

**Assessing the Pattern of Forest Resources Consumption and Biodiversity Conservation Among Rural Dwellers in Cross River State, Nigeria**

By

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<https://orcid.org/0000-0002-7965-5952>**Abstract**

This study investigated the assessment of the pattern of forest resources consumption and biodiversity conservation among rural dwellers in Cross River State, Nigeria. Three research hypotheses were formulated and tested at .05 level of significance. The study adopted the descriptive research design with population of 73,755 registered farmers in Cross River State. A sample of 499 was used through multi stage technique. The instrument titled 'Pattern of Forest Resource Consumption and Biodiversity Conservation among Rural Dwellers Questionnaire (PFRABCARDQ)' used for data collection was a structured questionnaire by the researchers which was subjected to validity test by two (2) experts in Test and Measurement Unit, Educational Foundation Department, University of Calabar, Calabar. Cronbach alpha method was utilized to establish the reliability which ranged from .62 to 75%. Simple and multiple regressions statistical tool was used in testing the hypotheses. The result obtained from the data analysis revealed that logging activities, methods of harvesting non-timber forest products (NTFPs) and Hunting practices were significant predictor of biodiversity among rural dwellers. From the findings it was recommended amongst others that conservation agencies should collaborate with traditional institutions to ensure that forests are properly maintained in the communities.

**Keywords:** Forest Resources, Biodiversity Conservation, Rural Dwellers.**Introduction**

Biodiversity provides valuable bio-resources that support the existence of man on earth. In addition, biodiversity also provides unquantifiable services to human. The services include nutrients and water cycling, soil formation and retention, resistance against invasive species, pollination of plant and regulation of climate as well as pest and pollination control. Human activities over the years have continued to put pressure on existing ecosystem, which have led to endangerment and extinction of various species of plants and animals (Offiong, et al 2025). The alteration in the activities and functions of ecosystem has necessitated various stakeholders in environment to clamour for an urgent redress of certain conducts that impinge on the quality and sustainability of various ecosystems due to climate change (Anakwe, 2021).

The need to conserve the forest and its resources has a long history with the adoption of various approaches including sensitization of citizens on the values of such resources with the aim of reducing human dependence on the scarce resources of the forest (Otukwa, 2018). The forest is an essential natural resource of the environment which comprises both timber and non-timber forest products with each playing a highly indispensable role within the ecosystem, hence, the need to constantly utilize these resources in a manner that would ensure their availability at all times. Biodiversity is the variability among living organisms from all sources including terrestrial, aquatic and ecological complexes of which they are part of. This includes the diversity within and between species of an ecosystem. It is the wealth of life forms found on earth that describe nature's variety including both the number of frequency of plants and animal species as well as micro-organism and diversify living things (Akanimore, 2020).

The ecological, social, cultural and economic implication of deforestation and the need to prevent the consequences associated with rapid deforestation in Cross River State informed government's decision to establish the Cross River Forestry Commission. (Agbor, 2014) noted that the Forestry Commission is responsible for the day-to-day management and conservation of the forest in order to maximize the benefit accruable from the forest and its resources. The commission is responsible for sensitizing forest communities on the best management practices; regulate the utilization of these resources in ways that would not fasten their rate of endangerment and extinction. The commission also formulate guidelines for planning, conserving and harvesting both timbers and non-timber forest resources in order to achieve sustainable forest management.

Forest conservation helps conserve ecosystems that provide habitats, shelter, food, raw materials, genetic materials, a barrier against disaster, a stable source of resources and many other ecosystem goods and services and thus can have an important role in helping species, people and countries adapt to climate change. By virtue of their protective status, these forests should remain free from destructive human interventions (Offiong, et al 2025). Forest areas may provide ecosystem services such as drinking water, carbon storage and fossil stabilization, harbour, sacred sites for different faith groups and hold important gene reservoirs of value in medicine, agriculture and forestry. In the face of climate change, these roles all become more critical to enhance the adaptive capacity of local people to cope with climate change (Simms, 2015). An understanding of integral role of forest in the earth life support system could be better understood from the ecological and socio-economic services which they provide to both the environment and mankind (Shibu, Alarape & Bichi, 2018).

Notwithstanding the importance of forest resources, major challenges facing the forest resources include decline of forest biodiversity population, structural change due to forest removal and conversion of forest land to other uses, forest fragmentation, forest practices, climate change, disease conditions, pests, atmospheric pollutions and so on (Bisong, 2023).

