**JOURNAL OF EDUCATIONAL THOUGHT (JET)**
**A PUBLICATION OF THE DEPARTMENT OF ADULT EDUCATION, FACULTY OF EDUCATION, UNIVERSITY OF LAGOS**
**adejet@unilag.edu.ng**
**adejet.journals.unilag.edu.ng**

# Challenges, Opportunities, and Strategies in Rural Ecology and Rural Development in Nigeria

**Babatunde A. Fajimi**

**&**

**Oyeyemi O. Aitokhuehi (Ph.D.)**
**&**

**Perpetua I. Ememe (Ph.D.),**
Department of Adult Education,
Faculty of Education, University of Lagos

https://doi.org/10.5281/zenodo.16745506

**Abstract**
This study explored the intricate interplay between rural ecology and rural development in Nigeria, where rural communities continue to play a pivotal role in food security and economic sustenance. Despite the availability of extensive literature on ecological issues and rural livelihoods, a significant research gap remains in comprehensively integrating ecological, social, and economic dimensions into an assessment of sustainable rural development. The study adopted a qualitative research design using secondary data sourced from academic journals, policy documents, and official publications. A systematic content analysis was conducted to identify key themes, followed by a thematic analysis to explain the nuanced dynamics shaping rural ecological systems and their impact on development outcomes. The study revealed that ecological degradation and socio-economic challenges are deeply interlinked, and this necessitated an integrated approach that aligns environmental conservation with community empowerment and policy reforms. The study suggested the revision of the national policy frameworks to embed ecological principles in development initiatives to promote sustainable agricultural practices and renewable energy solutions and enhance community participation through capacity-building programmes. Innovative and inclusive policy measures will effectively transform rural communities into vibrant centres of sustainable development, which will contribute to improving rural livelihoods in the communities.

**Keywords**: Community participation, natural resource management, rural development, rural ecology, sustainable livelihoods

## Introduction

Rural ecology is important to sustainable rural development in any nation. The interactions between living organisms and their environment in rural areas emphasise the dyadic relationships between humans and nature with implications for the sustainability of resources in the ecosystems (Hung-Anh & Hoang-Tien, 2019; Ikuemonisan, 2024). More than half of the population of developing countries, including Nigeria, live in rural communities and depend on the environment for their livelihoods (Ajayi, Olaniran & Adeleke, 2024; Asaju, 2017; Eneji & Ering, 2018; Omokhabi & Fajimi, 2023). Nigeria is agrarian and relies on rural communities for food security and economic sustenance (Villacis, Mayorga & Mishra, 2022; ICRISAT, 2022). The exploitation of natural resources in rural communities where rural dwellers subsist on a wide range of agricultural activities, including subsistence farming and hunting, livestock farming, fisheries, extractive mining, forestry, and rural crafts, is the mainstay of rural economies and national development.

The importance of rural ecology to sustainable rural development cannot be over-emphasised in Nigeria, where approximately 70% of its population, who are mostly poor people, live in multidimensional poverty in rural areas (National Bureau of Statistics, 2022; United Nations Nigeria, 2022). The linkage between rural ecology and rural development is significant for rural demographics in the context of agriculture, multidimensional poverty, particularly child poverty, climate change, and policy development to improve the primary source of livelihood and quality of life of the rural communities (Danso-Abbeam, Ojo, Baiyegunhi & Ogundeji, 2021; Hossain, Mendiratta & Savastano, 2024; Mammud, 2019). The rural ecosystem is the fulcrum of sustainable rural development. Understanding conservation based on agriculture and the rural ecosystem is

sacrosanct to rural development. Any development initiative that is not based on ecological fundamentals will not produce the desired results in the long run (Bollukcu & Aciksoz, 2016).

Rural ecology deals with the issue of establishing a balance between the rural population and local natural resources (Eneji & Ering, 2018). Rural development is the collective activity that focuses on utilising renewable natural resources in rural areas. These efforts aim to increase income levels, improve the standard of living, and protect and enhance the environment and cultural values (Bollukcu & Aciksoz, 2016). It is the developmental actions undertaken by rural residents to transform their communities' socio-economic and ethical structures. Rural development also involves integrating all activities related to rural communities' territorial dynamics, needs, and potentials into the country's multisectoral programmes.

