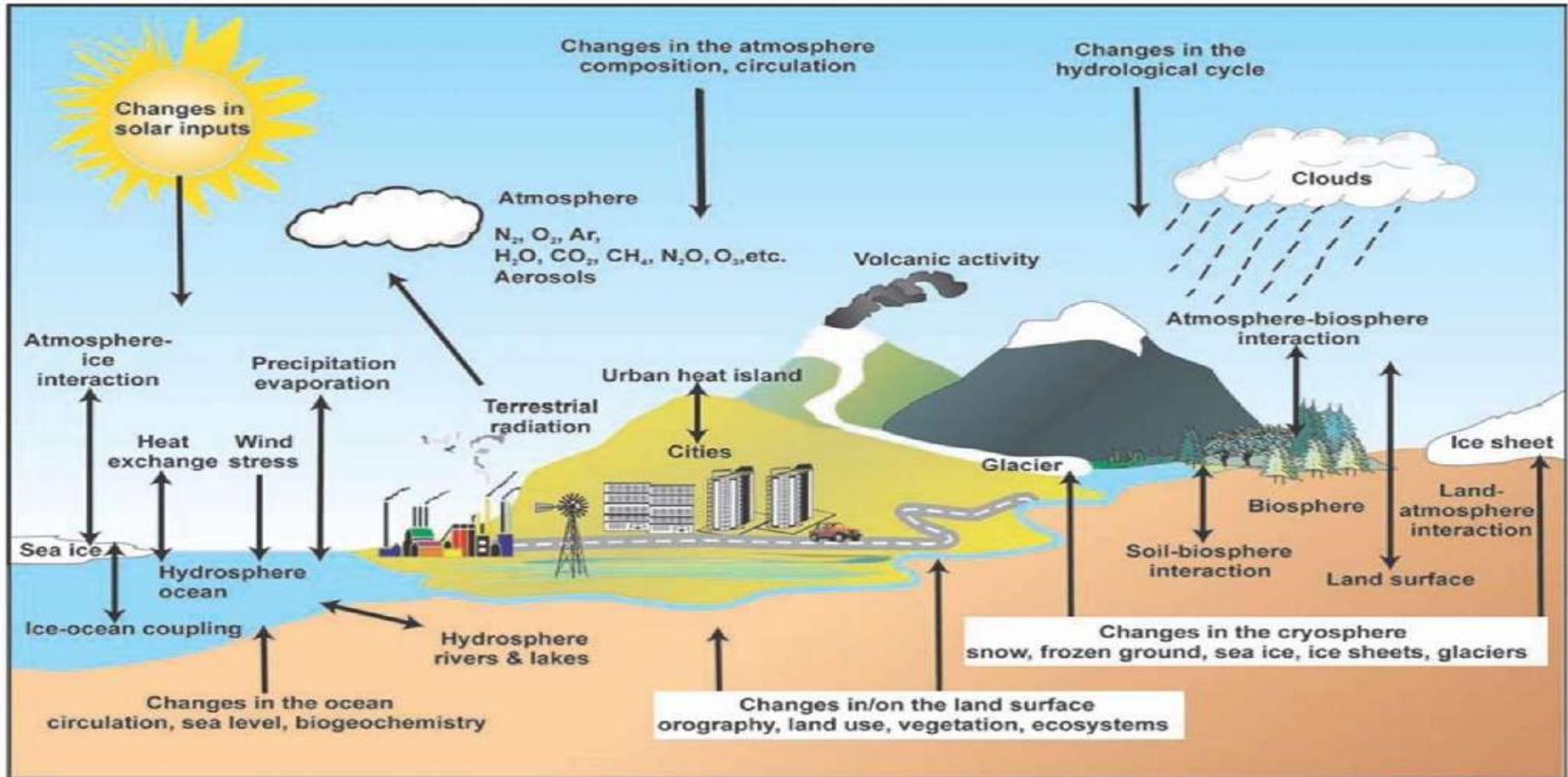
- ❖ Introduction - The State of the Climate.
- ❖ The climate system and global climate change.
- ❖ Hydrologic cycle linkage.
- ❖ What is it about the Watershed?
- ❖ Major Watersheds in Nigeria.
- ❖ Climate Change and Watershed.
- ❖ Impacts of Climate Change on Watershed Hydrology.
- ❖ Watershed Management.
- ❖ Why is watershed management important?
- ❖ Impacts of Climate Change on Watershed Hydrology – The Nigerian Situation.
- ❖ Policy Options - Goals of Watershed Development Planning and Management.
- ❖ Conclusions

