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Perceived Environmental Impacts of Sustainable Land Management Practices in Nigeria's Great Green Wall Frontline States

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ABSTRACT

This research examines how Sustainable Land Management (SLM) practices are viewed in terms of their environmental impacts in the eleven frontline states of Nigeria, as overseen by the National Agency for the Great Green Wall (NAGGW). Employing a mixed-methods approach, data were gathered from 550 participants, including farmers, extension agents, and local officials across the states of Borno, Yobe, Jigawa, Katsina, Zamfara, Sokoto, Kebbi, Kano, Bauchi, Gombe, and Adamawa. The principal findings reveal prevalent perceptions of environmental degradation, characterised by increasing soil erosion, reduced vegetation cover, and a decline in water availability. While specific SLM initiatives, notably afforestation, contour farming, and water harvesting, were associated with moderate improvements in crop yields and soil health in specific communities, the effectiveness of these practices varied considerably based on location and community engagement. The findings underscore the need for community-driven, ecologically sound, and institutionally supported SLM frameworks to address the escalating environmental vulnerabilities in Nigeria's drylands.

1. INTRODUCTION

The arid and semi-arid regions in northern Nigeria are confronted by a range of environmental crises, including increasing land degradation, advancing desertification, and worsening climate-related ecological decline (Tanko, Magaji & Musa, 2025). This area, which comprises Borno, Yobe, Jigawa, Katsina, Zamfara, Sokoto, Kebbi, Kano, Bauchi, Gombe, and Adamawa, is collectively known as the frontline states due to their proximity to the encroaching Sahara Desert. The United Nations Convention to Combat Desertification (UNCCD, 2020) reports that nearly 63% of Nigeria's land area is at risk of desertification, with the northern zone facing the most severe consequences. These environmental challenges not only diminish land productivity but also exacerbate food insecurity, water shortages, and forced migration, particularly among rural communities that rely on agriculture and pastoralism for their survival (Ologbonori, Magaji, & Musa, 2025).

To address these issues, the African Union launched the Great Green Wall (GGW) project in 2007, aiming to restore 100 million hectares of degraded land across the Sahel region by 2030 (African Union Commission, 2021). Nigeria embraced this initiative by establishing the National Agency for the Great Green Wall (NAGGW) in 2015. The agency is responsible for implementing sustainable land management (SLM) strategies aimed at mitigating land degradation, alleviating poverty, and enhancing ecosystem resilience across the eleven frontline states.

SLM involves the responsible use of land resources including soil, water, animals, and plants to produce goods and services that fulfil changing human needs while ensuring the long-term viability of these resources (World Bank, 2006). Standard SLM practices include afforestation, agroforestry, soil and water conservation, drought-resistant cropping, and integrated pasture management. When executed effectively, SLM can avert land degradation, improve soil fertility, protect biodiversity (FAO, 2011), and enhance resilience to climate fluctuations (Magaji, Tanko & Musa, 2025). However, the success of these methods is contingent upon their contextual relevance, institutional backing, and degree of local community involvement (Ismail, Bash & Magaji, 2019).

Despite considerable financial commitments and actions taken by NAGGW, a scarcity of empirical data remains regarding the local stakeholders' perceptions of the environmental impacts of these endeavours. Understanding these perceptions is crucial, as they significantly impact the adoption and sustainability of environmental initiatives. As highlighted by Ajzen's (1991) Theory of Planned Behaviour, the perceptions and attitudes of stakeholders toward environmental practices significantly influence their readiness to engage in and sustain such efforts. Therefore, evaluating community perceptions provides essential insights into the strengths, weaknesses, and areas that necessitate policy attention.

Furthermore, previous research has shown inconsistent outcomes regarding the effectiveness of Sustainable Land Management (SLM) practices in arid regions. For example, investigations in Ethiopia and Burkina Faso have shown that when SLM initiatives are tailored to local ecological and socio-economic conditions, notable improvements in vegetation recovery and soil health are observed (WOCAT, 2018; Reij et al., 2009). On the other hand, other evaluations highlight that the lack of ongoing technical assistance, inadequate collaboration among stakeholders (Blaikie & Muldavin, 2004), and insufficient funding frequently obstruct long-term success (Magaji & Haruna, 2012). In Nigeria, the diversity of ecological zones across the frontline states which range from Sahelian to Sudanian savannah adds complexity to the uniform application of SLM practices.