Despite the importance of rural ecology, Nigeria faces serious challenges in rural development because of numerous ecological problems. One of the primary concerns is land degradation, which affects agricultural productivity and food security. The degradation of natural resources because of unsustainable agricultural practices, deforestation, and human-induced climate change threatens ecological balance and rural development (Kirui, Mirzabaev, & Braun, 2021; United Nations Convention to Combat Desertification, 2018). The Food and Agriculture Organisation of the United Nations [FAO] (2019; 2021) stated that land, water, soil, and biodiversity are progressively degrading in sub-Saharan Africa, and land degradation affects about 65% of Nigeria’s agricultural land, resulting in reduced crop yields and increased vulnerability to food scarcity.

Climate change worsens these challenges by altering precipitation patterns, leading to droughts and flooding, significantly impacting rural livelihoods (Ibrahim & Ibrahim, 2024). Local climate

is influenced by natural climatic variations and the adaptive strategies employed by rural populations to survive in a changing environment, which can contribute to environmental degradation. This degradation creates negative feedback loops that adversely affect the survival of the rural population and the sustainability of the environment (Ememe & Fajimi, 2024). The loss of biodiversity resulting from habitat destruction and unsustainable resource extraction further complicates rural development, weakening the ecological foundations needed for sustainable livelihoods.

Based on the foregoing, it is recognised that the integration of ecological principles into rural development strategies is crucial for enhancing productivity, resilience, and sustainability in rural communities. While existing studies have highlighted the ecological challenges and their implications for rural livelihoods, there is a lack of comprehensive assessments that integrate ecological, social and economic dimensions of rural development (Martinez, Castro-Pardo, Barroso, & Azevedo, 2020). The study explored the complex link between rural ecology and rural development in Nigeria. It examined opportunities arising from aligning development strategies with environmental conservation and rural development in the country.

The study adopts a qualitative research design to explore the nuanced relationship between Nigeria's rural ecology and development. Secondary data were sourced from academic journals, textbooks, policy documents, and official publications. To ensure the reliability of the findings, inclusion criteria were established based on the recency, credibility, and relevance of the sources to rural ecological and developmental issues. A systematic content analysis was conducted to extract and categorise key themes and patterns from the selected literature. This process involved coding the data into manageable units, which facilitated a focused examination of how ecological

factors interplay with rural development outcomes. Subsequently, thematic analysis was employed to explore these themes in greater depth, thereby revealing the underlying dynamics and contextual influences shaping Nigeria's rural ecological landscape.

**Rural Ecology in Nigeria**

Rural ecology is the study of interactions among rural communities, natural environments, and the myriad of living organisms that inhabit these landscapes (Wang & Li, 2023). It is an interdisciplinary field that integrates ecology, agriculture, anthropology, and sociology principles to understand how traditional practices and natural ecosystems coexist and benefit one another. Nigerian rural ecology is rooted in the observation that rural landscapes are not merely sites for agricultural production but are dynamic systems where cultural heritage, biodiversity, and environmental processes are inextricably linked (Ogunbiyi, 2019).

At its core, rural ecology emphasises the abstraction of integrated land management, a system where agricultural practices, natural resource conservation, and community well-being are mutually reinforcing. Many Nigerian communities have developed traditional farming techniques over generations (Omokhabi & Fajimi, 2024). These techniques, such as agroforestry, intercropping, and crop rotation, are tailored to local environmental conditions and are vital for maintaining soil fertility and ecosystem productivity. By relying on a deep understanding of local biophysical processes, these practices demonstrate how indigenous knowledge and ecological science can work hand in hand to optimise the use of natural resources (Adeyemi, 2020).

Ecosystem services such as water filtration, pollination, and nutrient cycling are essential for sustainable agriculture and overall environmental health. Nigerian rural landscapes, characterised

by a mosaic of forests, savannas, wetlands, and coastal ecosystems, offer a rich context for examining how these services support both livelihoods and ecological balance. By studying these natural functions, rural ecologists can identify how traditional practices contribute to the maintenance of these critical services and, in turn, how communities can enhance and sustain them over time (Jones & Thompson, 2016). Local cultural practices and communal land tenure systems have long regulated resource use and preserved ecological integrity. Such participatory frameworks safeguard biodiversity and strengthen social bonds within communities, ensuring that environmental stewardship is both a collective and a culturally embedded endeavour.

