Assessment of the Impact of Varying Conservation Activities on Sustainability on Olokemeji Forest Reserve, Ogun State, Nigeria

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ABSTRACT

This study examined the impact of various conservation activities undertaken by communities around the Olokemeji Forest Reserve (OFR) on its sustainability. Communities were stratified based on their distance from the Reserve; selecting four communities located more than 5 km away. Data were collected using a structured questionnaire, with 157 questionnaires administered proportionally to the population of each selected community. Descriptive and inferential statistics, specifically the Logit regression model, were used for data analysis.

Results indicated that the majority of respondents were male (55.6%), farmers (55%), married (65.6%), and uneducated (38%). The chi-square ratio (33.08) demonstrated that the model was statistically significant in assessing the impact of community conservation activities on the sustainability of OFR. Conservation activities including Tree planting exercises (TEA), Proper monitoring of forest resources (PMF), Restrictions on grazing animals (RGA), and Funding of conservation activities (FCA) showed positive odds of 21.01, 19.62, 6.25, and 3.47, respectively, all having a statistically significant impact on OFR's sustainability. The study concludes that effective conservation of OFR requires a combination of these activities and recommends that policymakers and conservation managers implement a comprehensive plan incorporating all these factors to achieve sustainability and conservation objectives for OFR.

(Keywords: *conservation activities, community involvement, Olokemeji Forest Reserve, sustainability*)

INTRODUCTION

Forest reserves are crucial for biodiversity protection, ecological services, and climate stabilization. They offer home for a diverse range of plant and animal species, many of which are rare or endangered (Ogunjemite, *et al.*, 2021). Furthermore, forests are necessary for carbon sequestration, water management, and soil protection. Also, local populations frequently rely on forest resources for their livelihoods, producing a complex relationship between conservation efforts and socioeconomic needs. The loss or deterioration of these forests can have serious environmental repercussions, such as biodiversity loss, climate change, and decreased ecosystem services (FAO, 2020).

Despite their importance, the Nigerian forest reserves suffer severe conservation concerns. Illegal logging, land conversion for agriculture, and infrastructure development are major risks (Ogunleye, *et al.*, 2018). To address these challenges, comprehensive conservation policies must be developed that strike a balance between ecological preservation and sustainable development (Oduro, *et al.*, 2019). Effective conservation methods are required to counteract these effects and guarantee that the forest ecological services continue to be sustainable.

Conservation activities around forest reserves often include afforestation and reforestation, anti-poaching measures, community participation, and sustainable land management methods (Dube, *et al.*, 2021). Assessing the effectiveness of these efforts is critical for adaptive management and policy development. Recent advances in remote sensing, Geographic Information Systems (GIS), and participatory techniques have improved our capacity to

monitor and assess conservation activities (Ayeni, *et al.*, 2020).

The Olokemeji Forest Reserve in Ogun State, Nigeria, is one such critical ecological treasure. The reserve was designed to protect the region's distinctive flora and wildlife, but it has encountered substantial challenges from human activities like as logging, agriculture, and urban growth (Adejuwon, *et al.*, 2019). Recent research has concentrated on several issues of conservation in the Olokemeji Forest Reserve. Ayeni, *et al*. (2021) employed remote sensing techniques to analyze land cover changes, indicating severe deforestation and habitat fragmentation in recent decades. This emphasizes the critical need for effective conservation efforts.

Furthermore, Ogunjemite, *et al.* (2021) assessed the biodiversity state of the reserve, identifying numerous endangered species and underlining the necessity of habitat conservation. Furthermore, community-based conservation techniques have been investigated to engage residents in sustainable resource management, with studies indicating favorable results in terms of reduced illicit activity and enhanced forest health (Adejuwon, *et al*., 2020).

This study therefore aims to assess the effectiveness of ongoing conservation activities around the Olokemeji Forest Reserve by investigating the involvement of local communities in conservation efforts, the activities engaged in to conserve the forest reserve and their impacts on forest conservation.

Assessing these conservation activities around the Olokemeji Forest Reserve is critical as it provides insights into the effectiveness of current conservation strategies and identifies areas for improvement. It also contributes to a broader understanding of forest conservation challenges and solutions in Nigeria, paving the way for informed decision-making and strategic enhancements to ensure the Olokemeji Forest Reserve's long-term sustainability.

METHODOLOGY

Study Area

The study area is Olokemeji Forest Reserve. The area lies between latitude 7° 25' 0" N and longitude 3° 31' 59" E. The area is located within the tropical Savanna vegetation zones.