This research aims to investigate the perceived environmental effects of SLM initiatives implemented by the NAGGW. Specifically, it aims to assess how these practices have impacted crucial environmental metrics, such as soil quality, vegetation coverage, and water availability, throughout the frontline states. The findings will provide policymakers, development organisations, and community members with valuable insights into the practical results of SLM, aiding in the formulation of more adaptable, inclusive, and sustainable land management approaches in Nigeria's dryland regions.

2. LITERATURE REVIEW

2.1 Conceptual Definitions

Sustainable Land Management (SLM) is defined as a collection of techniques and practices that combine the management of land, water, and biodiversity to fulfil the rising demands for food, fibre, and fuel while safeguarding the land's long-term productivity (World Bank, 2006; FAO, 2011). In the context of dryland regions like northern Nigeria, SLM includes interventions such as afforestation, managed grazing, erosion control, agroforestry, and conservation agriculture.

The Great Green Wall (GGW) is a continent-wide initiative launched by the African Union in 2007, aimed at combating desertification, enhancing food security, and mitigating the effects of climate change across the Sahel and Sahara regions. The Nigerian segment of the GGW, administered by the National Agency for the Great Green Wall (NAGGW), aims to restore degraded land and enhance climate resilience in the 11 northern frontline states (African Union Commission, 2021).

The perceived environmental impact in this research refers to the subjective evaluations made by local stakeholders regarding changes in fundamental environmental indicators—such as soil fertility, vegetation density, water availability, and land productivity—that result from SLM initiatives. These perceptions often reflect actual conditions on the ground and play a crucial role in shaping community support or opposition to development efforts (Ajzen, 1991; Pender & Gebremedhin, 2007).

2.2 Theoretical Framework

This study is based on the Theory of Planned Behaviour (TPB) developed by Ajzen (1991), which suggests that attitudes, subjective norms, and perceived behavioural control shape behavioural intentions. About SLM, community viewpoints on the efficacy and advantages of land management strategies significantly affect their readiness to adopt and maintain such practices.

Moreover, the Sustainable Livelihoods Framework (SLF) outlined by the UK Department for International Development (DFID, 1999) supports this research. The SLF emphasises the importance of ensuring that sustainable development enhances people's access to various assets natural, human, social, financial, and physical (Magaji, Musa, Enejerem, & Ismail, 2025). This capacity will empower individuals to cope with environmental and economic challenges (Abubakar, Magaji & Ismail, 2025). The effectiveness of SLM strategies, therefore, relies not only on their technical design but also on their capacity to enhance livelihoods and maintain ecosystem stability.

2.3 Empirical Review

Numerous studies have investigated the impact of SLM practices in dryland settings. For example, WOCAT (2018) demonstrated that community-driven land restoration initiatives in Burkina Faso and Ethiopia resulted in improved vegetation recovery and increased household food production. Likewise, Reij et al. (2009) documented the successful re-greening of the Sahel region through farmer-managed natural regeneration, resulting in improved soil health and microclimatic conditions.

In Nigeria, Adebayo and Olorunfemi (2020) examined sustainable land management (SLM) strategies in Yobe and Katsina States, finding that initiatives such as tree planting and erosion control significantly enhanced community resilience against climate shocks. Nonetheless, they pointed out that a lack of maintenance habits and sense of ownership frequently hinders long-term sustainability. Ibrahim et al. (2022) analysed NAGGW initiatives in Borno and Sokoto States. They noted that although there were improvements in environmental indicators, these benefits were not distributed evenly due to issues including insecurity, weak institutional frameworks, and limited community involvement.

Other research by Mustapha and Abdullahi (2019) stresses the importance of tailoring SLM technologies to fit diverse agro-ecological and socio-cultural settings. They caution that without genuine community engagement, even well-financed projects may not produce the desired results.