**Rural Development in Nigeria**

The concept of rural development embodies a comprehensive framework that combines agricultural innovation, infrastructural development, community participation and environmental stewardship. Rural development in Nigeria is a multidimensional process aimed at transforming rural areas into dynamic centres of economic, social, and environmental well-being. It integrates strategies that enhance agricultural productivity, promote infrastructure development, and foster human capital, which contribute to a more balanced national growth. The evolution of rural development has transitioned from an exclusive focus on agriculture to a more holistic approach encompassing diverse sectors such as education, healthcare, renewable energy, and community empowerment (Ayodele, 2018).

Nigeria's rural areas have historically been the backbone of the nation's agricultural economy (Omokhabi & Fajimi, 2024). Traditional practices and small-scale farming have sustained rural livelihoods for generations. However, recognising the potential for broader economic transformation, policymakers and development practitioners have sought to leverage rural

development as a catalyst for overall national progress. Investments in modern agricultural techniques, mechanisation, and market access have enhanced productivity while simultaneously encouraging diversification into non-agricultural activities (Adekunle, 2019). This integrated approach nurtures economic resilience but provides a pathway for reducing the rural-urban divide.

Central to the concept of rural development is the empowerment of local communities. By involving residents in the planning and implementation of development initiatives, rural development fosters a sense of ownership and self-reliance (Fajimi, 2022; Olaleye, 2013). Incorporating indigenous knowledge and practices alongside modern innovations creates a synergistic effect, enabling rural communities to adapt to traditional and contemporary challenges (Ibrahim & Oladipo, 2020). Sustainable land management, renewable energy projects, and eco-friendly agricultural practices are increasingly integrated into development policies. These efforts are designed to protect natural resources, mitigate the impacts of climate change, and ensure that rural development is environmentally viable over the long term (Ibrahim & Oladipo, 2020).

**Theoretical Framework**

The study adopted the Sustainable Livelihoods Framework (SLF) to address the challenges and opportunities at the intersection of rural ecology and rural development in Nigeria with people-centric development that is responsive and participatory, and favouring multidisciplinary and multilevel development interactions (Karki, 2021). The SLF was developed by the British Department for International Development (DFID) from the earlier works of Robert Chambers in the mid-1980s on Sustainable Livelihoods to enhance the efficiency of development cooperation (Kollmair & St. Gamper, 2002; Natarajan, Newsham, Rigg & Suhardiman, 2022). It offers a

holistic approach to understanding rural communities utilising human, social, natural, physical, and financial capital assets to engender sustainable livelihoods.

The framework consists of six inter-linked elements comprising vulnerability context, livelihood assets, influence and access, transforming structures and processes, livelihood strategies, and livelihood outcomes to explain the complex interplay between environmental and socio-economic factors, offering a comprehensive tool for analysing the multidimensional issues facing Nigerian rural areas (Mandishekwa, 2022; Serrat, 2017). The SLF can accommodate the diverse challenges experienced by rural populations. Nigerian communities are often situated in environments marked by significant ecological degradation, such as deforestation, soil erosion, and climate variability, which adversely affect agricultural productivity and natural resource management (Amadi & Anokwuru, 2017). By integrating these elements, the SLF provides a robust platform that identifies the assets available to rural households and considers the vulnerabilities that may undermine their resilience.

Adapting the SLF to the Nigerian context requires recognising the country's unique ecological and developmental dynamics. In Nigeria, the vulnerability context is influenced by historical, cultural, and policy factors that have shaped rural livelihoods over the decades. Post-colonial development policies, while aimed at economic modernisation, have overlooked the necessity of environmental conservation ingrained in the precolonial and pre-independence initiatives in rural community development of the precolonial societies, thereby worsening ecological degradation (Akpan, 2012; Omokhabi & Fajimi, 2024).

Integrating the concepts of rural ecology and socio-economic development within this framework facilitates understanding how environmental challenges can precipitate opportunities for innovation. The framework posits that sustainable rural development is contingent upon the harmonious management of natural resources and the enhancement of community resilience. The hypothesised relationships within the SLF suggest that addressing environmental challenges through adaptive land management practices, community-based conservation initiatives, and policy interventions can lead to improved agricultural productivity and income generation, which outcomes, in turn, strengthen social capital and create a positive feedback loop for sustainable rural development (Udofia, 2021; Lusinga-Machikicho & Mutanana, 2022; Natarajan et al., 2022).

