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REVIEW ARTICLE

Public Participation and Community-Based Approaches in Soil and Water Conservation for Horticulture production Projects; A review

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ABSTRACT

This study examined the sustainability of irrigated rice production among beneficiaries of the Anchor Borrowers Programme (ABP) in Patigi Local Government Area of Kwara State, Nigeria. Data were collected using a structured questionnaire administered to 300 respondents representing 10% of the total 3,000 beneficiaries reported by the Rice Farmers Association of Nigeria (RIFAN) in the 2021/2022 farming cycle. A purposive sampling technique was employed across the three districts of Patigi LGA. Descriptive statistics (simple percentages and frequency distributions) and inferential statistics (stepwise multiple regression analysis) were used to analyze the data. The findings revealed that all respondents were male, with 68.67% married and 94.33% under the age of 50. A significant proportion (60.33%) had household sizes ranging between 11 and 20 persons, while 16.67% had no formal education. Most respondents (79.0%) cultivated between 1 and 8 hectares of land, with only 46.33% owning the land the farmed. Furthermore, only 13% had less than 20years of farming experience. In terms of rice yield, prior to ABP, 83.33% of farmers produced 30 bags or fewer, while only 11.67% exceeded 30 bags. After the implementation of the programme, 60.33% of farmers reported yields above 30 bags, indicating a significant improvement in productivity. The regression analysis showed that 94.5% of the variation in irrigated rice production was explained by key variables such as labour input, land ownership, payment of medical bills, household size, increase in median income, farming experience, loan repayment capacity, age, and expenditure on children's education. The study concludes that the ABP has significantly improved rice production, income, and welfare of farmers in the study area, indicating its potential for sustainability. It recommends that continued participation in irrigated rice farming, supported by similar programmes could enhance food security and rural development. The success observed in Patigi can also serve as a replicable model for other rice-growing regions in Nigeria.

Introduction

Public participation has become a central pillar in soil and water conservation (SWC) projects for horticulture crop production, as evidence increasingly shows that projects designed without local input often fail to achieve sustainability. The inclusion of communities in planning, decision-making, and implementation ensures that conservation interventions are not only technically sound but also socially acceptable and aligned with local realities (Ajayi et al., 2021). Scholars argue that participatory processes generate legitimacy by allowing stakeholders to voice their concerns, thereby reducing resistance and enhancing compliance (Mutua et al.,, 2021). In Nigeria, for example, state-led afforestation programs often struggled due to low adoption rates, while community-driven initiatives such as the Fadama III Project achieved broader success by incorporating participatory rural appraisal (World Bank, 2021). Participation also strengthens accountability and reduces dependency, as communities are empowered to contribute resources, knowledge, and labor, making them co-owners rather than passive beneficiaries (Ogunleye and Ojo, 2023). However, in horticulture production activities, public participation is not a panacea; the quality of participation varies, ranging from tokenistic consultation to genuine decision-making power, which raises concerns about inclusivity, elite capture, and representation, particularly for marginalized groups such as women and youth (Pretty, 2020a; Gwali *et al*., 2022).

Community-based approaches (CBAs) in horticulture farming activities extend participation by institutionalizing local responsibility and embedding conservation within community structures. Community-Based Horticulture Resource Management (CBHRM), for instance, has emerged as an effective strategy for balancing environmental sustainability with local livelihoods. Evidence from Sub-Saharan Africa shows that CBHRM projects contribute to reduce soil erosion, improved water harvesting, enhanced food security and increase horticultural crops yields when adequately supported by governments and NGOs (FAO, 2022). In Kenya, self-help groups have successfully rehabilitated degraded watersheds, while in Ethiopia, Farmer-Managed Natural Regeneration (FMNR) has been instrumental in restoring degraded landscapes for horticulture activities by empowering communities to manage natural regrowth (Reij and Winterbottom, 2020). In Nigeria, community forest management committees have played critical roles in combating desertification in semi-arid states, demonstrating that local ownership improves both adoption rates and sustainability (Akinsanmi, 2021). Yet, despite their promise, CBAs are constrained by financial limitations, lack of technical capacity, and weak institutional frameworks that undermine long-term outcomes (Adeleke, 2023). These limitations underscore the need for hybrid models that combine grassroots participation with state and international support, as community initiatives rarely thrive in isolation.