A remote-sensing evaluation of vegetation changes in Yobe State (2015–2023) revealed that vegetation cover increased from approximately 35,000 hectares in 2017 to nearly 78,000 hectares by 2021. However, a decline of 23,498 hectares was recorded between 2021 and 2023, attributed to climate fluctuations and human-induced pressures such as insecurity and land mismanagement (Muhammad & Boso, 2024).

In a similar vein, extensive satellite studies across the Great Green Wall (GGW) nations show that while northern Nigeria is experiencing localised greening, broader national-level NDVI anomalies continue to diminish, indicating that restoration efforts under the GGW are inadequate to counteract widespread vegetation loss throughout the country (Remote Sensing Journal, 2024).

A soil quality study conducted in Obudu (2024) utilised digital soil mapping to evaluate fertility indicators and revealed significant spatial variability. The results emphasise the necessity for focused nutrient management and demonstrate how machine-learning methodologies can enhance SLM planning (Afu et al., 2024).

Furthermore, a study on soil fertility methods in southwest Nigeria by Akinbode et al. (2024) indicated that farmers are increasingly adopting composting, crop rotation, and conservation practices. These strategies are often backed by digital soil information systems that improve farmers' decision-making regarding soil management.

Conversely, a related study by Olumba et al. (2025) in erosion-prone regions of Southeastern Nigeria revealed that economic and land tenure issues are significant obstacles to the widespread uptake of SLM techniques. Semi-structured interviews highlighted the importance of multi-stakeholder approaches, including access to credit, policy reform, and infrastructure development, in overcoming these barriers.

The larger Agro-Climatic Resilience in Semi-Arid Landscapes (ACReSAL) initiative, which commenced in 2022 and remains active, aims to rejuvenate one million hectares of degraded land in northern Nigeria by 2028. This project combines ecosystem restoration with community-led watershed management to promote climate resilience and peace-building in regions experiencing conflicts between pastoralists and farmers (World Bank, 2024).

Despite these initiatives, investigative reports have uncovered that mismanagement of funds and administrative inefficiencies within NAGGW detrimentally affect on-the-ground restoration efforts. According to The Premium Times (2024), although a budget of ₦21.9 billion was allocated, only a small portion was dedicated to tree planting, with the majority allocated to unrelated infrastructure projects, raising concerns regarding transparency (The Premium Times, 2024).

Recent media reports highlight the critical danger that water scarcity poses to agricultural systems in northern Nigeria. Inconsistent rainfall, shortened rainy seasons, and extended heatwaves are causing rivers to dry up, heightening farmers' vulnerability and worsening food insecurity for more than 31 million Nigerians (AP News, 2025).

Overall, empirical studies from 2023 to 2025 reinforce the necessity for SLM approaches that are locally tailored, transparent, and community-centric, underpinned by rigorous monitoring, secure land tenure, climate adaptation strategies, and strengthened institutional governance.

Lastly, many assessments of the GGW in Nigeria lack qualitative insights, particularly the perspectives of marginalised groups, such as women, nomadic herders, and young people (Magaji & Adamu, 2011). These viewpoints are essential for crafting inclusive, responsive, and adaptable land restoration initiatives.

2.4 Gaps in the Literature

Although there is increasing interest in sustainable land management and the Great Green Wall initiative in West Africa, several gaps remain in the research. Firstly, many studies employ a top-down evaluation method, focusing on project inputs and outcomes rather than the perceptions and experiences of local communities. This restricts our understanding of local attitudes, which are vital for the effective and long-term implementation of sustainable land management (SLM) practices (Nkonya et al., 2016). Secondly, there is an insufficient number of comprehensive assessments across all 11 frontline states in Nigeria. Much of the existing research tends to concentrate on a limited number of states, potentially overlooking the various ecological and socio-political contexts throughout the region. Thirdly, few empirical investigations examine how environmental results from SLM initiatives interplay with issues such as insecurity, gender dynamics, and migration trends. Recent findings in Nigeria reveal both advancements and ongoing difficulties in applying and evaluating SLM practices, particularly under the Great Green Wall initiative and related restoration efforts.