**Challenges in Rural Ecology and Rural Development**

Since Nigeria's return to democratic government in 1999, the country has implemented various rural development strategies to enhance the living standards of its rural population. These include improving agricultural productivity, enhancing infrastructure, and fostering economic opportunities. One significant initiative is the National Agricultural Extension and Research Liaison Services (NAERLS), which provides farmers with education and research support to improve agricultural practices. This programme aims to enhance the skills of farmers, thereby increasing their productivity and overall livelihood (Issa, Mani, Abubakar, & Owolabi, 2022; Oduehie, Shu'aibu, Adam, Muhammad, Ukonu, Yakubu, & Mamman, 2018).

The Agricultural Transformation Agenda (ATA) is another important initiative that focuses on transforming Nigeria's agricultural sector through increased investment, improved access to markets, and enhanced technology adoption (Atani-Ekiye, 2019; Obiora, 2014; Obayelu & Obayelu, 2014). In addition to agricultural initiatives, the Rural Electrification Agency (REA)

works to provide renewable energy solutions to rural communities. Access to reliable electricity due to the REA initiative is essential for improving quality of life, enabling local businesses, and facilitating educational opportunities (Adeleke, 2022; United Nations Development Programme [UNDP], 2021). The Federal Ministry of Agriculture and Rural Development (FMARD) has launched various programmes that promote sustainable agricultural practices, improve food security, and enhance rural livelihoods.

Despite these efforts, the challenges facing rural development in Nigeria remain substantial and require ongoing efforts from key stakeholders in governmental and non-governmental organisations. One of the most pressing issues is multidimensional poverty where over 80% of the rural population lives below the poverty line with 42% intensity of rural poverty compared to 37% in urban areas, severely limiting access to essential services such as healthcare, education, and clean water (United Nations Nigeria, 2022). This economic hardship restricts the capacity of rural communities to invest in sustainable practices that could improve their livelihoods. Many rural areas in Nigeria lack adequate roads, transportation networks, and communication facilities, hampers access to markets and essential services (UNDP, 2021). The lack of infrastructure discourages investment in these areas, perpetuating the cycle of poverty and underdevelopment.

Another critical challenge is migration, particularly the trend of young people leaving rural areas in search of better opportunities in urban centres. This contributes to demographic imbalances and agricultural labour shortages, undermining rural economies' sustainability (Adeyemo, 2020). The decline in the rural labour force aggravates food insecurity and hinders overall rural development. Ecological degradation, including deforestation, soil erosion, and water pollution, is also a significant challenge. The changing rainfall patterns disrupt planting seasons, while soil

degradation diminishes the land's fertility, making it difficult for farmers to maintain consistent yields. The impacts of climate change have reduced agricultural productivity and increased food insecurity in rural communities (Edoho, 2020).

**Opportunities in Rural Ecology and Rural Development**

Despite the challenges confronting rural development in Nigeria, there are numerous opportunities for sustainable development in rural communities. When approached through sustainable natural resource management, policy innovations, community and technological innovations, and integrated development models, these opportunities are abundant.

Natural resource management is at the heart of sustainable rural development. Nigeria's vast rural areas are endowed with significant natural resources that, if managed sustainably, can revitalise degraded lands and ensure food security. Agroforestry, conservation agriculture, and soil regeneration techniques rehabilitate land affected by erosion and nutrient depletion and enhance biodiversity and ecosystem services (Edoho, 2020). By adopting such practices, rural communities can improve soil fertility and water retention, laying the foundation for more productive and resilient agricultural systems.

Policy innovations play a critical role in realising these opportunities. There are several programmes designed to elevate rural living standards. Initiatives such as the National Agricultural Extension and Research Liaison Services (NAERLS) and the Agricultural Transformation Agenda (ATA) have provided the policy framework necessary to boost agricultural productivity and market access (Issa, Mani, Abubakar, & Owolabi, 2022; Oduehie et al., 2018). These policies offer avenues for enhancing rural education, improving infrastructure, and creating an enabling environment for technological adoption. Furthermore, continuous policy reform that incorporates

participatory planning and decentralised decision-making can ensure that the needs and aspirations of rural populations are at the forefront of development strategies, fostering a more inclusive and responsive governance system.

Community and technological innovations also offer transformative potential in rural ecology and development. Rural communities increasingly harness local knowledge and modern technologies to overcome traditional development challenges. Digital extension services, mobile-based market information systems, and community-based cooperatives have empowered farmers by providing timely information on best practices, weather forecasts, and market prices (Obayelu & Obayelu, 2014). These innovations bridge the gap between rural producers and modern agricultural practices and stimulate local entrepreneurship and value chain development.