# Introduction

## **The State of the Climate.**

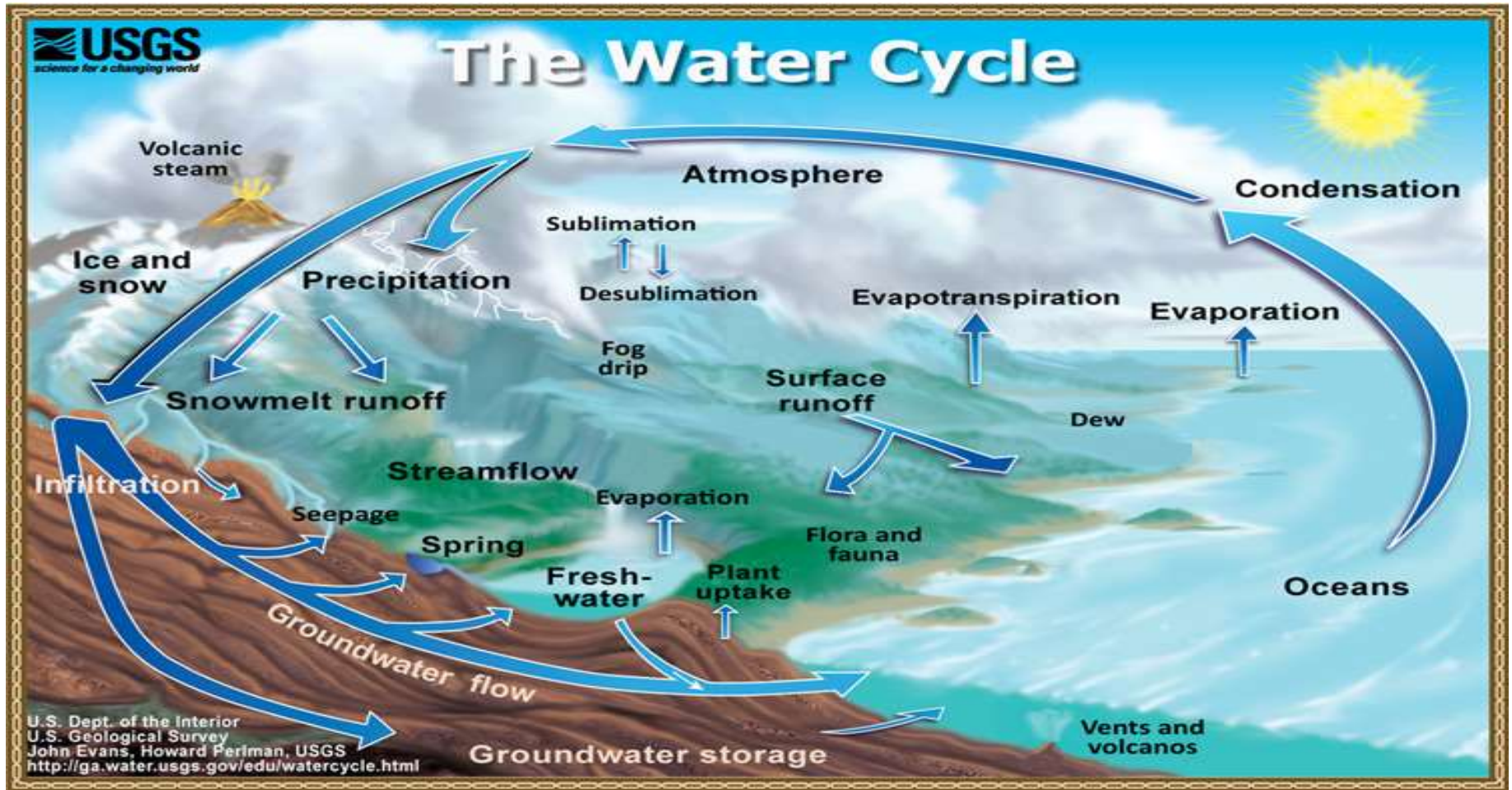
- The concentration of GHGs has been rising steadily since the time of the Industrial Revolution as a result of human activity, primarily the burning of fossil fuels and changes in land use, leading to increasing global temperatures.
- The concentration of greenhouse gas (GHG) emissions in the atmosphere is wreaking havoc across the world and threatening lives, economies, health and food.
- The world's wealthiest 1 per cent emits more than twice the emissions of the poorest half combined.
- China is one of the top GHG emitters - 27.79%
- United States of America - 12.74%
- Russian Fed. 4.68%
- Japan 2.57%
- Brazil 2.55% of global emissions (IPCC 2008).