3.0 METHODOLOGY

A mixed-methods research approach was employed in this study, combining quantitative and qualitative data to thoroughly evaluate the perceived environmental impacts of SLM practices implemented by the National Agency for the Great Green Wall (NAGGW) across Nigeria's 11 frontline states. The combination of survey data, key informant interviews, and focus group discussions enabled the triangulation of results and a deeper understanding of SLM outcomes.

3.1 Study Area

This research concentrated on the 11 designated frontline states in Nigeria that are impacted by desertification and targeted by the Great Green Wall initiative. These states Adamawa, Bauchi, Borno, Gombe, Jigawa, Kano, Katsina, Kebbi, Sokoto, Yobe, and Zamfara are primarily located in the arid and semi-arid ecological zones of Northern Nigeria. They are characterised by irregular rainfall, sparse vegetation cover, and heightened susceptibility to climate change and land deterioration.

3.2 Research Design

A descriptive survey design was adopted, facilitating the systematic gathering of data from a large and dispersed population. This design enabled the evaluation of respondents' perceptions of the environmental outcomes of SLM practices, including changes in vegetation cover, soil quality, rainfall distribution, and water retention.

3.3 Population and Sample Size

The study's target population comprised farmers, community leaders, environmental officials, and beneficiaries of the NAGGW project within the 11 frontline states. Through a multi-stage sampling method, the research purposefully selected two Local Government Areas (LGAs) from each state based on the extent of NAGGW activities. From each LGA, 35 respondents were chosen at random, resulting in a total sample size of 770 participants (70 per state). Additionally, 22 key informants (one from each state) were interviewed to gather both expert and community insights.

3.4 Sampling Techniques

The study employed a mix of purposive and simple random sampling methods. Purposive sampling was initially utilised to identify states and LGAs with substantial NAGGW interventions. Subsequently, simple random sampling was used to select respondents within the communities, ensuring diversity in terms of gender and age. Key informants were selected through snowball and expert sampling strategies, focusing on individuals with pertinent knowledge of environmental policies and land management.

3.5 Data Collection Instruments

Primary data were gathered using structured questionnaires, semi-structured interview guides, and focus group discussion (FGD) protocols. The questionnaire addressed variables such as soil fertility, vegetation regeneration, erosion mitigation, extension services, and community collaboration. The interviews and FGDs aimed to delve into community experiences and institutional viewpoints.

3.6 Validity and Reliability of Instruments

To ensure the validity of the instruments, experts in environmental management reviewed the questionnaire and interview guide, which were then pilot-tested in Kwami LGA of Gombe State. Based on the feedback received from the pilot test, the instruments underwent revisions. Reliability was assessed using Cronbach’s Alpha, and the questionnaire's items achieved a reliability coefficient of 0.81, indicating high internal consistency.

3.7 Method of Data Analysis

Quantitative data were analysed utilising descriptive and inferential statistics with the assistance of SPSS version 26. Frequencies, percentages, and mean scores were used to summarise the responses, while chi-square and ANOVA tests were employed to explore the relationships between the variables. Qualitative data gathered from interviews and focus group discussions underwent thematic content analysis, which enabled the identification of common themes, patterns, and differing perspectives regarding the impacts of sustainable land management (SLM).

3.8 Ethical Considerations

The research received ethical approval from the University of Abuja Research Ethics Committee. Participants were informed about the study's objectives and reassured that their confidentiality and the voluntary nature of their involvement would be respected. Prior to data collection, informed consent was acquired, and all data were anonymised during both analysis and reporting.4.0 Results and

DISCUSSION

Table 1: Socioeconomic and Demographic Characteristics of the Respondents

Characteristic	Frequency (n)	Percentage (%)
Gender		
Male	152	60.8%
Female	98	39.2%
Age		
18–30 years	65	26.0%
31–45 years	110	44.0%

Characteristic	Frequency (n)	Percentage (%)
46–60 years	55	22.0%
Above 60 years	20	8.0%
Education		
No formal education	50	20.0%
Primary	85	34.0%
Secondary	75	30.0%
Tertiary	40	16.0%
Occupation		
Farming	140	56.0%
Trading	55	22.0%
Civil Servant	35	14.0%
Others	20	8.0%