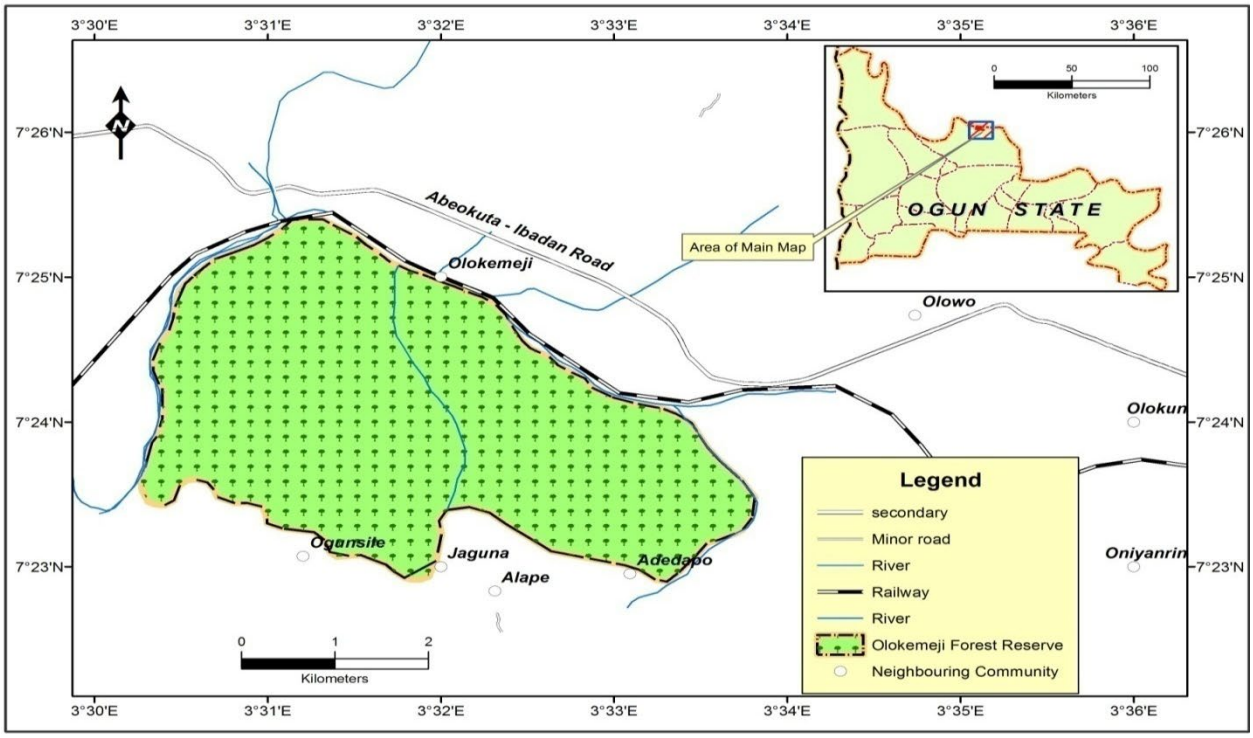

Figure 1: Map of Olokemeji Forest Reserve showing Neighboring Communities.

The area is dominated by two seasons: The dry season and rainy season. The dry season usually begins from November to March, while the rainy season starts from April to October. The annual rainfall ranges from 1400mm – 1500mm and average relative of about 65%. The average temperature is 31.8℃. The people are predominantly Egbas and they speak Egbas dialect. However, their main language is Yoruba while few non-Yoruba are Fulani, Hausa, and Igedes of Benue State and Ito (Akinsoji, 2013).

DATA COLLECTION

Sampling Techniques

Field research was adopted for the study. The communities were identified around the reserve were classified based on distance to the Forest Reserve during the recognizance survey. Four communities that were > 5 km from the reserves were purposively selected. These are: Olokemeji, Ogunsile, Adedapo and Jaguna.

Projected population was used to sample intensity for each community according to Diaw *et al*., (2002) which posits 10% samplings intensity for population below 500, 5% for population below 1000 and 2.5% for population > 1000. Thus, 35 questionnaires were distributed in Adedapo, 55 in Olokemeji, 37 in Ogunsile and 30 in Jaguna making a total of 157 questionnaires.

DATA ANALYSIS

Data was analyzed using descriptive and inferential statistics of Logit regression model to identify the effectiveness of the different conservation practices in Olokemeji Forest Reserve.

