

## Reiterating the Evolving Impacts of Climate Change and Global Warming in Nigeria

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Received: October 17, 2025; Manuscript No: JCCC-25-3121; Editor Assigned: October 21, 2025, 2025; PreQc No: JCCC-25-3121(PQ); Reviewed: October 23, 2025, 2025; Revised: November 18, 2025; Manuscript No: JCCC-25-3121(R); Published: January 7, 2026.

Citation: Joshua YD (2025) Reiterating the Evolving Impacts of Climate Change and Global Warming in Nigeria. *J. Clim. Change Pollut.* Vol.2 Iss.1, January (2026), pp:17-18.

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### ABSTRACT

Nigeria is increasingly encountering severe and unpredictable weather patterns, aligning it with global climate-sensitive nations like India, China, and the United States. This commentary revisits the implications of such physical changes, especially in the context of orographic and large-scale atmospheric interactions that exacerbate rainfall intensity ("cloud boost"). It further highlights cascading impacts on security, agriculture, land health, human displacement, and carbon fluxes. Finally, it advocates for urgent, integrated adaptation strategies that combine engineering, community resilience, policy coherence, and climate education.

**Keywords:** Climate change in Nigeria; Global warming impacts; Extreme weather events Nigeria; Cloud boost phenomenon; Orographic rainfall Nigeria; Sahel climate trends; Rainfall intensification Nigeria; Flooding and displacement Nigeria

### INTRODUCTION

In recent years, Nigeria has faced a noticeable escalation in extreme weather events unusually heavy rains, flash floods, and storms with increasing frequency. Air Vice Marshal Akugbe Iyamu has drawn parallels between Nigeria's emerging climate volatility and long-established patterns in India, China, and the United States. Of particular interest is the phenomenon he describes as "cloud boost", ostensibly triggered by the nation's mountainous topography interacting with equatorial trade-wind dynamics, intensifying rainfall rates to as much as 5–7 cm/hour. This commentary seeks to clarify how such climatological phenomena may operate in Nigeria, and to emphasize the urgent socioeconomic and environmental risks that climate change intensifies across the Sahelian and monsoon-influenced regions.

#### Mechanisms & Context: Cloud Dynamics and Rainfall Intensification

#### Orographic & Convective Interactions

Highland regions and mountain chains influence local convection by forcing moist air upward, leading to orographic lifting. Combined with strong equatorial wind convergence, this can intensify vertical moisture transport and precipitation. In tropical regions, convective systems become more vigorous under warmer conditions, fueled by increased atmospheric moisture content ( $\approx 7\%$  moisture capacity per  $^{\circ}\text{C}$  warming) [1].

#### Aerosol Cloud Interactions and Invigoration

Recent atmospheric modeling suggests that elevated aerosol concentrations can amplify convective storms. Increased aerosols lead to higher humidity retention, which enhances vertical ascent and convective vigor [2]. This may help explain why regions exposed to anthropogenic emissions or dust see more extreme storms.

#### Sahelian Rainfall Trends

Over the Sahel, storm systems are evolving: fewer frequent storms but with higher intensity when they occur [3]. This reinforces that Nigeria, particularly in its northern and transitional zones, must anticipate stronger, more unpredictable rainfall bursts.

#### Implications

##### Security & Human Displacement

Flooding and encroaching deserts displace communities, compounding scarcity of fertile land or water and intensifying competition. These pressures may inflame conflicts, insurgency, or banditry (e.g. over grazing areas).

##### Agriculture & Food Security

Erratic rainfall and land degradation reduce yields and crop resilience. Nigeria's ability to feed its population becomes more tenuous, forcing reliance on imports, price instability, or food insecurity.

##### Poverty & Livelihood Loss

Farmers, pastoralists, and fisherfolk face systemic threats. The erosion of traditional livelihoods pushes vulnerable populations into deeper poverty, aggravating inequality.

#### Land Degradation & Ecosystem Decline

Soil erosion, loss of cover, desertification, and wash-off of topsoil significantly degrade land health and productivity creating negative feedback loops in ecosystem resilience [4].

#### Pollution & Public Health

During floods, drainage overflow mobilizes waste, pollutants, and disease vectors (cholera, leptospirosis). Contaminated waters pose serious health threats.

#### Reinforcing Climate Change

Degraded ecosystems become net emitters of carbon (e.g. from decaying biomass). Instead of sequestering CO<sub>2</sub>, they contribute to atmospheric greenhouse gas accumulation.

### Strategic Responses & Adaptation Pathways

#### Infrastructure for Resilience

**Flood and Water Storage Systems:** Dams, retention basins, and controlled floodways must be integrated along rivers like Benue, Kaduna, and others to modulate peak flows. **State-sponsored Shelters & Relocation Plans:** Strategically sited shelters for climate-displaced populations in flood or desert-prone zones [5].

#### Expert Engagement & Policy Integration

Engage climatologists, environmental engineers, and social planners in all levels of planning. Forge climate-smart policies that align energy, land use, water, and disaster management sectors.

#### Education, Awareness & Community Participation

National and grassroots campaigns to build climate literacy, adaptive practices (e.g. agroforestry), and early warning systems. Empower local communities in decision-making; foster ownership of adaptation projects.

#### Sustainable Land Use & Restoration

Promote climate-smart agriculture: agroforestry, conservation tillage, drought-tolerant crops. Scale up afforestation, reforestation, and soil rehabilitation efforts.

#### Regulation & Enforcement

Strengthen regulations on deforestation, sand mining, uncontrolled urban expansion, and land abuse. Implement strict environmental impact assessments (EIAs) and enforcement on developmental projects.

### Advocacy & Urgent Call to Action

Nigeria is teetering on a climate precipice. Floods are deadlier, storms more extreme, and the land less forgiving. Unless leadership, policy, and community action align now, the consequences rising insecurity, hunger, mass displacement will intensify [6]. This is a clarion call to federal, state, and local governments; the private sector; civil society; and citizens: act now. The time for climate action is not tomorrow it is today. Protecting our environment is no longer optional; it is essential for national survival and the legacy of generations unborn.

### CONCLUSION

Nigeria is experiencing increasingly intense and unpredictable climate events driven by orographic convective interactions, aerosol influences, and evolving Sahelian rainfall patterns. These changes are magnifying national challenges, including flooding, displacement, food insecurity, land degradation, and public-health risks. The evidence underscores the urgent need for integrated adaptation strategies that combine resilient infrastructure, climate-smart land use, expert-guided policy, and community participation. Immediate action is essential to protect livelihoods, strengthen national security, and build long-term climate resilience for future generations.

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