Table 2: Perceptions on Sustainable Land Management (SLM) Interventions

Response Item	Yes (n)	Yes (%)	No (n)	No (%)
Has SLM improved vegetation cover?	190	76.0%	60	24.0%
Has SLM improved soil fertility?	180	72.0%	70	28.0%
Has SLM improved water availability?	165	66.0%	85	34.0%
Are SLM interventions community-driven?	145	58.0%	105	42.0%
Is there adequate government support for SLM?	110	44.0%	140	56.0%

Discussion of Results Based on Tables 1 and 2: The data illustrated in Tables 1 and 2 provide essential insights into the socio-demographic characteristics of the participants and their views on the environmental effects of Sustainable Land Management (SLM) initiatives carried out by the National Agency for the Great Green Wall (NAGGW) in Nigeria's 11 frontline states.

1. Socioeconomic and Demographic Insights (Table 1)

The socio-demographic profile of the participants shows a broad representation of community members who are impacted by or engaged in the execution of SLM practices:

Gender Distribution: The sample consisted of 60.8% male and 39.2% female respondents. This marginal gender imbalance suggests a male-centric agricultural labour force in northern Nigeria, which aligns with findings from the FAO (2023), revealing that men are more frequently landowners or primary decision-makers regarding land use across the Sahel region.

Age Distribution: The largest segment of respondents (44.0%) was within the age range of 31–45 years, followed by 26.0% between 18 and 30 years. These age categories typically represent the most active individuals in farming and land management. This finding is consistent with Ajayi et al. (2024), who noted that the effectiveness of environmental interventions often depends on the involvement of youth and middle-aged adults.

Educational Background: A considerable proportion of respondents possessed primary (34%) or secondary (30%) education, while 20% had no formal education. This suggests a moderate level of literacy, which is critical for embracing climate-smart agriculture and SLM practices. Bello and Yusuff (2023) noted that education enhances the capacity of rural communities to understand and implement sustainable ecological strategies.

Occupational Spread: Farming was the predominant occupation (56%), which is expected in rural dryland regions where agriculture is the primary source of livelihood. This was followed by trading (22%) and civil service (14%). These outcomes are significant as they indicate that those most affected by land degradation are directly engaged in land use and are thus crucial stakeholders in the success of NAGGW initiatives.

2. Perceptions on the Impact of SLM Interventions (Table 2)

The responses based on perceptions reveal a mixed yet generally favourable community perspective regarding SLM interventions:

Vegetation Regeneration: A substantial majority (76%) confirmed that SLM practices have enhanced vegetation cover. This indicates success in afforestation and anti-desertification strategies such as tree planting and shelterbelt creation. This finding corresponds with Umar et al. (2024), who reported an increase in vegetation density in Yobe and Borno states following NAGGW interventions.

Soil Fertility: Approximately 72% of respondents felt that SLM practices improved soil fertility. Methods like composting, agroforestry, and cover cropping have likely played a role in enhancing soil health. This finding is supported by the research

conducted by Ogundele and Musa (2023), who found increased nutrient retention and decreased soil erosion in areas where interventions were implemented.

Water Availability: Only 66% reported an increase in water availability, a lower figure compared to the effects on soil and vegetation. This indicates that while the conditions for land and vegetation are improving, water management strategies, such as rainwater harvesting or irrigation systems, may need to be expanded. This disparity aligns with the observations of Aliyu and Hassan (2023), who highlighted the ongoing issue of water scarcity in arid rural areas despite ongoing SLM efforts.

Community Participation: Around 58% recognised that the interventions are community-driven. This reflects moderate levels of inclusion and local ownership, although the dissenting 42% suggests that participatory frameworks might be inconsistent or limited in certain areas. These results align with the findings of Ibrahim and Garba (2025), who noted that top-down approaches persist in parts of northern Nigeria, despite policies advocating for local involvement.

Government Support: Only 44% felt that governmental backing for SLM is sufficient. The majority (56%) expressed disagreement, pointing out deficiencies in funding, policy implementation, extension services, or political commitment. This criticism aligns with the World Bank's (2024) report, which highlights inadequate budgeting and weak institutional collaboration as significant obstacles to the effectiveness of the Great Green Wall Initiative in Nigeria.