To identify various conservation techniques operating in the study area, the logit regression is given as:

$P^1\ b_0+b_1x_1+b_2x_2 + \ldots\ldots\ldots\ldots\ldots\ b_8x_8$

Where:

P^1 = Conservation activities (dependent variable) b_0, b_1, b_2 …… bn = regression parameters

the independent variables are:

x_1 = dummy variable indicating conservation activities operating (CAO) is a reason responsible for conservation and development activities or not.

x_2 = dummy variable indicating monitoring against forest (MAF) is a factor responsible for conservation and development activities or not.

x_3 = dummy variable indicating people restricted from grazing animals (PGA) is a factor responsible for conservation and development activities or not.

x_4 = dummy variable indicating planting exercise carried in this area (PEA) is a factor responsible for conservation and development activities or not.

x_5 = dummy variable indicating proper monitoring of forest (PMF) is a factor responsible for conservation and development activities or not.

x_6 = dummy variable indicating controlled exploitation of forest (CEF) is a factor responsible for conservation and development activities or not.

x_7 = dummy variable indicating funding of conservation activities (FCA) is a factor responsible for conservation and development activities or not.

x_8 = dummy variable indicating technical support in conservation (TSC) is a factor responsible for conservation and development activities or not.

x_9 = dummy variable indicating adequate provision of forest (APF) is a factor responsible for conservation and development activities or not.

RESULTS AND DISCUSSIONS

Socioeconomic Characteristics of the Respondents

Figure 2 shows the age distribution of respondents in the study area. The majority (28%) are above 61 years old, closely followed by those in the 41-50 years age range. The smallest group (3%) consists of respondents aged 10-20 years. There is little variation in the percentage of respondents aged 30-50 years.

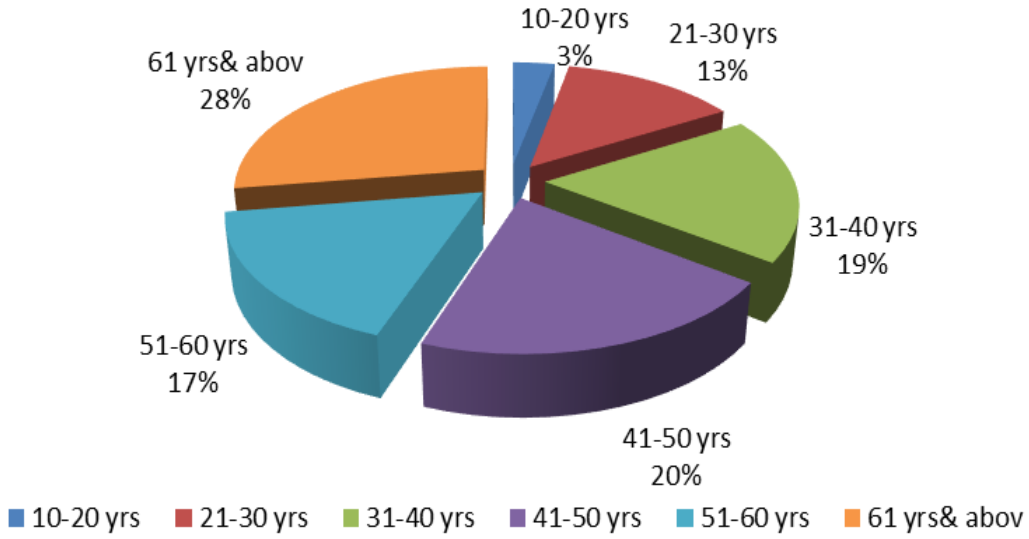

Figure 2: Age of the respondents.
Source: Researcher, 2023.

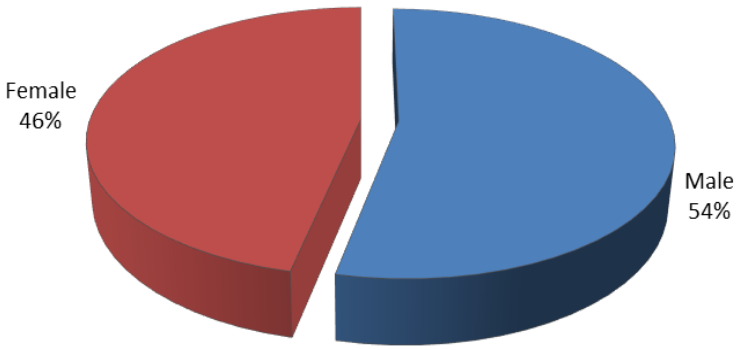

Figure 3: Gender of the Respondents.
Source: Researcher, 2023.

This implies that those within the 30-50 years age group are the most active in the study area.

