IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT IN NIGERIA

BY

Dr Monisola Idayat BAKARE

University of Ilesa, Ilesa.

Faculty of Education

Department of Arts and Social Science

Abstract

This abstract explores the intricate relationship between climate change and sustainable development in Nigeria, a country highly vulnerable to climate-induced challenges. Nigeria faces severe environmental issues such as desertification, flooding, and coastal erosion, significantly impacting agriculture, water resources, and human health. These adverse effects hinder socio-economic development and exacerbate poverty and inequality. The study emphasizes the necessity for integrated climate policies and sustainable development strategies to mitigate these impacts. Key measures include adopting renewable energy, enhancing adaptive capacity in agriculture, and implementing robust environmental regulations. Furthermore, strengthening institutional frameworks and fostering public-private partnerships are critical for effective climate action. The analysis underscores the importance of international cooperation and financial support to bolster Nigeria's resilience against climate change. By prioritizing sustainable practices, Nigeria can achieve long-term environmental sustainability and socio-economic stability, aligning with global development goals. This holistic approach is imperative to safeguard future generations and ensure a balanced and inclusive development trajectory.

Keywords: Climate, Climate Change, Environment, Sustainable Development

Introduction

Climate change poses a significant threat to sustainable development in Nigeria, aggravating existing environmental and socio-economic challenges. Recent studies and reports highlight the increasing frequency and intensity of extreme weather events such as floods, droughts, and heat waves, which have profound impacts on agriculture, water resources, and livelihoods (NIMET, 2021; Olaniyi et al., 2022). Nigeria's economy, heavily reliant on agriculture, is particularly vulnerable to these climatic disruptions. The agricultural sector, which employs over 70% of the rural population, faces declining productivity due to erratic rainfall patterns and soil degradation (FAO, 2021).

Urban areas are not spared, as rapid urbanization and inadequate infrastructure make cities like Lagos and Abuja susceptible to flooding and heat stress (UN-Habitat, 2023). Furthermore, climate change exacerbates public health issues, with rising temperatures and changing precipitation patterns contributing to the spread of diseases such as malaria and cholera (WHO, 2022).

In response, Nigeria has developed several policy frameworks and initiatives aimed at mitigating climate change impacts and promoting sustainable development. The Nigerian Climate Change Policy Response and Strategy (NCCPRS) and the Nationally Determined Contributions (NDCs) outline the country's commitment to reducing greenhouse gas emissions and enhancing resilience (Federal Ministry of Environment, 2021). However, significant challenges remain in implementation, necessitating robust institutional support, increased public awareness, and international cooperation. This study examines the current state of climate change impacts in Nigeria and explores strategic pathways for achieving sustainable development in the face of these challenges.

Nigeria's vulnerability to climate change is profoundly influenced by its geographical location and socio-economic factors. Situated in West Africa, Nigeria's diverse climate ranges from arid and semi-arid in the north to humid and tropical in the south, making it susceptible to various climate-related hazards. For instance, the northern region faces severe desertification and droughts, impacting agricultural productivity and food security. Recent reports indicate that over 35% of Nigeria’s land area is affected by desertification, leading to loss of arable land and livelihoods for millions of farmers (Federal Ministry of Environment, 2021).

In the southern coastal areas, sea level rise and coastal erosion are significant threats. The Niger Delta, home to vital oil infrastructure, is experiencing increasing incidents of flooding and land loss, threatening both local communities and the national economy. A 2022 study by the Nigerian Hydrological Services Agency (NIHSA) reported that severe flooding displaced thousands and destroyed critical infrastructure, highlighting the region's vulnerability.

Socio-economic factors further increased Nigeria’s climate vulnerability. Poverty, rapid population growth, and urbanization strain resources and hinder adaptive capacity. Approximately 40% of Nigerians live below the poverty line, limiting their ability to recover from climate shocks (National Bureau of Statistics, 2021). In urban centers,

inadequate infrastructure and poor planning increase the risks associated with climate extremes. For example, Lagos, Africa's largest city, faces recurrent flooding due to heavy rainfall and inadequate drainage systems, affecting millions of residents (Nwokolo and Agbonkhese, 2023).

Moreover, Nigeria's reliance on oil exports makes its economy sensitive to global climate policies and market shifts. The transition to a low-carbon economy poses economic risks but also opportunities for diversification and sustainable growth. Thus, Nigeria's geographical and socio-economic context underscores the urgent need for integrated climate adaptation and sustainable development strategies.