Importantly, public participation and CBAs also facilitate the integration of indigenous horticulture production knowledge with scientific expertise, creating hybrid conservation strategies that are more effective and resilient. Traditional horticulture practices such as terracing, contour plowing, and water harvesting have long been used by rural communities to adapt to environmental stressors, and their integration into modern SWC projects enhances cultural acceptance and

sustainability (Mwangi and Kariuki, 2022). In northern Nigeria, for instance, indigenous Zai pits and stone bunds have been revitalized and combined with horticulture and agroforestry techniques to restore degraded farmlands (Buba and Waziri, 2023). Such practices not only conserve soil and water but also contribute to biodiversity preservation and climate change adaptation, reinforcing the multidimensional benefits of participatory approaches in horticulture activities. By recognizing the value of indigenous knowledge, participatory horticulture projects avoid the pitfalls of imposing foreign solutions that may be ecologically inappropriate or socially resisted. However, the success of integrating indigenous horticulture production knowledge depends on capacity building, awareness campaigns, and institutional frameworks that validate community contributions and bridge the gap between traditional wisdom and scientific innovation for a greater horticulture crops yield (FAO, 2022; Ogunleye and Ojo, 2023).

Another critical dimension of public participation in SWC for horticulture production projects is community-led monitoring and evaluation, which strengthens project accountability, learning, and adaptability. Unlike top-down monitoring frameworks that often emphasize bureaucratic reporting, participatory horticulture production activities monitoring empowers communities to track progress, identify challenges, and suggest adaptive measures (Adeleke, 2023). This process enhances transparency, reduces corruption risks, and ensures that interventions remain relevant to evolving local needs in horticulture projects. For example, participatory water governance projects in Kenya and Tanzania have shown that when communities are engaged in monitoring, conflicts over water access decrease, and compliance with conservation norms increases (Gwali *et al*., 2022). In Nigeria, community monitoring committees established under watershed management programs helped to identify erosion hotspots and mobilize rapid responses before problems escalated (Ogunleye and Ojo, 2023). These findings indicate that participatory horticulture production activities monitoring not only improve project outcomes but also fosters social learning, whereby communities build capacity to manage resources sustainably beyond project cycles. Nonetheless, challenges such as low literacy, gender exclusion, and inadequate training may limit the effectiveness of participatory horticulture production activities monitoring, suggesting the need for continuous institutional support and capacity building.

While public participation and CBAs horticulture production activities offer promising pathways to sustainability, their effectiveness is shaped by broader governance and policy environments. Weak institutional frameworks, limited financial support, and political interference often undermine community horticulture production initiatives in many African contexts (Pretty, 2020b; Mutua *et al*., 2021). For instance, in Nigeria, while community forest committees have made strides in land rehabilitation, lack of legal recognition and inadequate funding have limited their impact (Akinsanmi, 2021). Similarly, donor-driven projects sometimes emphasize short-term results rather than building long-term community capacity, leading to the collapse of interventions once external funding ceases (Reij and Winterbottom, 2020). Addressing these gaps requires policies that institutionalize horticulture production stakeholders'

participation, provide consistent financial and technical support, and create inclusive governance mechanisms that empower marginalized voices. In this way, participatory and community-based approaches can move beyond rhetoric to become transformative strategies for sustainable soil and water conservation for upscaling horticulture production activities in the communities.

Previous perspective

Scholars increasingly agree that open horticulture production projects participation is not only a normative ideal but also a functional necessity for effective environmental governance. In soil and water conservation for horticulture activities projects, local participation is crucial for ensuring legitimacy, equity, and technical feasibility, as communities possess experiential knowledge on horticulture production techniques that often complements scientific expertise. Pretty (2020a) argues that participatory models of conservation deepen social ownership, improve compliance with agreed practices, and reduce conflicts between horticulture crop production project implementers and beneficiaries. Similarly, Mutua *et al*. (2021), in their study of Sub-Saharan Africa, found that horticulture production conservation initiatives designed with strong community involvement record higher adoption rates, greater efficiency in resource use, higher yield and longer-term sustainability compared to top-down interventions. This finding resonates with research on African drylands, where participatory governance has been shown to integrate traditional ecological knowledge with modern horticultural land management practices, making horticulture conservation projects more adaptive to local socio-environmental conditions (Kemeze *et al*., 2022). Nonetheless, scholars caution that participation varies significantly in quality, ranging from tokenistic consultation to genuine decision-making power, raising concerns about inclusivity, gender dynamics, and equitable representation within horticulture producer communities (Mulat *et al*., 2023).