These findings align with Hennessy and Means (2018), who posit that older people tend to live in rural areas more than urban areas. Olatunji et al. (2021) found that rural areas in Nigeria often have higher proportions of older adults, as younger individuals migrate to urban centers in search of better employment opportunities. Similarly, Nyambedha, *et al*. (2020) in rural Kenya indicated that older adults tend to remain in rural areas due to strong community ties and the availability of agricultural work that supports their livelihoods. Additionally, Eze, *et al*. (2020) highlighted that rural-to-urban migration patterns often leave behind older generations who have lived in rural areas for decades, while younger individuals move to urban centers for education and employment opportunities.

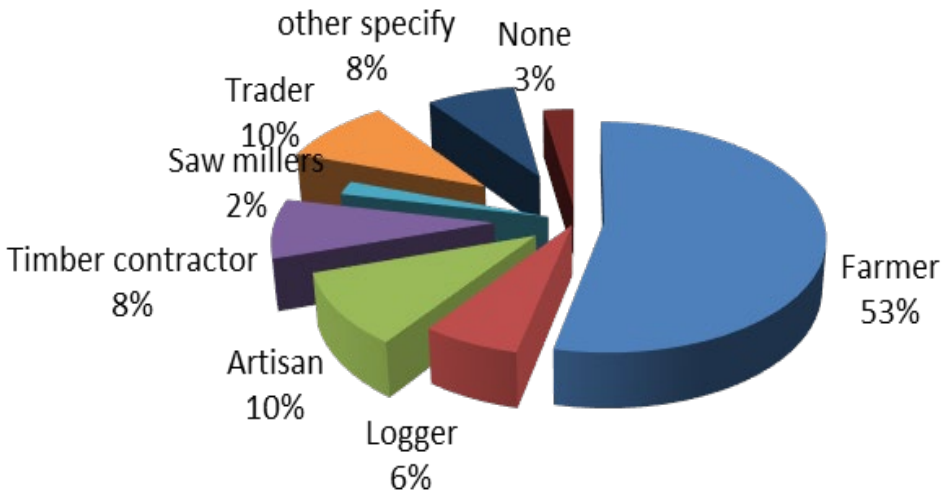

Figure 4: Occupation of the Respondents.
Source: Researcher, 2023.

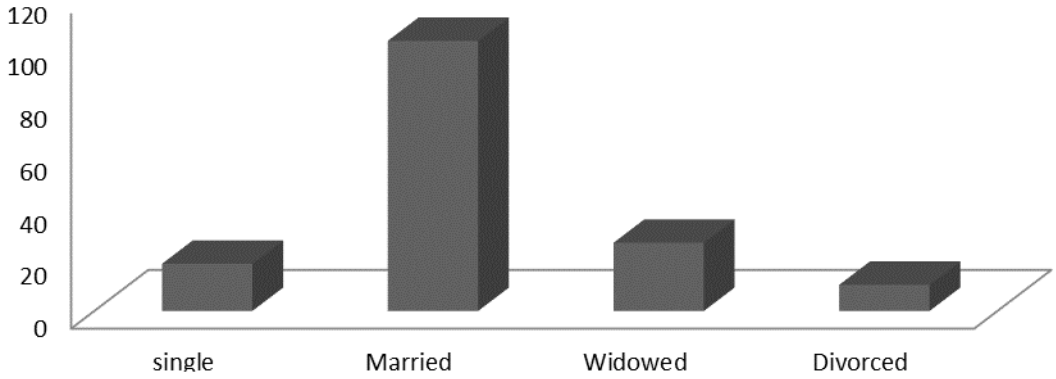

Figure 5: Marital Status of the Respondents.
Source: Researcher, 2023.

Figure 4 shows that the majority of respondents (53%) are farmers, followed by 10% dealers, 10% artisans, 8% wood contractors, 6% loggers, and 3% who do not have a specific employment. These findings are consistent with research by Babatunde, *et al*. (2015), who discovered that farming remained the most common occupation rural Nigerian communities owing to the reliance on agriculture for both sustenance and revenue (Adepoju and Obayelu, 2013). Similarly, Awe, *et al*. (2020) emphasized the necessity of livelihood diversification, in which rural households participate in a variety of activities like as trade, artisanal employment, and logging to meet their livelihood needs in the rural areas. Diversification is critical for risk management and family resilience.