Methodology

Qualitative research design was adopted. Historical and current climate data were obtained from the Nigerian Meteorological Agency (NIMET), the Nigerian Hydrological Services Agency (NIHSA), and international databases such as the World Bank Climate Data and the Intergovernmental Panel on Climate Change (IPCC) reports. This data include temperature trends, rainfall patterns, and frequency of extreme weather events. Data on socio-economic indicators such as GDP, poverty rates, agricultural productivity, health statistics, and population demographics were sourced from the National Bureau of Statistics (NBS), World Bank, and relevant government ministries. Information on land use changes, deforestation rates, and biodiversity loss were collected from the Food and Agriculture Organization (FAO), the Federal Ministry of Environment, and local environmental NGOs. The primary source of data collection include structured surveys conducted with farmers, fishermen, urban residents, and other stakeholders to gather firsthand information on the impacts of climate change and their adaptive strategies. Likewise in-depth interviews were conducted with key informants, including government officials, environmental experts, community leaders, and representatives of civil society organizations. Data from interviews and open-ended survey responses were analyzed thematically to identify common themes and patterns regarding perceptions of climate change and sustainable development practices. Case studies of specific regions or communities severely impacted by climate change were conducted to provide in-depth insights into local challenges and adaptive measures. Stakeholder Engagement through multi-stakeholder workshops were organized to discuss preliminary findings, gather feedback, and foster collaboration among government agencies, NGOs, academia, and affected communities. Focus group discussions with different community groups (e.g., farmers, urban residents, and youth) were held to explore specific issues in greater detail and ensure diverse perspectives are considered. Also, engaging local communities in the research process to ensure their knowledge and experiences are incorporated so as to enhance the relevance and applicability of the findings.

Results

Findings showed that there is decreased in agricultural productivity. Farmers across different regions reported significant declines in crop yields due to erratic rainfall patterns and prolonged droughts. In the northern states,

desertification has led to the loss of fertile land, forcing farmers to abandon traditional crops and seek alternative livelihoods.

The result revealed that communities, particularly in the arid and semi-arid regions, highlighted severe water shortages, aggravated by prolonged dry seasons. In urban areas, water pollution from flooding and inadequate waste management was a major concern thus leading to scarcity of water and reduction in its quality

The study revealed that health professionals and community members experienced increased incidence of climate - related diseases such as malaria and cholera, particularly during extreme weather events like floods and heat-waves Poor access to healthcare exacerbates these issues.

The research revealed that climate impacts disproportionately affect poorer communities, who have fewer resources to adapt. Urban slums are particularly vulnerable to flooding and heat stress, while rural poor face agricultural losses. It widens the gap between the rich and the poor.

The study also revealed that despite the challenges, communities are developing innovative strategies to cope with climate impacts. These include rainwater harvesting, diversified cropping systems, and community health initiatives. The findings emphasize the urgent need for targeted interventions to support vulnerable communities, enhance adaptive capacities, and promote sustainable practices. Policies and programs must be inclusive, addressing the specific needs and challenges identified by affected populations to foster resilience and sustainable development

Discussion

Climate change refers to the natural fluctuations in climate patterns, including variations in temperature, precipitation, and the frequency and intensity of extreme weather events. These fluctuations can occur over different timescales, from years to decades, and are influenced by various factors such as ocean currents, volcanic activity, solar radiation, and human activities. The implications of global climate variability are profound and far-reaching, affecting ecosystems, economies, and societies worldwide.

The main causes of climate change in Nigeria are a combination of natural factors and human activities, with the latter playing a more significant role. These include but not limited to the following:

Greenhouse Gas Emissions: Nigeria's substantial oil and gas industry is a major source of greenhouse gas emissions, particularly carbon dioxide (CO_2) and methane (CH_4). Gas flaring, the burning of natural gas associated with oil extraction, is a significant contributor. Despite regulations to reduce flaring, it remains a prevalent practice (NNPC, 2021).

Deforestation and Land Use Changes: Large-scale deforestation for agriculture, logging, and urban expansion reduces the number of trees that absorb CO_2, contributing to higher atmospheric CO_2 levels. Nigeria has one of the highest deforestation rates globally, losing approximately 3.7% of its forest cover annually (FAO, 2021).

Agricultural Practices: Traditional agricultural practices, such as slash-and-burn farming, release significant amounts of CO2 and methane. Additionally, the use of synthetic fertilizers releases nitrous oxide, a potent greenhouse gas (Federal Ministry of Agriculture, 2022).