# The climate system and global climate change



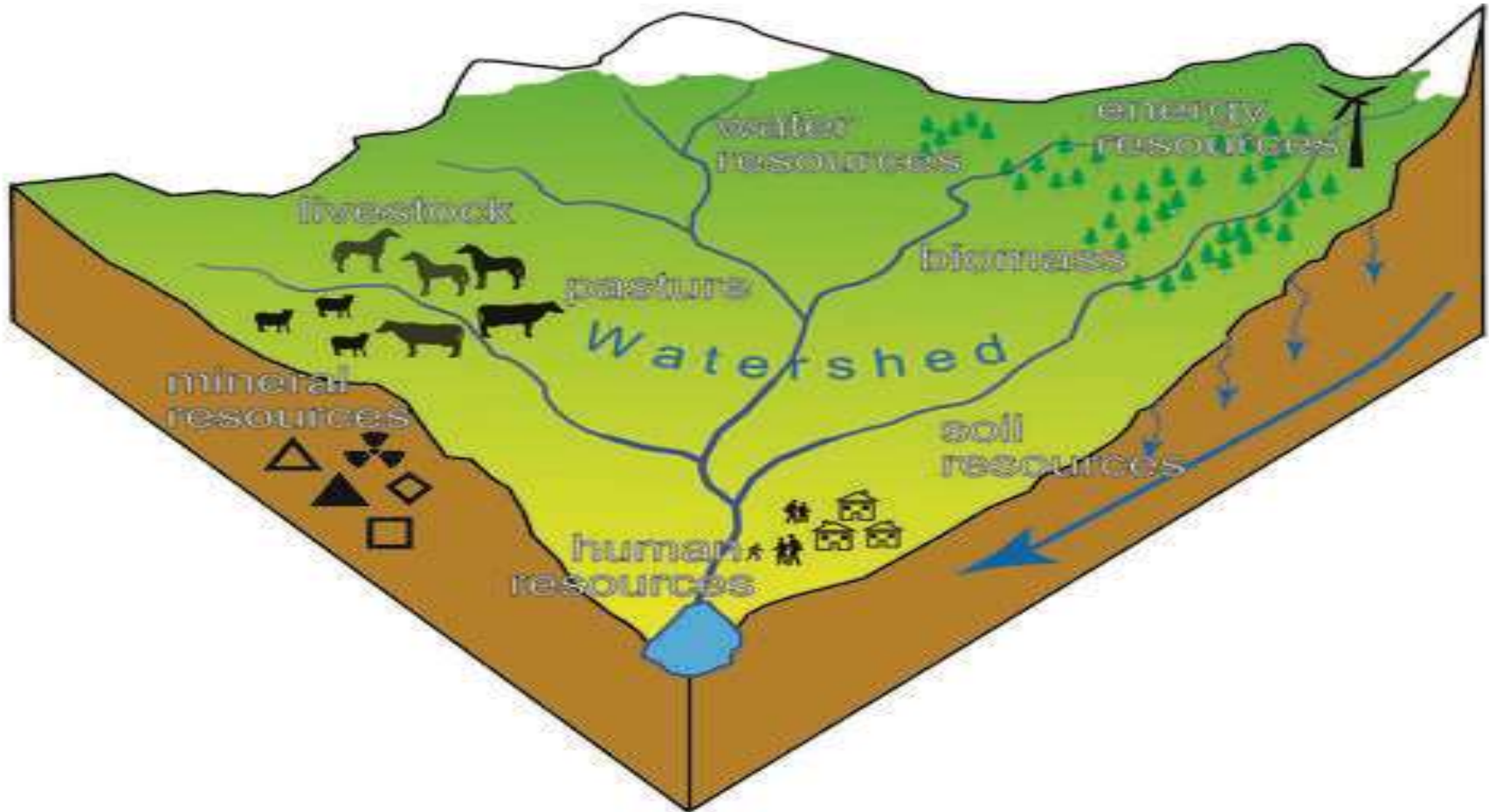
- The elements of the global climate system include the atmosphere, biosphere, hydrosphere, cryosphere, and lithosphere
- Greenhouse gases are responsible for an approximately 30 °C elevation of global average surface temperature.
- Since the Industrial Revolution, increasing greenhouse gas concentrations due to fossil fuel combustion, cement-making, land use changes has increased the mean surface temperature of the Earth by approximately an additional 1 °C.