Figure 5 reveals that the majority of respondents (65.5%) were married, with 16.6% widowed. These findings are consistent with study from the Fatima et al (2020), which revealed that marriage rates remain high in rural regions due to established social institutions and cultural norms that value marriage. This might imply that rural communities have higher marriage rates than urban regions, which can be attributed to greater community bonds and the socioeconomic benefits of marriage in rural settings.

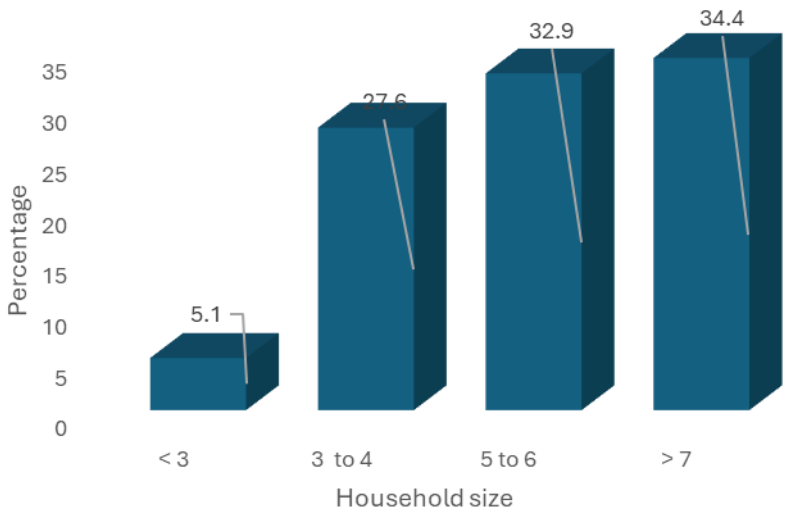

Figure 6: Household of the Respondents.
Source: Researcher, 2023 Researcher, 2023.

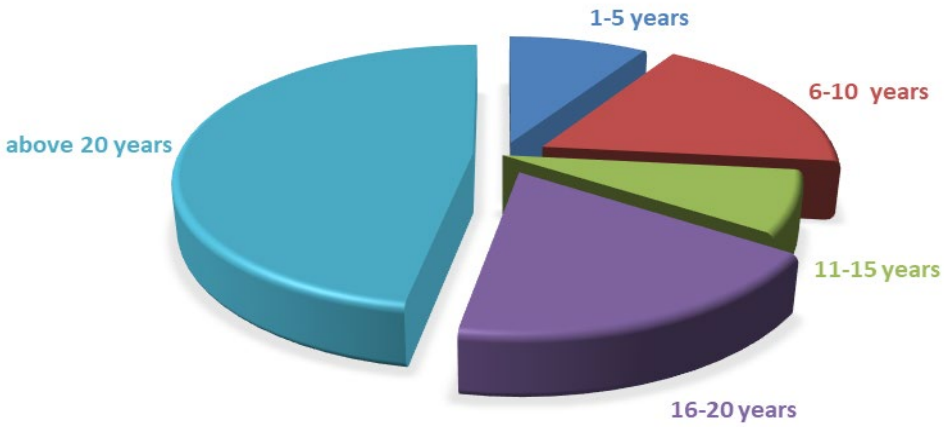

Figure 7: Years Living in the Community of the Respondents.
Source: Researcher, 2023 Researcher, 2023.

Figure 6 shows the largest group (34.4%) comprises households with seven or more members. This is closely followed by households with five to six members, while the smallest group (5.1%) consists of households with one to two members. These results support the findings by the World Bank (2021) highlighting that larger household sizes in rural areas are often associated with agrarian economies, where more family members contribute to farming activities. Additionally, Kola-Oladiji, *et al.* (2016) posit that the high household size might have negative implication for conservation activities, as it might mean more mouths to be fed and consequently, an increased need to harvest more NTFPs.

Figure 7 shows that respondents who had resided in the neighborhood for more than 20 years had the largest percentage (47.1%), followed by those aged 16 to 20 (18.5%). Respondents who had resided in the town for 11-15 years accounted for the smallest percentage (7.6%). The high percentage of people who resides in the area might be owing to strong family ties and a reliance on agricultural livelihoods (Olagunju, *et al.* 2023).