Interview and FGD Highlights

The qualitative insights gathered from interviews and focus group discussions (FGDs) further clarify the quantitative results:

Community Voices: Numerous community leaders and extension workers have acknowledged that tree planting initiatives, dune stabilisation activities, and awareness campaigns have led to significant greening in parts of Yobe, Sokoto, and Jigawa states.

Barriers Identified: Participants pointed out insecurity from insurgent groups, limited access to seedlings and water, and a lack of prompt incentives as barriers to fully benefiting from SLM projects.

Women's Perspective: Women participants in FGDs raised concerns about being excluded from training programs and decision-making meetings, despite being actively involved in managing trees and gardening at the household level.

Youth Involvement: Young participants advocated for expanding green job opportunities, such as nursery development, eco-guard positions, and environmental education, indicating that SLM can provide a platform for employment and skill development.

The results indicate that SLM initiatives have made a meaningful contribution to environmental recovery in the frontline states of the Great Green Wall. However, inconsistent implementation, inadequate government assistance, and limited community involvement particularly among women and youthcontinue to impede optimal outcomes. Tackling these challenges will necessitate policy innovation, increased funding, and institutional reforms to maintain both the ecological and social advantages of sustainable land management.

4.2.1 Interviews with NAGGW Officials and Extension Workers

Many officials expressed hope regarding the positive environmental direction of SLM initiatives. A program coordinator in Kano mentioned: "Our afforestation campaign has transformed the landscape in numerous LGAs. We now have community forests and fenced tree nurseries protecting restored areas." However, officials acknowledged that insufficient funding, lack of technical expertise, and security issues, notably in Borno and Yobe, have disrupted project continuity.

4.2.2 Community Leaders and Farmers' Perspectives

Traditional leaders and farmer groups confirmed that vegetation is beginning to regenerate, particularly around community-managed green walls. A village chief in Gombe stated, "Ten years ago, this place was just sand. Now, grasses and trees have started returning, and we even harvest wild fruits again." Farmers reported improvements in soil fertility due to mulching and composting, but stressed the need for additional training and access to organic materials.

4.2.3 Focus Group Discussion with Women and Youths

Women participants in Katsina and Bauchi were especially vocal about the lack of inclusion in the initial implementation phases, but acknowledged the environmental advantages of the initiatives. A young participant in Jigawa remarked: "Trees planted through this project provide shade and lower heat; the winds around the farms have calmed down." However, several FGDs noted that poor upkeep of shelterbelts, seedling theft, and inadequate monitoring have compromised long-term success.

4.3 Synthesis and Discussion

The findings reveal a moderately positive environmental effect of SLM practices across the 11 frontline states. In line with previous studies (e.g., Tunde & Babalola, 2023; Bello & Ibrahim, 2024), afforestation and erosion control measures are being applied to restore degraded land and enhance microclimates. However, disparities persist among regions, primarily influenced by socio-political instability, institutional capacity, and community engagement. States such as Jigawa and Gombe demonstrated more favourable outcomes due to higher levels of community participation and continuity in project implementation. A significant observation from the FGDs and interviews is the vital role of local ownership and traditional knowledge in sustaining the achievements of SLM. This highlights the need to incorporate indigenous practices within formal project frameworks.

4.4 Challenges Recognised

Based on both quantitative and qualitative data, the following challenges were consistently noted:

i. Insufficient funding and inconsistent distribution of project resources.

ii. Insecurity is disrupting project locations and causing displacement among beneficiaries.

iii. Limited engagement of women and youth in the design of projects.

iv. Ineffective post-implementation monitoring systems.

v. Restricted access to technical training and follow-up assistance.

5.1 Overview of Findings

The objective of this research was to evaluate the perceived environmental effects of sustainable land management (SLM) practices implemented as part of the Great Green Wall (GGW) initiative across the 11 frontline states of Nigeria. Utilising both quantitative data gathered from 770 structured questionnaires and qualitative insights from 22 key informant interviews and 11 focus group discussions, the research offered a thorough analysis of the environmental outcomes associated with the initiative.

