

EVALUATING CLIMATE ADAPTATION AND DESERTIFICATION CONTROL STRATEGIES IN NORTHWESTERN NIGERIA: A SYSTEMATIC REVIEW

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Abstract

Northwestern Nigeria, characterized by its dry and semi-arid ecosystems, is increasingly vulnerable to the adverse effects of climate change and desertification. These environmental challenges pose significant threats to livelihoods, food security, and sustainable development in the region. This systematic review examines the current strategies implemented to combat climate change and desertification, focusing on agricultural practices, afforestation efforts, renewable energy adoption, and governmental and community interventions.

The review draws on data from peer-reviewed articles, government reports, and international development agency publications to assess the effectiveness and limitations of existing mitigation and adaptation strategies. Key findings reveal that while afforestation programs and climate-smart agricultural initiatives show promise, their success is limited by inadequate funding, weak policy implementation, and low levels of public awareness. Furthermore, renewable energy projects—particularly solar power—have emerged as viable alternatives to support sustainable development, but require greater investment and institutional support.

Community-based responses have demonstrated localized success, particularly in areas where traditional knowledge is integrated with modern conservation techniques. However, these efforts often lack scalability due to fragmented coordination among stakeholders. Governmental policies, though well-intentioned, often fall short due to gaps in enforcement and insufficient cross-sectoral collaboration.

The review concludes that a multi-pronged and inclusive approach is essential for addressing the intertwined issues of climate change and desertification in Northwestern Nigeria. Key recommendations include increasing investment in climate-resilient agriculture, strengthening afforestation through community engagement, enhancing policy enforcement, and expanding renewable energy infrastructure. Cross-sectoral partnerships and increased public education are also critical for fostering sustainable environmental management in the region.

Keywords: Climate Change; Desertification; Northwestern Nigeria; Review and Agriculture

INTRODUCTION

Northwestern Nigeria's geological and socioeconomic features make it very vulnerable to desertification and climate change. About 35% of Nigeria's land area is affected by desertification, which exacerbates the region's poverty, food insecurity, and migration (UNCCD, 2022). By changing rainfall patterns, raising temperatures, and decreasing water supply, climate change exacerbates these issues (Ahmed *et al.*, 2021). A multifaceted strategy that incorporates community involvement, climate adaptation, and sustainable land management is needed to solve these problems. In order to successfully tackle climate change and desertification, this paper examines existing measures, analyses obstacles, and suggests methods.

METHODOLOGY

Using PRISMA criteria, a systematic literature review was carried out. Scopus, Google Scholar, and government publications from 2000 to 2024 were among the data sources. Keywords like "desertification," "climate change," "Northwestern Nigeria," and "adaptation measures" were utilised. Relevance screening was done on the articles, with an emphasis on interventions unique to Northwestern Nigeria. Measures taken, results, and obstacles were the main topics of data extraction. Findings were integrated using qualitative synthesis.

RESULTS AND DISCUSSION

1. Programs for Reforestation and Afforestation Restoring damaged land and establishing a green corridor across dry regions are the goals of Nigeria's Great Green Wall plan (Federal Ministry of Environment, 2023). Millions of trees have been planted thanks to this project, however there are still issues with low survival rates and little community engagement (Usman *et al.*, 2020).
2. Climate-Adaptive Farming Methods To counteract land degradation and boost production, agroforestry, drip irrigation, and crop rotation are being encouraged (Bello *et al.*, 2020). However, due to budgetary limitations and restricted access to technology, adoption rates continue to be low.
3. Adoption of Renewable Energy Agricultural output has increased and dependency on fossil fuels has decreased because to solar energy projects like solar-powered irrigation systems (Ado & Yusuf, 2021). However, insufficient infrastructure and significant upfront expenses frequently restrict these endeavours.
4. Institutional and Policy Frameworks A foundation for tackling desertification is provided by national policies such as the National Action Program to Combat Desertification (FGN, 2021). However, their efficacy is compromised by inadequate enforcement and bad execution.
5. Interventions Based in the Community Resilience has been successfully increased by community involvement in water harvesting and soil conservation initiatives (Aliyu *et al.*, 2023). But additional funding is required for capacity-building.

CONCLUSIONS

In Northwestern Nigeria, efforts to address desertification and climate change are making headway, but there are still big gaps. Climate-smart agriculture, renewable energy, and reforestation all have promise, but they need to be properly coordinated and resourced. For the region to flourish sustainably, these deficiencies must be filled.

RECOMMENDATIONS

1. **Scale Up Renewable Energy Projects:** To lessen reliance on non-sustainable energy sources, increase solar and wind energy projects.
2. **Improve Agricultural Extension Services:** Give farmers financial assistance and training to help them implement climate-smart practices.
3. **Enhance Policy Implementation:** Provide more funds for environmental regulations and impose sanctions for land degradation and deforestation.
4. **Raise Public Awareness:** To increase community involvement in conservation and afforestation initiatives, use educational programs. **Promote Research and Development:** Fund studies on regional approaches to climate adaptation and desertification mitigation.

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