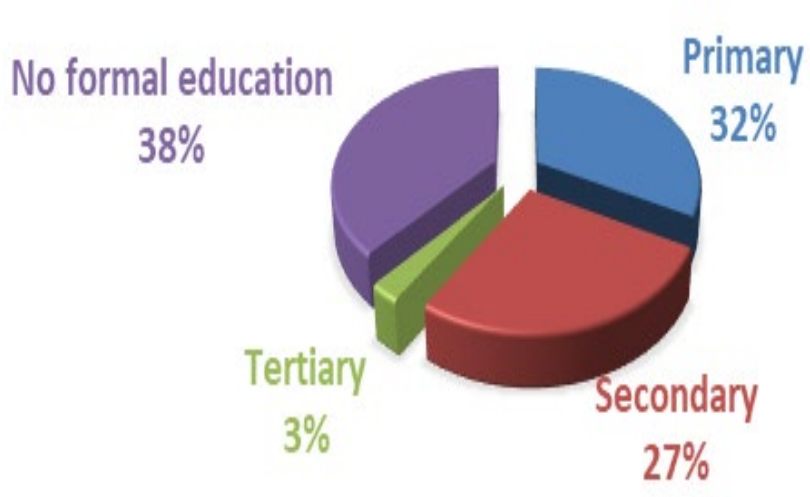

Figure 8: Education Level of the Respondents.
Source: Field survey, 2022.

Figure 8 shows that the majority (38%) of respondents had no formal education. Those with primary education accounted for 32%, 27% had secondary school education, and only a small percentage (3%) had tertiary education. This finding aligns with Holly (2019), who stated that there is less formal education in rural communities compared to urban areas. This may be due to limited access to formal education in rural Nigerian communities as a result of inadequate educational infrastructure, such as schools and trained teachers. The study also highlighted the financial constraints that prevent many rural families from affording education for their children (Ezeudu and Fadeyi, 2024).

CONSERVATION ACTIVITIES OPERATING IN THE STUDY AREA

Table 1 shows the result of logit regression analysis for conservation activities. It reveals a 2-Log Likelihood of 156.83a indicates model fit, with lower values suggesting a better fit.

The table shows the result of logistic regression analysis with several independent variables related to forest management and their impact on the odds of successful forest conservation. The Constant; (Coefficient: 0.88, Odds Ratio: 2.41).

The constant represents the log odds of the dependent variable when all predictors are zero. An odds ratio of 2.41 indicates a positive baseline effect on forest conservation. The model correctly predicts 77.1% of cases compared with 100% for a perfect model, indicating good predictive power. The Likelihood Ratio Chi-square (33.08) shows the model is statistically significant, confirming that the predictors collectively contribute to forest conservation outcomes. A test of the full model against a constant only model was statistically significant at 0.05, indicating that conservation activities as a set reliably distinguished between Yes and No to conservation activities in Olokemeji Forest Reserve.

Table 1 shows the result of logistic regression analysis with several independent variables which include monitoring against forest encroachment (MAF), restrictions on grazing animals (RGA), tree planting exercises (TEA), proper monitoring of forest resources (PMF), controlled exploitation of forest resources (CEF), funding of conservation activities (FCA), technical support in conservation (TSC), and the provision of forest facilities (APF) related to forest management and their impact on the odds of successful forest conservation.

Table 1: Logit Regression Estimates of Conservation Activities of Olokemeji Forest Reserve

Independent variable	Coefficient	Std. Err	Odd ratio
Constant	0.88	0.18	2.41*
Is monitoring against forest encroachment in this area (MAF)	0.26	0.68	1.30
Are people restricted from grazing animals in this area (RGA)	1.83	1.03	6.25*
Is tree planting exercise carried in this area (TEA)	3.05	1.85	21.01*
Is there proper monitoring of forest resources in this area (PMF)	3.00	1.21	19.62*
Is there controlled exploitation of forest resources in this area (CEF)	0.43	0.75	1.54
Is there funding of conservation activities in this area (FCA)	1.25	0.58	3.47*
Is there technical support in conservation of this forest reserve (TSC)	4.52	1.36	91.51*
Is there any adequate provision of forest facilities (APF)	-1.44	0.88	0.29
Correct prediction	77.1%		
-2 Log likelihood	156.83[a]		
Likelihood Ratio Chi-square	33.08		

Source: Researcher, 2023

Dependent Variable: Do you have any conservation activities operating in the forest reserve (Yes =1, No=2)

The Constant term has a coefficient of 0.88 and an odds ratio of 2.41, indicating a baseline level of positive conservation outcome. Monitoring against forest encroachment (MAF); this variable has a coefficient of 0.26 and an odds ratio of 1.30, suggesting a modest positive effect on conservation, although it is not statistically significant.