Integrated development models synthesise natural resource management, innovative policies, and community engagement. Integrated models foster synergies that enhance overall rural development by aligning sustainable agricultural practices with renewable energy solutions and ecological conservation. Coupling renewable energy initiatives with modern agricultural practices can improve post-harvest processing, storage, and market access while reducing carbon footprints and mitigating environmental degradation (Atani-Ekiye, 2019).

**Strategies for the Alignment of Rural Ecology with Rural Development**

The literature synthesis reveals that a comprehensive strategy that integrates policy, community empowerment, sustainable practices, infrastructural development, and multi-stakeholder partnerships is essential to address the imperatives of environmental conservation and socio-economic development in rural communities in Nigeria.

The first step to realise sustainable rural development in Nigeria is policy integration. Historically, development policies have operated in silos, with environmental conservation frequently treated as separate from economic planning (Hirai, 2022; Omokhabi & Fajimi, 2024). A cohesive policy framework that harmonises agricultural, environmental, and developmental policies is important to redress this imbalance. Inter-ministerial committees to foster communication between departments responsible for environmental affairs, agriculture, and rural development can facilitate this integration. This will include revising legislative instruments to embed ecological sustainability as a key criterion for project funding and evaluation (Bhatt, 2023).

Community Empowerment and Participatory Governance are equally pivotal. Empowering local communities through participatory governance fosters sustainable development by ensuring that local voices, particularly those of marginalised groups, are included in decision-making processes. Building local capacity through training programmes on sustainable practices and resource management can bolster community resilience. Community forums and local councils serve as platforms for dialogue, enabling residents to co-create solutions that address environmental and developmental challenges (Bokolo, 2024; Omokhabi & Fajimi, 2024). This inclusive approach builds project ownership and leverages indigenous knowledge systems that have proven effective in sustainably managing natural resources in Nigerian contexts.

The promotion of sustainable practices supports rural development. Eco-friendly agriculture, agroforestry, and conservation agriculture are critical to creating a sustainable rural economy. Eco-friendly practices reduce chemical inputs and enhance soil fertility through organic amendments, while agroforestry integrates trees with crops and livestock, contributing to environmental conservation and diversified income streams (Olaniyan, Ujah, Mahbub & Afanwoubo, 2024). Conservation agriculture, which focuses on minimal soil disturbance, permanent soil cover, and

crop rotation, safeguards soil health and mitigates erosion. Adopting these practices requires targeted extension services, incentives, and training workshops facilitated by agricultural experts.

Rural communities have suffered from inadequate infrastructure, which hampers access to markets and essential services. Prioritising improvements in road networks, water supply systems, and electrification projects can revitalise local economies while reducing development's environmental footprint (Muhammad & Otu, 2024). Renewable energy initiatives and adopting technological solutions in agriculture, such as precision farming and digital platforms, further enhance resource management and economic growth (Papadopoulos, Arduini, Uyar, Psiroukis, Kasimati & Fountas, 2024). Multi-stakeholder partnerships are also necessary with collaboration among government agencies, private sector entities, NGOs, and local communities to create a robust resource management and monitoring framework, ensuring accountability and transparency in project implementation (Momen, 2021).

## Conclusion

The study has shown a complex interplay between rural ecology and rural development in Nigeria. Environmental challenges such as deforestation, soil erosion, and climate variability are closely interlinked with socio-economic issues, including persistent poverty, inadequate infrastructure, and land tenure conflicts. These challenges are further exacerbated by institutional weaknesses and policy implementation gaps, which collectively impede effective resource management and sustainable development.

Equally, the study highlighted opportunities that can be harnessed through sustainable natural resource management, renewable energy solutions, and community-driven initiatives that capitalise on indigenous knowledge. Adopting eco-friendly practices, such as agroforestry and

conservation agriculture, offers a means of mitigating environmental degradation while improving agricultural productivity. Renewable energy projects present a dual benefit of reducing reliance on fossil fuels and energising rural economies.

The implications for policy and practice indicate that decision-makers and stakeholders can develop cohesive policy frameworks that integrate environmental conservation with socio-economic development. Strategies such as inter-ministerial collaboration, decentralisation of governance, and enhanced community participation are essential. Empowering local communities through capacity-building programmes and participatory decision-making can transform local practices, ensuring that development initiatives are both ecologically sound and economically viable. Multi-stakeholder partnerships and innovative technological applications have been shown to create synergies that mitigate environmental degradation and stimulate economic growth.