Community-Based Horticulture Resource Management (CBHRM) has emerged as a dominant institutional framework for horticulture production activities participatory conservation in developing regions. According to Ogunleye and Ojo (2023), CBHRM projects in Nigeria have shown promise in reducing horticulture land degradation, improving water governance, and fostering collective responsibility among local farmers, particularly when adequately supported by governmental agencies and development partners. In addition, research in Northern Nigeria indicates that farmer-managed natural regeneration and community-led soil fertility restoration for horticulture production programs strengthen both social cohesion and ecological resilience, thereby validating CBHRM as a viable model for tackling land degradation (Akinola *et al*., 2021). However, critics argue that challenges such as elite capture of benefits, insufficient technical capacity, and limited financial resources undermine the equity and long-term sustainability of CBHRM projects (Nkemnyi *et al*., 2020). These critiques highlight the need for robust institutional safeguards to ensure fair participation and inclusive outcomes, particularly for marginalized horticulture producers groups such as women and landless farmers who are often excluded from decision-making processes..

The global policy environment has also shifted in favor of participatory conservation. International development organizations including the Food and Agriculture Organization (FAO), the United Nations Convention to Combat Desertification (UNCCD), and the World Bank emphasize community-driven models in soil and water management for horticulture production activities. FAO (2022), for example, advocates for integrating community-led watershed management practices into national environmental policies as a way of enhancing climate resilience. Similarly, the UNCCD (2021) stresses that local participation is indispensable for achieving Land Degradation Neutrality (LDN) targets, as top-down programs often fail without grassroots ownership. Case studies from Ethiopia and Ghana further demonstrate that participatory watershed management for horticulture activities leads to improved soil fertility, reduced erosion, and stronger adaptive capacities against climate variability (Mulat *et al*., 2023; Gyasi *et al*., 2021). These developments underscore the global recognition that sustainable soil and water conservation for horticulture production activities cannot be realized through technocratic interventions alone but must instead be embedded in inclusive governance frameworks where horticulture producer communities are empowered as equal stakeholders.

Conceptual Framework

This study adopts the Participatory Governance Theory, which provides a robust analytical lens for understanding the role of stakeholders in environmental management, particularly in soil and water conservation projects for horticultural production. Participatory governance emerged in response to the limitations of hierarchical, top-down governance systems that often marginalize local actors such as rural horticulturalist and undermine the sustainability of interventions (Ansell and Torfing, 2021). The theory emphasizes that decision-making processes in any horticulture project should be inclusive, deliberative, and collaborative, allowing diverse actors—governments, communities, civil society organizations, and international agencies—to co-produce knowledge and shape policies. In the context of environmental governance, this framework highlights that ecological systems are deeply intertwined with social and institutional arrangements, meaning that sustainable outcomes require not only scientific and technical expertise but also the integration of indigenous farming knowledge, cultural practices, and community priorities (Newig *et al*., 2020). By focusing on inclusivity and empowerment, participatory governance provides a means of overcoming the democratic deficits and implementation gaps that have historically plagued conservation initiatives for horticulture production project in many developing regions.

In soil and water conservation for horticulture production project, Participatory Governance Theory underscores the importance of shared accountability and joint problem-solving among stakeholders. Traditional governance models have tended to centralize authority in state institutions, resulting in low community ownership, poor compliance, poor horticulture products price and project failures (Ostrom, 2010; Kooiman, 2022). Conversely, participatory governance reframes environmental management as a cooperative process, where horticulturist farmers, local leaders, NGOs, and policy-makers collaboratively define goals,

allocate responsibilities, and monitor outcomes. Recent empirical studies support this argument, showing that conservation projects with strong participatory mechanisms—such as participatory mapping, community watershed committees, and farmer-led monitoring—tend to achieve higher adoption rates and greater sustainability (Mulat *et al*., 2023; Gyasi *et al*., 2021). The theory further stresses that inclusivity should not only be formal but also substantive, ensuring that marginalized groups such as women, youth, and landless horticulturist farmers are meaningfully represented in decision-making. In this sense, participatory governance is not merely about consultation but about shifting power relations and creating institutional spaces where diverse voices influence policy directions and resource allocation.

Furthermore, participatory governance offers an important framework for linking local action with broader institutional structures and global sustainability agendas. Soil and water conservation projects for horticulture production often exist at the intersection of local community needs and international commitments such as the United Nations Sustainable Development Goals (SDGs) and the United Nations Convention to Combat Desertification (UNCCD). Participatory governance facilitates this linkage by creating platforms for dialogue across governance scales, thereby aligning community-level initiatives with state and global objectives (FAO, 2022; UNCCD, 2021). For example, participatory watershed management in Sub-Saharan Africa has been shown to strengthen both ecological resilience and local governance capacity, contributing to land degradation neutrality targets while simultaneously addressing local horticulturist community livelihoods (Kemeze *et al*., 2022). This multi-scalar perspective is essential in understanding why horticulture production projects that ignore community voices often fail to achieve long-term impact, whereas those rooted in participatory governance tend to endure. Thus, by situating environmental governance within a broader network of actors such horticulturist farmers and institutions, Participatory Governance Theory provide a comprehensive framework for analyzing not only the effectiveness but also the legitimacy and equity of soil and water conservation for horticulture production projects.