Restrictions on grazing animals (RGA) have a coefficient of 1.83 and an odds ratio of 6.25, this variable shows a strong positive and significant effect on conservation efforts. Tree planting exercises (TEA) has a coefficient of 3.05 and an odds ratio of 21.01, indicating a very strong positive and significant impact on conservation outcomes. Proper monitoring of forest resources (PMF) has coefficient is 3.00 with an odds ratio of 19.62, showing a significant positive effect on conservation.

Controlled exploitation of forest resources (CEF) has a coefficient of 0.43 and an odds ratio of 1.54, suggesting a positive effect, though not statistically significant. Funding of conservation activities (FCA) with a coefficient of 1.25 and an odds ratio of 3.47, this variable has a significant positive effect on conservation while technical support in conservation (TSC) has a very high coefficient of 4.52 and an odds ratio of 91.51, indicating an extremely strong and significant positive impact on conservation.

In contrast, Provision of forest facilities (APF) has a negative coefficient of -1.44 and an odds ratio of 0.29, suggesting a significant negative effect on conservation outcomes.

The model predicts conservation outcomes correctly 77.1% of the time, with a -2 Log likelihood of 156.83 and a likelihood ratio chi-square of 33.08, indicating a good fit.

Chandra, *et al.* (2022) discovered that adequate monitoring and controls on resource use, such as grazing, are critical for forest integrity. Their findings back up the strong favorable benefits seen for RGA and PMF in the current investigation. Furthermore, tree planting activities and technical assistance are essential components of sustainable forest management.

This study's findings are consistent with those of Geleye, *et al.* (2024), who emphasize the importance of reforestation and providing technical competence to local people, as well as the strong favorable effects of PEA and TSC found here. Funding for conservation efforts is another critical aspect.

Chandra, *et al*. (2022) emphasized the need of financial assistance in efficiently implementing conservation measures, which confirms FCA is effective in Olokemeji.

However, the negative effect of the provision of forest facilities (APF) suggests that simply providing facilities without proper management or integration into a comprehensive conservation strategy might not be effective. This finding aligns with research by Chandra, *et al*. (2022), who

found that the mismanagement of resources and facilities can lead to negative conservation outcomes.

The results imply that effective conservation and sustainable forest management depend on a combination of factors such as effective restrictions on activities such as grazing are crucial for protecting forest resources; Tree planting and reforestation programs have significant positive impacts; continuous and effective monitoring of forest resources is essential and, adequate funding and technical support are necessary for implementing and maintaining conservation activities. In contrast, providing infrastructure without a strategic strategy and competent administration might jeopardize conservation efforts. As a result, policymakers and conservation managers should focus on comprehensive plans that incorporate these factors in order to accomplish sustainable forest management and conservation objectives.

CONCLUSION

The study suggests that effective conservation and sustainable forest management require a mix of elements, including planting trees (TEA), proper monitoring of forest resources (PMF), funding conservation activities (FCA), and providing technical assistance (TSC). It also emphasizes how giving infrastructure without a strategic strategy and competent management could undermine conservation efforts. The study suggests that policymakers and conservation managers focus on comprehensive plans that incorporate these factors in order to accomplish sustainable forest management and conservation objectives

REFERENCES

1. Adepoju, A.O. and O.A. Obayelu. 2013. “Livelihood Diversification and Welfare of Rural Households in Ondo State”. *Journal of Development and Agricultural Economics*. 5(12): 482-489.

2. Adejuwon, J.O., S.A. Adejuwon, and S.B. Ogungbenro. 2019. “Olokemeji Forest Reserve, Southwestern Nigeria”. *Journal of Environmental Geography*. 12(1-2): 1-10.

3. Adejuwon, S.A., A.O. Ayeni, and I. Olorunfemi. 2020. “Community-Based Conservation Strategies and Sustainable Management of Forest Resources in Olokemeji Forest Reserve, Nigeria”. *International Journal of Environmental Studies*. 77(4): 1-15.

4. Akinsoji, A. 2013. “Quantitative Analysis of a Forest Fragment in Olokemeji Forest Reserve, Nigeria”. *Journal of Natural Sciences Research*. 3(13): 111-114.

5. Ayeni, A.O., O.A. Fashae, and O.H. Adedeji. 2020. “Remote Sensing and GIS-Based Assessment of Land Use/Land Cover Changes in Olokemeji Forest Reserve, Nigeria”. *Journal of Geospatial Information Science and Technology*. 2(2): 1-10.

6. Ayeni, A.O., O.A. Fashae, and O.H. Adedeji. 2021. “Assessment of Deforestation and Habitat Fragmentation in Olokemeji Forest Reserve using Satellite Imagery”. *Remote Sensing Applications: Society and Environment*. 21: 1-12.