**Way Forward**

The study suggested that a holistic integration of rural ecology with rural development in Nigeria is imperative, as follows:

- The government should revise policy frameworks to harmonise environmental conservation with socio-economic objectives. This can be achieved by establishing inter-ministerial committees and reforming legislation to ensure ecological sustainability is embedded in every development project.
- Local communities should be empowered through participatory governance and capacity-building initiatives. Stakeholders should organise training programmes that promote sustainable practices and the use of indigenous knowledge to engender community resilience in these communities.

- The government should create an environment enabling investment in eco-friendly infrastructure, renewable energy, and modern agricultural technologies. This will enhance the productivity of local communities while mitigating environmental degradation.
- Multi-stakeholder partnerships should exist among government, development partners, community development organisations, and academics to mobilise resources and offer technical expertise to ensure integrated development strategies remain resilient and sustainable.

**References**

Adekunle, A. (2019). Strategies for rural development: A Nigerian perspective. *African Development Review, 21*(3), 87–104.

Adeleke, O. (2022). Rural electrification and sustainable energy access in Nigeria. *Energy Policy Journal, 14*(2), 156–172.

Adeyemi, O. (2020). Traditional agricultural practices and soil health in Nigeria. *Journal of African Agriculture, 12*(3), 45–60.

Ajayi, A. O., Olaniran, H. D., & Adeleke, F. G. (2024). The Rural Development Agenda: What is the Future for Nigerian Communities? In Jimoh, U. U., Ipingbemi, O. & Adejumo, S. A. (eds.), *Human Settlement Planning in Nigeria: A Festschrift in Honour of Professor Waheed Bolanle Wahab.* Department of Urban and Regional Planning, University of Ibadan. 347-376.

Akpan, N. S. (2012). Rural Development in Nigeria: A Review of Pre- and Post-independence Practice. *Journal of Sociological Research, 3*(2). 146–159.

Amadi, L. & Anokwuru, G. (2017). Sustainable Rural Livelihoods: Elusive Post-Colonial Development Projects in Nigeria? *International Journal of Political Science, 3*(4). 28-42. http://dx.doi.org/10.20431/2454-9452.0304003.

Asaju, K. (2017). Sustainable rural development in Nigeria: an overview. *Online Journal of Arts, Management and Social Sciences, 2*(1). 173–182.

Atani-Ekiye, I. (2019). Agricultural transformation and rural development in Nigeria. *Journal of African Development Studies, 11*(1), 45–62.

Ayodele, O. (2018). Rural development and agricultural transformation in Nigeria. *Journal of African Rural Studies, 5*(2), 112–128.

Bhatt, R. (2023). Environmental Impact Assessment System and Process in Developing Countries. Open Journal of Ecology, 13. 977–1009. Doi:10.4236/oje.2023.1312059.

Bokolo, A. (2024). The Role of Community Engagement in Urban Innovation Towards the Co-Creation of Smart Sustainable Cities. Journal of the Knowledge Economy, 15. 1592–1624. https://doi.org/10.1007/s13132-023-01176-1.

Bollukcu, P. & Aciksoz, S. (2016). *Ecological Approach to Rural Development*. file:///C:/Users/USER/Downloads/B.Bollukcu-Pyz-32.pdf.

Danso-Abbeam, G., Ojo, T. O., Baiyegunhi, L. J. S., & Ogundeji, A. A. (2021). Climate change adaptation strategies by smallholder farmers in Nigeria: Does non-farm employment play any role? *Heliyon, 7*(6). 1-10. doi: 10.1016/j.heliyon.2021.e07162.

Edoho, A. (2020). Climate change and ecological degradation in Nigerian agriculture. *Environmental Management Review, 9*(3), 88–102.

Ememe, P. I. & Fajimi, B. A. (2024). Rural Women's Resilience to Climate Change in Coastal Communities in Lagos State, Nigeria. *Rivers State University Journal of Education (RSUJOE), 27*(1). 1-15.

Eneji, R. I. & Ering, S. O. (2018). Community-based Natural Resources Management and Rural Development in Nigeria: A Theoretical Review. *International Journal of Humanities and Social Science, 8*(11). 111- 116. doi: 10.30845/ijhss.v8n11p13.

Fajimi, B. A. (2022). Community Involvement in Education in Nigeria: Challenges for Adult and Non-Formal Education. International Journal of Adult Learning and Continuing Education, 6(1). 66-74.