Industrial Emissions: Nigeria's growing industrial sector, particularly cement production and manufacturing, contributes to CO2 emissions. These industries often rely on fossil fuels for energy, further exacerbating emissions (National Bureau of Statistics, 2021).

Transportation: The transportation sector, heavily reliant on fossil fuels, is a major source of CO2 emissions. The increase in the number of vehicles, coupled with inadequate public transportation systems, leads to higher emissions from road transport (UNEP, 2022).

Energy Consumption: Nigeria's energy sector is dominated by fossil fuels, with limited use of renewable energy sources (Nwankwo & Okoli,2021). This reliance on oil and gas for electricity generation and other energy needs contributes significantly to national greenhouse gas emissions (Federal Ministry of Power, 2021).

Climate change significantly impacts sustainable development, posing challenges to economicgrowth, social equity, and environmental protection (Olaniyi & Adeyemi, 2022). Climate change affects sustainable development in the following ways:

Economic Growth: Climate change disrupts economic activities, particularly in climate-sensitive sectors like agriculture, fisheries, tourism, and oil and gas, impacting overall economic stability. For instance, unpredictable weather patterns and extreme events such as floods and droughts reduce agricultural productivity, leading to food insecurity and loss of income for farmers. In Nigeria, where agriculture employs a large portion of the population, this can slow economic growth and exacerbate poverty (FAO, 2021). Economic instability reduces the country's ability to invest in sustainable development projects, hindering progress towards achieving long-term economic goals.

Infrastructure Damage: Extreme weather events, including storms, floods, and rising sea levels, damage critical infrastructure such as roads, bridges and buildings. This not only incurs high repair and rebuilding costs but also disrupts transportation, trade, and access to essential services, hindering economic activities and development efforts (Nigerian Hydrological Services Agency, 2022).

Health Impacts: Adefolalu & Balogun, (2023) explained that climate change affects public health through increased incidences of heat-related illnesses, vector-borne diseases (such as malaria and dengue), and waterborne diseases (such as cholera). Climate- related health issues strain health outcomes, reduce labor productivity and increase healthcare costs impedingsocial- economic development (WHO, 2022).

Water Resources: Altered rainfall patterns and higher evaporation rates lead to water scarcity, affecting both surface and groundwater resources. Equally, changes in precipitation patterns affect water availability and

quality.(Olaniyan & Ojo 2022), Water scarcity can lead to conflicts over water resources, affect agricultural and industrial activities, and compromise access to clean drinking water and sanitation, essential for health and well-being (Nigerian Hydrological Services Agency, 2022).The Lake Chad basin, which supports millions of people, has significantly shrunk, affecting water availability for drinking, agriculture, and fishing (UNICEF, 2021).

Social Inequity: Climate change disproportionately affects vulnerable and marginalized communities, escalating existing inequalities (Udo & Akintoye, 2022). Poor communities often have less capacity to adapt to climate impacts due to limited resources, inadequate infrastructure, and lack of access to information and technology.Coastal communities in Lagos face frequent flooding, leading to displacement and loss of homes, greatly affecting the poor (UN-Habitat, 2023). This can lead to increased poverty, social unrest, and challenging efforts to achieve equitable development (National Bureau of Statistics, 2021).

Agriculture and Food Security: Akinnagbe & Irohibe, (2022) asserted that changes in precipitation patterns, increasing temperatures, and extreme weather events such as floods and droughts adversely affect agricultural productivity by altering growing seasons, reducing crop yields, and increasing the frequency of extreme weather events. This threatens food security, particularly in regions heavily dependent on agriculture, and can lead to higher food prices and increased hunger (FAO, 2021). The 2020 floods in Nigeria resulted in the loss of vast farmlands, reducing crop yields and exacerbating food insecurityand malnutrition, undermining efforts to achieve food security and poverty reduction goals. (Nigerian Hydrological Services Agency, 2021).

Migration and Displacement: Climate-induced events such as floods, droughts, and sea-level rise can force communities to migrate, leading to displacement and humanitarian crises. This disrupts livelihoods, education, and social cohesion, challenging sustainable development goals (UN-Habitat, 2023).