The Great Green Wall Initiative in Northern Nigeria

The Great Green Wall (GGW) is a pan-African reforestation program aimed at combating desertification across the Sahel, including Northern Nigeria. The Nigerian government, through the National Agency for the Great Green Wall (NAGGW), has implemented afforestation and land restoration projects in states like Adamawa, Yobe, Borno, Sokoto, and Katsina. Despite achievements such as community tree planting, horticulture gardens establishment and job creation for rural youth, the initiative faces setbacks including poor funding, corruption, and weak monitoring mechanisms (NAGGW, 2023). These challenges limit its large-scale effectiveness particularly for horticulture activities, but localized successes show that coordinated action can restore degraded land for agriculture activities.

Nigeria Erosion and Watershed Management Project (NEWMAP)

The NEWMAP project, funded by the World Bank and implemented by the Federal Ministry

of Environment, targets gully erosion and watershed degradation in Nigeria, with interventions in Northern states such as Gombe and Kano. The project has helped reduce erosion through slope stabilization, terracing, and reforestation while also empowering communities with livelihood alternatives. However, little achievements was notice in the horticulture production cycles, also, sustainability remains a concern, as most of the interventions are donor-driven, with limited long-term community ownership (World Bank, 2021).

Climate-Smart Agriculture in Adamawa and Kano States

Even though, several NGOs, including LINKS Nigeria and International Institute of Tropical Agriculture (IITA), have promoted climate-smart agriculture (CSA) in Northern Nigeria. In Adamawa and Kano, farmers were introduced to practices such as agroforestry, mulching, solar irrigation, and crop diversification, which increased resilience to drought and reduced land degradation. Studies show that CSA adoption improves soil fertility and reduces the pressure on marginal lands (Terdoo and Adekola, 2014). Yet, poverty and lack of awareness limit wider adoption across rural farming communities.

Afforestation in Yobe and Borno States

Yobe and Borno, among the most desertification-prone states, have embarked on community-driven afforestation programs. For instance, Yobe State launched a program distributing tree seedlings to farmers and schools, creating awareness on environmental conservation. While these efforts have rehabilitated pockets of degraded land, insurgency-related insecurity in the Northeast has disrupted many horticulturists farming continuities, making it difficult to expand reforestation on a wider scale (UNDP, 2022). These case studies provide a mix of government-led, donor-supported, and community-driven approaches, each with successes and shortcomings.

Findings

i. Insufficient Funding and Corruption Weaken Environmental Policies

Evidence from the Great Green Wall initiative and the Nigeria Erosion and Watershed Management Project (NEWMAP) shows that limited budget allocations, mismanagement of funds, and corruption remain major impediments to large-scale environmental restoration (World Bank, 2021; NAGGW, 2023). Horticulture production projects are often donor-driven, with weak domestic sustainability plans.

ii. Weak Enforcement of Environmental Regulations

Despite Nigeria having robust environmental laws, weak institutional capacity and political interference hinder their implementation. Findings reveal that illegal logging, unsustainable farming, and overgrazing persist, worsening desertification and erosion in Northern Nigeria (Elum *and Lawal*. 2022).

iii. Low Community Participation Due to Poverty and Awareness Gaps

Studies indicate that while communities in states such as Adamawa, Yobe, and Kano express willingness to participate in afforestation and climate-smart agriculture, poverty limits their ability to invest in long-term practices. Furthermore, lack of awareness reduces adoption of innovative solutions such as

agroforestry and solar irrigation (Terdoo and Adekola, 2014; Sadda, et al., 2023).

iv. Climate Change Intensifies Land Degradation

Findings confirm that rising temperatures, irregular rainfall patterns, and prolonged droughts accelerate soil erosion and desertification across Northern Nigeria thereby drastically reducing land size for horticulture production projects. This directly affects horticultural productivity, food security, and rural livelihoods, making land degradation a socio-economic as well as environmental issue (Mai, 2024; Mai, et al .2024).

v. Mixed Outcomes from Case Studies

The Great Green Wall has restored some degraded areas but faces funding and governance issues. NEWMAP has reduced gully erosion but struggles with sustainability. Climate-smart agriculture projects show positive impacts but are yet to be scaled up due to poverty and insecurity. Local afforestation efforts in Yobe and Borno demonstrate grassroots commitment but remain fragile due to insecurity and climate shocks. Above all, land that could have been utilize for horticulture production projects is daily becoming scarce due to the menace of soil and water degradation.