Food and Agriculture Organisation of the United Nations. (2018). *Ecosystems for food security: A strategic framework for food security in Nigeria*. https://openknowledge.fao.org/server/api/core/bitstreams/29404c26-c71d-4982-a899-77bdb2937eef/content.

Food and Agriculture Organisation of the United Nations. (2021). *Strategic Framework 2022-2031*. Food and Agriculture Organisation of the United Nations. https://www.fao.org/nigeria.

Hirai, T. (2022). A balancing act between economic growth and sustainable development: Historical trajectory through the lens of development indicators. Sustainable Development, 30(6). 1900-1910. https://doi.org/10.1002/sd.2357.

Hossain, M., Mendiratta, V. & Savastano, S. (2024). Agricultural and Rural Development Interventions and Poverty Reduction: Global Evidence from 16 Impact Assessment Studies. *Global Food Security, 43*. https://doi.org/10.1016/j.gfs.2024.100806.

Hung-Anh, D. B. & Hoang-Tien, N. (2019). Ecological aspect of sustainable development of rural areas. *International Journal of Research in Finance and Management*, 2(2). 05-07.

Ibrahim, A. L. & Ibrahim, M. S. (2024). Climate Change, Food Security and the Attainment of Sustainable Development Goals in Nigeria. *Journal of Political Discourse, 2*(1). 45-57.

Ibrahim, M., & Oladipo, S. (2020). Assessing the role of rural development in Nigeria's economic growth. *Nigerian Journal of Economic Development, 18*(1), 50–66.

ICRISAT (2022). *International Crops Research Institute for the Semi-arid Tropics in Nigeria*. https://www.icrisat.org/assets/Flyers/Country-Flyers/ICRISAT-in-Nigeria.pdf.

Ikuemonisan, E. S. (2024). Challenges and Strategies in Nigerian agribusiness entrepreneurship for sustainable development. *CBI Agriculture and Bioscience, 5*(115). 1-19.https://doi.org. 10.1186/s43170-024-00303-5.

Issa, I., Mani, M., Abubakar, A., & Owolabi, S. (2022). Impact of agricultural extension services on smallholder productivity in Nigeria. *Nigerian Journal of Agricultural Economics, 25*(4), 34–50.

Jones, R., & Thompson, L. (2016). Integrating traditional knowledge and modern ecology. *International Journal of Environmental Studies, 9*(1), 78–90.

Karki, S. (2021). Sustainable Livelihood Framework: Monitoring and Evaluation. *International Journal of Social Sciences and Management, 8*(1). 266–271. DOI: 10.3126/ijssm.v8il.335790.

Kirui, O. K., Mirzabaev, A., & von Braun, J. (2021). Assessment of land degradation 'on the ground' and from 'above.' *SN Applied Sciences, 3*(318). https://doi.org/10.1007/s42452-021-04314-z.

Kollmair, M. & St. Gamper, J. (2002). *The Sustainable Livelihoods Approach.* Input paper for the Integrated Training Course of NCCR North-South, Aeschiried, Switzerland. https://www.humanitarianlibrary.org/sites/default/files/2014/02/SLA_Gamper_Kollmair.pdf.

Lusinga-Machikicho, S. & Mutanana, N. (2022). A Critical Analysis and Review of the Sustainable Livelihoods Approach for Rural Development. *Advances in Social Sciences Research Journal, 9*(11). https://doi.org/10.14738/assrj.911.13382.

Mammud, V. E. (2019). Rural Development in Nigeria: Concept, Approaches, Challenges and Prospects. *Global Scientific Journals, 7*(5). 444-459.

Mandishekwa, R. (2022). Development-induced Internal Displacement: A Sustainable Livelihoods Framework Perspective. *Researching Internal Displacement Working Paper 27*. https://researchinginternaldisplacement.org/wp-content/uploads/2022/07/RID-WP_Mandishekwa_Dev-ID_080722.pdf.

Martinez, P. F., Castro-Pardo, M., Barroso, V. M., & Azevedo, J. C. (2020). Assessing Sustainable Rural Development Based on Ecosystem Services Vulnerability. *Land, 9*(222). 1-23. doi:10.3390/land9070222.

Momen, M. N. (2021). Multi-stakeholder Partnerships in Public Policy. In Partnerships for the Goals. Springer, Cham. DOI: 10.1007/978-3-319-959563-4_50.

Muhammad, O. A. & Otu, M. A. (2024). Overview of Nigeria's Infrastructural Development. CSIID Journal of Infrastructure Development, 7(3). 522-532. DOI: 10.7452/jid.v7.13.1148.