# Hydrologic cycle linkage



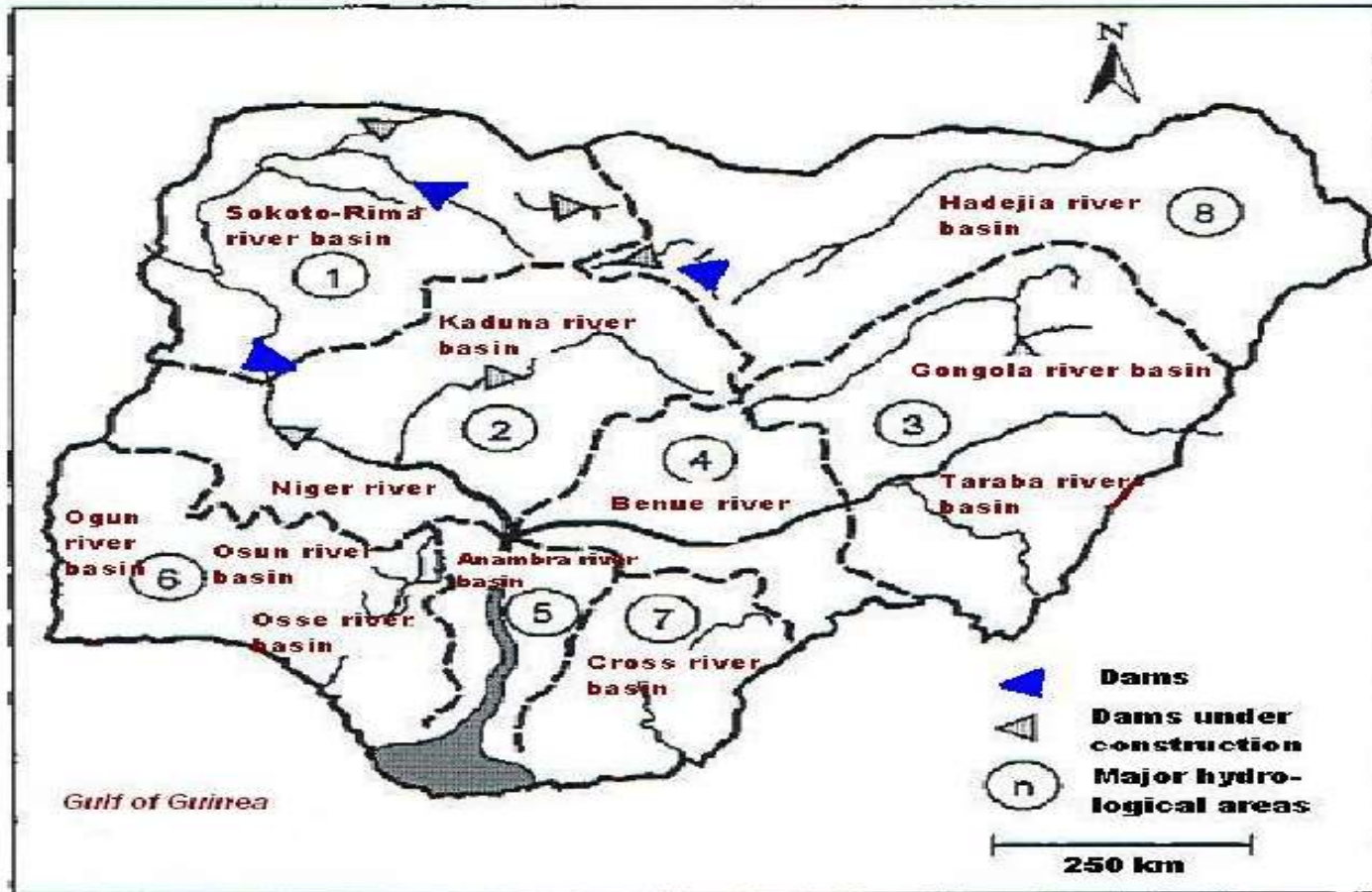
- The hydrologic cycle, also known as the water cycle is a way of describing the material flow of water throughout the Earth.
- This series of steps describes how water moves across the Earth and changes form.
- These specific steps result in the circulation of water between oceans, the atmosphere, and the land.