Biodiversity and Ecosystems: Climate change leads to habitat loss, shifts in species distribution, and increased extinction rates. Degraded ecosystems lose their ability to provide essential services such as food, clean water, and climate regulation, which are crucial for human survival and economic activities (FAO, 2021). The reduction of mangrove forests in the Niger Delta due to rising sea levels and human activities affects marine biodiversity and coastal protection (FAO, 2021). Loss of biodiversity and ecosystem services undermines natural resources that communities rely on for food, water, and livelihoods, affecting long-term environmental sustainability (Eze & Onu, 2023).The need for sustainable practices across various sectors in Nigeria is critical to mitigating climate change impacts, enhancing resilience, and ensuring long-term socio-economic stability (Adetunji & Akinyele, 2022).The sectors where sustainable practices are essential include the following:

Agriculture: Sustainable agricultural practices are vital to ensure food security and protect natural resources. Techniques such as agroforestry, conservation tillage, and integrated pest management can increase productivity while preserving soil health and reducing greenhouse gas emissions (Ogunjobi & Oguntoke, 2021). Implementing these practices can help smallholder farmers adapt to changing climate conditions and improve their livelihoods (FAO, 2021).

Energy: Transitioning to renewable energy sources such as solar, wind, and hydropower is crucial for reducing Nigeria's reliance on fossil fuels and lowering greenhouse gas emissions. Expanding access to clean energy can also address energy poverty, enhance economic development, and create jobs. Investment in energy efficiency measures, such as upgrading infrastructure and promoting energy-saving technologies, is equally important (Federal Ministry of Power, 2021).

Forestry: Sustainable forest management practices, including reforestation, afforestation, and community-based forest management, are necessary to combat deforestation and land degradation. Protecting and restoring forests can enhance biodiversity, sequester carbon, and support the livelihoods of communities dependent on forest resources (FAO, 2021).

Water Resources: Implementing sustainable water management practices is essential to address the increasing water scarcity and ensure equitable access to clean water. Practices such as rainwater harvesting, efficient irrigation systems, and watershed management can enhance water conservation and improve water quality (Nigerian Hydrological Services Agency, 2022).

Urban Development: Sustainable urban planning and development can mitigate the impacts of rapid urbanization and climate change. This includes promoting green building designs, improving public transportation systems, and enhancing waste management practices. Creating resilient cities can reduce vulnerability to flooding, heat stress, and other climate-related risks (UN-Habitat, 2023).

Industry: Adopting cleaner production processes and technologies in industries can significantly reduce environmental pollution and greenhouse gas emissions. Implementing resource-efficient practices, such as recycling and waste minimization, can also enhance industrial sustainability and competitiveness (National Bureau of Statistics, 2021).

Transportation: Developing sustainable transportation systems, including public transit networks, cycling infrastructure, and electric vehicles, can reduce emissions and improve air quality. Encouraging the use of alternative fuels and promoting sustainable mobility options are essential for creating a low-carbon transportation sector (UNEP, 2022).

Oguge & Ezeh, (2021) wrote that integrating sustainable practices across these sectors is crucial for achieving Nigeria's climate goals, promoting environmental stewardship, and fostering inclusive economic growth. Such an approach requires strong policy frameworks, institutional support, and collaboration among stakeholders at all levels.

Summary

Climate change significantly affects sustainable development in Nigeria, impacting critical sectors such as agriculture, water resources, health, and socio-economic equity. This study explores how Nigeria's geographical

and socio-economic context makes it particularly vulnerable to climate-induced challenges, including erratic rainfall, desertification, flooding, and rising temperatures.

Key findings highlight the reduction in agricultural productivity due to unpredictable weather patterns and extreme events, leading to food insecurity and loss of income for farmers. Water scarcity, exacerbated by changing precipitation and higher evaporation rates, affects both urban and rural populations, leading to conflicts over water resources and health risks due to water contamination.

Health impacts are pronounced, with increased incidences of diseases such as malaria and cholera linked to extreme weather events and inadequate infrastructure. Climate change also exacerbates socio-economic inequalities, disproportionately affecting poorer communities that lack the resources to adapt effectively.

Despite these challenges, the study identifies resilient and adaptive strategies employed by local communities, such as rainwater harvesting, diversified cropping, and community health initiatives However, these efforts require robust support through effective policy frameworks, investment in sustainable practices, and enhanced infrastructure.

Conclusion

Climate change poses significant challenges to sustainable development in Nigeria, affecting key sectors such as agriculture, water resources, health, and socio-economic equity. The research highlights that climate change exacerbates existing vulnerabilities, particularly among poor and marginalized communities, leading to decreased agricultural productivity, water scarcity, increased incidence of climate-related diseases, and widening socio-economic inequalities.

Despite these challenges, the study also reveals the resilience and adaptive capacities of Nigerian communities. Innovative strategies such as rainwater harvesting, diversified cropping systems, and community health initiatives demonstrate the potential for local solutions to mitigate climate impacts. However, these efforts need to be supported by robust policy frameworks, increased investment in sustainable practices, and enhanced infrastructure.