Natarajan, N., Newsham, A., Rigg, J., & Suhardiman, D. (2022). A sustainable livelihoods framework for the 21st century. *World Development, 155*. 1-15. https://doi.org.10.1016/j. worlddev.2022.105898.

National Bureau of Statistics (2022). *Nigeria Multidimensional Poverty Index (2022)*. Abuja: The Presidency, Federal Republic of Nigeria. https://www.nigerianstat.gov.ng/ pdfuploads/NIGERIA%20MULTIDIMENSIONAL%20POVERTY%20INDEX%20SURVEY%20RESULTS%202022.pdf.

Obayelu, E., & Obayelu, G. (2014). Market access and technology adoption in Nigerian agriculture. *African Journal of Rural Development, 7*(2), 120–135.

Obiora, C. (2014). Investment in Nigerian agriculture: Challenges and prospects. *African Economic Review, 16*(1), 97–113.

Oduehie, C., Shu'aibu, A., Adam, J., Muhammad, I., Ukonu, E., Yakubu, A., & Mamman, A. (2018). The role of NAERLS in rural development in Nigeria. *Journal of Agricultural Extension, 10*(3), 77–92.

Ogunbiyi, A. (2019). Biodiversity and rural livelihoods in Nigeria. *African Journal of Ecology, 7*(2), 102–118.

Olaleye, Y. L. (2013). *Introduction to Community Development*. Open & Distance Learning Centre, University of Ibadan.

Olaniyan, C. K., Ujah, G. O., Mahbub, O. O., & Afanwoubo, B. J. (2024). Integrating Trees into Agricultural Landscapes: Benefits and Challenges of Agroforestry Systems. International Journal of Agriculture and Earth Sciences, 10(7). 94-121. DOI: 10.56201/IJAES.v10.no7.2024.

Omokhabi, A. A. & Fajimi, B. A. (2023). Women in Pandemics and Sustainability of African Rural Communities. *Shodh Sari-An International Multidisciplinary Journal, 02*(03). 67-105. DOI: https://doi.org/10.59231/SARI7593.

Omokhabi, A. A. & Fajimi, B. A. (2024). Suburbia in Nigeria: A New Approach to Understanding Rural Community Transformation and Development. In Kester, K. O., Aderogba, K. A., Oladeji, S. O., Omokhabi, A. A., Adeyemo, C. W., Adebayo, D. A., & Odusanya, O. S. E. (eds.), *Continuing Education and Development in an Emerging Digitalised World: Festschrift for Professor Deborah Adetunbi Egunyomi*, Department of Adult Education, University of Ibadan, Nigeria, 30-43.

Papadopoulos, G., Arduini, S., Uyar, H., Psiroukis, V., Kasimati, A. & Spyros, F. (2024). Economic and environmental benefits of digital agricultural technologies in crop production: A review. Smart Agricultural Technology, 8. https://doi.org/10.1016/j.atech.2024.100441.

Serrat, O. (2017). The Sustainable Livelihoods Approach. *Knowledge Solutions*, 21–26. DOI: 10.1007/978-981-10-0983-9_5.

Udofia, A. N. (2021). UNDP's Sustainable Livelihood Programmes and Poverty Reduction in Nigeria: The Development Paradox of Prebendalism. *AKSU Journal of Administration and Corporate Governance, 1*(2). 96-114.

United Nations Convention to Combat Desertification (2018). *Nigeria: Final report of the Land Degradation Neutrality Target Setting Programme*. https://www.unccd.int/sites/default/files/ldn_targets/Nigeria%20LDN%20TSP%20Country%20Report.pdf.

United Nations Development Programme. (2021). *Renewable energy initiatives in rural Nigeria*. UNDP Nigeria.

United Nations Nigeria (2022). *Common Country Analysis.* https://www.unodc.org/conig/uploads/documents/Common_Country_Analysis_2022_Nigeria.pdf.

Villacis, A. H., Mayorga, J., & Mishra, A. K. (2022). Experience-based food insecurity and agricultural productivity in Nigeria. *Food Policy, 113*. https://doi.org/10.1016/j.foodpol.2022.102286.

Wang, J. & Li, Y. (2023). Image Characteristics of Rural Ecology Culture under Rural Vitalisation Policy. *3c Empresa. Investigacion y pensamiento critic, 12*(2), 286-303. https://doi.org/10.17993/3cemp.2023.120252.286-303.