Discussion

The findings suggest that combating water and soil erosion and desertification in Northern Nigeria could greatly contribute to horticulture production projects, even though, is not merely an environmental issue but one deeply tied to governance, socio-economic structures, and climate change adaptation. The persistence of weak institutions and corruption undermines environmental governance, making policies appear ineffective despite their robustness on paper. This aligns with global literature that highlights governance as the cornerstone of sustainable land management (Elum et al., 2022).

Moreover, the low participation of indigenous horticulturist farming communities, primarily driven by poverty, highlights the gap between policy formulation and grassroots realities. While international donor projects such as NEWMAP provide temporary relief, they cannot substitute for strong, locally-owned initiatives. For environmental restoration to be sustainable, horticulture farming communities must be empowered with both knowledge and economic incentives to adopt climate-smart agriculture and conservation practices.

The case studies further reinforce that piecemeal interventions, though successful at micro-levels, fail to deliver systemic transformation without political will, adequate funding, and effective monitoring. The Great Green Wall, for instance, demonstrates the potential of large-scale afforestation but also underscores the risks of poor financial accountability.

The accelerating impact of climate change makes it clear that combating desertification requires integrating environmental strategies into broader development planning. Without urgent adaptation strategies, Northern Nigeria risks worsening food insecurity, forced migration, malnutrition, new diseases outbreaks, sicknesses and conflicts over scarce resources.

Conclusion

This study has demonstrated that soil and water erosion and desertification in Northern Nigeria are not just ecological challenges but also governance and developmental issues

hampering the advancement of horticultural crop production project. The findings reveal that weak institutional enforcement, poor funding, corruption, and limited horticulturist farming communities participation continue to undermine the effectiveness of public administration both horticultural project and environmental management. Additionally, climate change has accelerated the pace of land degradation, reducing horticultural crop productivity and threatening food security. Case studies such as the Great Green Wall initiative, NEWMAP, and climate-smart agriculture interventions show that while progress has been made, the sustainability of these programs is constrained by poor accountability, donor dependence, insecurity, and socio-economic challenges.

The analysis confirms that combating water, soil and desertification for horticulture production project requires more than technical solutions; it demands strong political will, transparent governance, grassroots participation, and climate adaptation strategies. Effective public administration is central to ensuring that policies move from paper to practice and that land restoration initiatives achieve long-term impacts for sustainable horticulture production project. Unless urgent, coordinated, and well-funded measures are taken, Northern Nigeria risks worsening land degradation for horticulture production projects, displacement of rural horticulturist farming communities, scarcity of fruit and vegetables for healthy living and deepening poverty.

Recommendations

1. Strengthen horticultural production through enhance land reclamation, Environmental Governance, Enforce transparency and accountability mechanisms in anti-desertification programs. Strengthen institutions responsible for monitoring land use and implementing environmental regulations for increase soil and water conservation activities for horticultural production projects..
2. Increase Budgetary Allocation and Financial Accountability where land restoration activities are being launched. Provide adequate, sustained funding for reforestation, watershed management, and climate adaptation projects. Reduce dependence on international donors by prioritizing domestic funding sources.
3. Promote horticulturist community participation and Awareness. Empower rural horticulturist communities through training, provision of viable seeds and other inputs, create massive awareness campaigns, and economic incentives for adopting climate-smart horticulture production activities.. Involve community heads, indigenous rulers, farmers' associations, and civil society organizations in soil, and water conservation projects policy design and implementation for horticulture production projects..
4. Scale-up Climate-Smart horticulture production activities and Sustainable Land restoration and Use Practices. Expand the use of agroforestry, mulching, terracing, and solar irrigation to improve resilience against climate change. Support smallholder horticulturist farmers with access to credit, improved seedlings, and extension services.

5. Expand Afforestation and Reforestation Initiatives. Strengthen the Great Green Wall and state-led afforestation projects with adequate funding, monitoring, and horticulturist community ownership. Encourage private sector participation in fruit tree planting and renewable energy projects to reduce dependence on fuel wood.
6. Integrate Climate Change Adaptation into Development Planning. Align environmental policies with national development strategies and climate resilience frameworks. Prioritize early warning systems, Source and distribute horticulture drought-resistant crop seeds, and soil and water conservation techniques to mitigate future risks and enhance horticulture production project activities across the region.

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