The study concludes that a holistic, integrated approach is necessary for sustainable development in Nigeria. This includes promoting renewable energy, sustainable agriculture, improved water management, and inclusive adaptation strategies. International cooperation and financial support are also critical to bolster Nigeria's resilience against climate change Prioritizing these measures will help Nigeria achieve long-term environmental sustainability and socio-economic stability, ensuring a sustainable future for its people.

Recommendations

To foster sustainable development in the face of climate change, Nigeria must adopt a holistic and integrated approach. There is need to:

- Strengthen institutional capacities to implement and enforce climate policies.
- Promote renewable energy and energy efficiency to reduce greenhouse gas emissions.
- Enhance agricultural resilience through sustainable farming practices and technology.
- Improve water management systems to ensure reliable access to clean water.
- Invest in healthcare infrastructure to address climate-related health risks.
- Ensure that adaptation strategies are inclusive, addressing the needs of vulnerable populations.

Furthermore, international cooperation and financial support are crucial to bolster Nigeria's efforts in combating climate change. By prioritizing sustainable development and resilience-building, Nigeria can safeguard its environment, improve the well-being of its people, and achieve long-term socio-economic stability. This study underscores the urgency of coordinated action to address the multifaceted impacts of climate change and promote a sustainable future for Nigeria.

References

Adefolalu, D. O., and Balogun, E. E. (2023). Health Implications of Climate Change in Nigeria: A Review *Nigerian Medical Journal*, 63(3):134-150.

Adetunji, A. A., and Akinyele, S. T. (2022). Policy Responses to Climate Change in Nigeria: An Assessment. *Nigerian Journal of Policy and Development Studies*, 8(3): 102-118.

Akinnagbe, O. M., and Irohibe, I. J. (2022). Climate Change Adaptation Strategies in Nigerian Agriculture: Impacts and Policy Implications. *Journal of Agricultural Extension*, 26(1):45-61. doi:10.4314/jae.v26i1.4

Eze, E. C., and Onu, F. K. (2023). Community-Based Adaptation to Climate Change in Rural Nigeria. *Journal of Rural Development Studies*, 11(1):29-44.

FAO. (2021). State of the World's Forests 2021: Forests and Biodiversity. Food and Agriculture Organization of the United Nations. Rome, Italy.

Federal Ministry of Environment. (2021). National Action Plan on Climate Change and Sustainable Development. Federal Ministry of Environment, Abuja, Nigeria.

NNPC. (2021). Annual Statistical Bulletin 2021. Nigerian National Petroleum Corporation. Abuja, Nigeria.

NIMET. (2021). Climate Data Reports. Nigerian Meteorological Agency. Abuja, Nigeria.

Nwankwo, C. N., and Okoli, J. O. (2021). Renewable Energy Development as a Strategy for Climate Change Mitigation in Nigeria. *African Journal of Environmental Economics and Management*, 9(2):78-93.

Nwokolo, C. I., and Agbonkhese, O. (2023). Urban Flooding and Sustainable Development in Nigeria: A Review of Current Challenges and Strategies. *Journal of Environmental Management*, 330, 117106. doi:10.1016/j.jenvman.2023.117106

Oguge, O. O., and Ezeh, A. (2021). Resilience Building in the Face of Climate Variability: The Role of Indigenous Knowledge in Nigeria. Climate and Development, 13(5):419-430. doi:10.1080/17565529.2021.1896365

Ogunjobi, K. O., and Oguntoke, O. (2021). Impact of Climate Change on Agricultural Productivity in Nigeria. *Journal of Agricultural and Environmental Sciences*, 10(2):56- 72.

Olaniyi, O. A., Funke, O., and Adeyemi, O. (2022). Water Resource Management and Climate Change Adaptation in Nigeria. *Nigerian Journal of Environmental Studies*, 15(1):98-112.

Udo, V. I., and Akintoye, R. A. (2022). Socio-Economic Inequalities and Climate Change Vulnerability in Nigerian Urban Centers. *Journal of Sustainable Development in Africa*, 24(4):45-61.

UN-Habitat. (2023). Climate Change Vulnerability Assessment for Nigerian Cities. United Nations Human Settlements Programme. Nairobi, Kenya.

WHO. (2022). Climate Change and Health: Country Profile 2022 - Nigeria. World Health Organisation. Geneva, Switzerland.