# What is it about Watershed?



- The watershed is the area of land that drains or sheds water into a specific receiving water body, such as a lake or a river.
- Every body of water (e.g., rivers, lakes, ponds, streams, and estuaries) has a watershed.

# Major Watersheds in Nigeria



Three major watersheds have been identified in Nigeria from which major rivers and streams and their tributaries took their sources.

1. The North Central Highlands watershed of which the Jos Plateau is the major component.
2. The Western Uplands of which the Idanre hills is a major component.
3. The Eastern Scarplands of the Udi Plateau is the major component.

# Climate Change and Watershed

- Changes in the climate regime can influence natural processes of a watershed ecosystem IPCC 2001a and have long-term implications on economic and ecological processes.
- A general consensus is that the average global surface temperature has risen by 0.45–0.6°C (0.8–1.0°F) and the average sea level has risen approximately 15–20 cm (6–8 in.) during the last century (IPCC 2001).
- This trend of increasing surface temperatures could impact the hydrologic cycle and various processes of a watershed system.
- Specific potential impacts include changes in
  - Runoff,
  - nutrient enrichment,
  - sediment loading,
  - evapotranspiration rates in a watershed system (Band et al. 1996).



# **Impacts of Climate Change on Watershed Hydrology**

The potential effects of a climate change on watershed hydrologic processes and its expected are:

- **Increased Atmospheric Evaporative Demand (Increased Evapo-transpiration)**
- **Change in Vegetation Composition Affecting Evaporation and Interception**
- **Precipitation Change**
- **Altered Groundwater Storage and Recharge**
- **Change in Stream Flow and runoff Characteristics**