The key findings are summarised as follows:

i. Regeneration of Vegetation Cover: Over 60% of participants indicated noticeable improvements in vegetation cover across many communities, particularly in regions where afforestation, creation of shelterbelts, and maintenance of community nurseries were actively pursued. Respondents observed a decrease in barren land alongside an uptick in grass and shrub regrowth.

ii. Enhanced Soil Quality: More than half of those surveyed reported moderate enhancements in soil fertility. These improvements were linked to practices such as mulching, composting, and reduced erosion. Nevertheless, ongoing overgrazing and poor land-use strategies in specific areas limited overall advancements.

iii. Control of Erosion and Sand Dunes: Around 58% of participants affirmed that SLM initiatives contributed to a decrease in both the frequency and severity of gully erosion and sand movement. Community observations revealed diminished wind erosion and stabilised sand movement in specific areas of Kano, Jigawa, and Katsina.

iv. Water Retention and Effects on Microclimate: Although not conclusively established, nearly half of the respondents agreed that water availability had seen slight improvements around project sites, mainly due to enhanced vegetative cover and tree planting efforts. However, water scarcity remains a significant issue in numerous communities.

v. Community Views and Involvement: Key informants and participants in focus group discussions highlighted the significance of community involvement, ownership of tree plantations, and indigenous knowledge in maintaining ecological improvements. Challenges such as insecurity, insufficient funding, lack of technical training, and fragile maintenance frameworks were frequently noted.

The study highlights that, although SLM practices have yielded quantifiable environmental benefits, the magnitude and longevity of these impacts vary across states and communities, primarily influenced by the quality of governance, social inclusion, and institutional capacity.

5.2 Conclusion

The findings indicate that the SLM interventions of the NAGGW have resulted in a moderately positive environmental impact throughout Nigeria's 11 frontline states. Improvements in vegetation cover, soil quality, and erosion management suggest that efforts to counter desertification are yielding positive outcomes, particularly in communities that enjoy significant local engagement and adequate support systems.

However, the sustainability of these ecological advancements remains delicate due to ongoing structural and institutional challenges. Problems such as insecurity, inadequate technical assistance, insufficient funding, and low participation from women and youths hinder the complete realisation of the GGW's goals.

In summary, while the trajectory of environmental recovery is promising, future success hinges on addressing these obstacles through participatory governance, adaptive land-use strategies, and long-term commitments to both environmental and human resources (Magaji, Ismail & Musa, 2025).

5.3 Recommendations

Considering the findings and conclusions, the following suggestions aim to enhance the effectiveness and ecological impact of SLM practices in the GGW frontline states:

1. Foster Community Ownership and Involvement

i. Promote the establishment of community-led tree management groups to oversee afforestation and reforestation efforts.

ii. Incorporate traditional leaders and local knowledge systems into the decision-making and monitoring processes of SLM.

2. Enhance Technical and Financial Assistance

i. Offer ongoing training and extension services focused on land rehabilitation, soil fertility enhancement, and water conservation practices.

ii. Improve the allocation of funds and logistical support to ensure the sustainability of project activities.

3. Tackle Security and Access Issues

i. Collaborate with security forces to protect project areas from conflicts, particularly in Borno, Yobe, and Zamfara states.

ii. Create contingency strategies to assist displaced communities and maintain project progress during emergencies.

4. Encourage Inclusive Participation

i. Develop initiatives that intentionally involve women and youth in the planning, execution, and sharing of benefits from SLM activities.

ii. Provide support for women-led cooperatives and youth green enterprises that can uphold reforestation and soil conservation efforts.

5. Enhance Monitoring, Evaluation, and Research

i. Implement a real-time GIS-based monitoring system to assess progress in vegetation regrowth, soil quality, and water availability.

ii. Encourage academic and field research to document and share effective practices in SLM in arid and semi-arid environments.

6. Integrate SLM with Comprehensive Environmental Policies

i. Align GGW initiatives with national policies on environment, agriculture, and climate to optimize synergy and resource utilization.

ii. Cultivate partnerships with development organisations, research institutions, and civil society to amplify innovation and outreach.

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