7. Awe, F., T.O. Olarewaju, L.A. Orumsense, and B.T. Olatunji. 2020. “Effects of Wood Harvesting on Livelihood of Forest Fringe Communities in Southwest”. *Agro Science.* 19(4): 51-55.

8. Babatunde, R.O., E.O. Ayinde, F.O. Oladipo, and A.O. Adekunle. 2015. “Determinants and Effects of Livelihood Diversification among Small Scale Poultry Farmers in Oyo State, Nigeria”. *Ethiopian Journal of Environmental Studies and Management*. 8(1): 782-791.

9. Chandra, A., D. Fauzi, F.H. Khatimah, and S.A. Wicaksono. 2022. “Assessing Drivers of Conservation in Simancuang Village Forest, West Sumatra”. *Small Scale Forestry.* 21(1): 93-118.

10. Chikanda, A. 2019. “An Analysis of Forced Migration”. *Migration Studies.* 7(1): 59-82.

11. Diaw, K., B. Blay, and C. Adu-Anning. 2002. “Socio-Economic Survey of Forest Fringe Communities: Krokosua Hills Forest Reserve”. A report submitted to the Forestry Commission of Ghana.

12. Dube, T., O. Mutanga, and M. Sibanda. 2021. “Evaluating the Success of Conservation Strategies in African Forest Reserves: A Review”. *African Journal of Ecology*. 59(3): 1-15.

13. Eze, B.U. 2019. “Understanding the Impacts of Rural-Urban Migration on Agricultural Economy of Nigeria: An Analytic Review”. *International Journal of Agricultural Research, Sustainability, and Food Security.* 6(3): 367-375.

14. Ezeudu, T.S. and T.J. Fadeyi. 2024. “Examining the Influence of Infrastructure Deficit on Economic

Activities, Education, and Healthcare in Rural Areas in Nigeria". *Nnamdi Azikwe Journal of Political Science*. 9(1): 155-176.

15. FAO.2020. "Global Forest Resources Assessment 2020". Food and Agriculture Organization of the United Nations: Rome, Italy.

16. Geleye, Y. 2024. "A Systematic Review of Potential Analogy of Phytobiomass and Soil Carbon Evaluation Methods. *Ethiopia Insights.* 9(1): 20220313.

17. Hennessy, C. and R. Means. 2018. "Connectivity of Older People in Rural Areas". In: Walker A (ed.), *The New Dynamics of Ageing*. Policy Press: Bristol, UK. 147–166.

18. Holly, L.D. 2019. "Non-Formal Education Needs Of Rural Farmers For Improved Participation In Community Development In Rivers State". Department of Vocational and Technology Education Rivers State University: Port Harcourt, Nigeria.

19. Htay, T., K.K. Htoo, F.P. Mbise, and E. Roskaft. 2022. "Factors Influencing Communities' Attitude and Participation in Protected Areas Conservation: A Case Study from Northern Myanmar". *Society and Natural Resources*. 35(3): 302-319.

20. Kola-Oladiji, K.I., O.A. Olutayo, F. Awe, and T.O. Oguntoye. 2016. "Livelihood Diversification Strategies among Forest Environments' Dwelersin, Edo State, Nigeria". *Ibadan Journal of Sociology*. 4: 4-28

21. Oduro, W., O. Amponsah, and D. Attuquayefio. 2019. "Balancing Conservation and Development: Community Participation in Forest Management in West Africa". *Environmental Development*. 30: 1-9.

22. Ogunjemite, B.G., O.A. Olaniyi, and O.D. Akinyemi. 2021. "Biodiversity Assessment in Olokemeji Forest Reserve, Ogun State, Nigeria". *Journal of Wildlife and Biodiversity*. 5(3): 1-10.

23. Ogunleye, A.J., A.J. Adeola, and O.S. Akinola. 2018. "Challenges of Forest Conservation in Nigeria: Lessons from Olokemeji Forest Reserve". *Nigerian Journal of Forestry*. 47(2): 1-20.

24. Okoli, C., C.M. Okaforocha, P. Osang, and E.S. Nwokoye. 2024. "Unemployment an Educational Attainment in Nigeria". *South Asian Journal of Social Studies and Economics*. 21(3): 204-13.

25. Olagunju, K.O., K.S. Olagunju, A.I. Ogunniyi, A.O. Omotayo, and Z. Oyetunde-Usman. 2023. "To Own or Not to Own? Land Tenure Security and Production Risk in Small Scale Farming". *Land Use Policy*. 127. 106584 ISSN 0264-8377

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