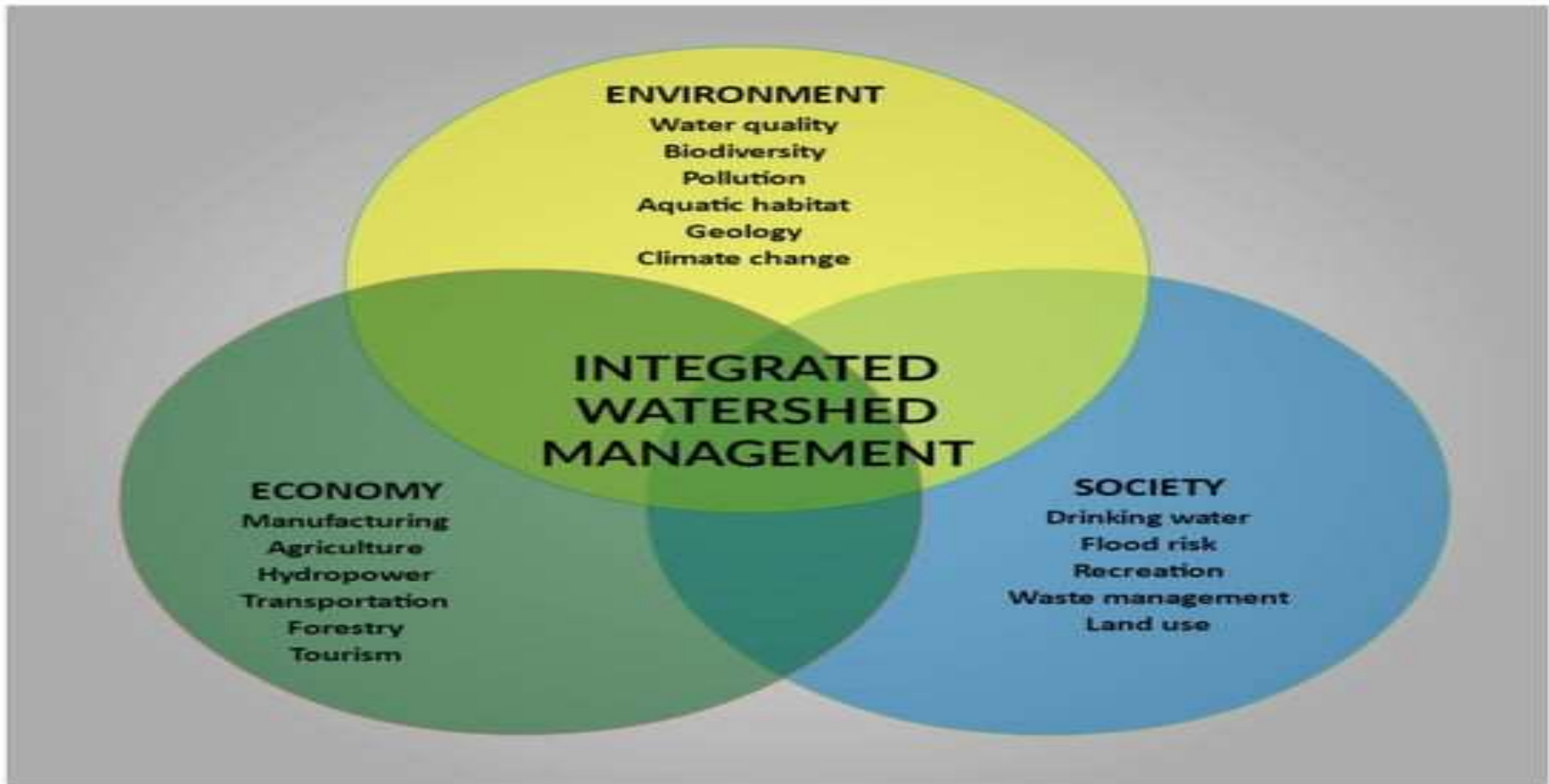
# Impacts of Climate Change on Watershed Hydrology – The Nigerian Situation

Nigeria is located between Lat.4° N and Lat. 14° N

- Between Latitudes 4° N and 7° N which coincides with the Tropical Rain Forest is characterized by high temperatures, very high evapotranspiration loss, and thick cloud cover resulting in heavy and torrential rains.
- Between Latitudes 10° N and 14° N coincides with the Savanna vegetation with moderate to deficient rainfall is characterized by high evaporative loss from the land that is already suffering moisture deficit.



# Watershed Management



## Major watershed management objectives:

- ensuring that beneficial uses of water resources and other related resources are maintained,
- avoiding negative off-site impacts (externalities) on water and related resources,
- It also helps to promote social and economic growth, to protect, reduce, or repair natural resources and the environment,
- reduce local susceptibility to climate extremes, and maintain a balanced biodiversity action

# Policy Options

## GOALS OF WATERSHED DEVELOPMENT PLANNING AND MANAGEMENT

- To avoid environmental degradation
- To promote sustainable development of the basin.
- To integrate land and water management
- To promote integrated, optimal development of natural resources, agriculture, infrastructure, social services etc.
- To promote rural development.
- To decentralize planning and management and make it adaptive.
- To integrate environmental dimensions with other aspects of planning and management

# Conclusions

Generally since water is vital for the existence of life and overall process of the planet and is vulnerable to climate change impacts developing and testing probabilistic regional models to understand and predict key impacts of changes in water dynamics under a range of climate scenarios is expedient.

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