Logging activities could lead to complete loss of biodiversity which affects climate, undermine future economic development and threaten social and political stability of any state or country (Azeez & Aluko, 2019). Biodiversity has a lot of watersheds, carbon sequestration, research and pharmaceutical, maintenance of water quality, maintenance of climate stability, flood control, provision of food, shelter, and construction of bridges, among others (Ohan, 2024). The most disturbing aspect of impact of logging activities is the results in loss of species (Yaccoz, Nichols & Bouliner, 2017). It is quite clear that logging results in loss of biodiversity.

Harvesting of non-timber forest products (NTFPs) has severely influenced biodiversity conservation negatively. Non-timber forest products are harvested for commercial purposes and include thousands of wild or semi-wild species or parts of species used for medicines, food, decorations, fragrance containers, dyes, fuel, shelter, art, ceremonial purpose and more. Despite the known and substantial economic value of non-forest timber in aggregate, historically, managers have not included them as important factors in forest management. Non-timber forest could be defined by six broad categories: (i) Food such as wild edible mushrooms, fruits and nuts (ii) Medicinal plants and fungi (iii) Floral greenery and horticulture stocks (iv) Fibre and dye plants, lichens and fungi (v) Oil, resins and other extracts from plants, lichens and fungi and (vi) Fuel wood and small diameters wood used for poles, post and carvings.

Non-timbers forest products have been recognized internationally as an important element in sustainable biodiversity (Swan, 2018).

The non-timber forest products which is the subset of biodiversity, plays a vital economic role in the lives of over communities living in and around the forest not to mention the vast majority of people who depend on the forest products. It represents an important underestimate part of rural economy, (Pauline, 2018). Mina et al (2020). Forest is a vital source of food, medicine, raw material and income which rural communities have made use of unsustainably. The trees within the various forests provide the timber which houses are built and furniture constructed; trees produce, short fibre pulp for paper. They also produce a variety of useful resins and oil. Trees are useful in contributing to soil conservation, climate amelioration and provision of fodder for livestock. (Katja et al, 2017).

Hunting practices has really resulted to biodiversity loss. The widespread of activities of hunting has come under increasing scrutiny based on ethical concerns and the arguments that it can threaten species and fail to contribute meaningfully to local livelihood, (Murphy, 2017), Ode and Nsairu (2016). Hunting activities are eroding biodiversity and land use changes are historically the most influential drivers of biodiversity loss (Salawu, 2018). Strict protection or legislated restrictions on hunting activities can be appropriate actions in response to unsustainable rate of hunting activities that affects biodiversity negatively (Choa, 2016). Hunting activities can be divided into three broad categories: (i) Subsistence hunting (food for own consumption), (ii) Commercial hunting (sales of animal products to a consumer community in local, national or international markets) and (iii) Recreational hunting (recreational hunting can be broadly defined as the pursuit and killing of animal primarily for leisure and enjoyment purpose).

The rapid rate of global natural resources utilization for safe guarding human needs has promoted natural resources decline and deterioration various policies, programs and projects have been embarked upon as deliberate strategies to offset natural resources depletion through platforms of natural resource protection such as the protected area systems, protected areas within any geographically area Eyo (2016). Mainstream ecological conservation objectives ranging from biodiversity protection, habitat provision to enhancing natural and associated cultural resources appreciation for varied purpose and benefits. Protected areas are designed to exist in different forms based on the priorities for conservation needs within landscapes (Andrew-Essien, 2017).

Despite the efforts of government and non-governmental organization in promoting rational and sustainable exploitation of forest resources, the manner in which some rural dwellers still exploit forest resources has become a source of concern to various stakeholders in the forest sector, some of the intervention efforts introduced has been awareness creation on the value of forest resources as well as provision of alternative sources of livelihood. These efforts have yielded little or no positive results as most rural dwellers still see the forest as a gift from nature, which should be exploited without any conscious effort to conserve it. This has led to the loss of biodiversity and extinction of several species of plants and animals, Aluko, Adejumo and Babadoye (2019). Therefore, the researcher's resolve to carry out research on pattern of forest resources consumption and biodiversity conservation among rural dwellers in Cross River State, Nigeria.

### **Research Hypotheses**

The following hypotheses were formulated for the study:

1. There is no significant influenced of logging activities on biodiversity conservation.
2. Methods of harvesting non-timber forest products (NTFPs) does not significantly influenced biodiversity conservation.
3. There is no significant influenced of hunting activities on biodiversity conservation.

### **Methodology**

The researcher employed descriptive research design with the population consisting of all farmers in Cross River State, Nigeria that are registered under the Agricultural Development Programmes across various local government areas. Records from the Agricultural Department Programme offices 2025 across

the State showed 73,755 registered farmers in the study area. Multi stage sampling procedure were adopted to select the LGAs, communities and respondents therein for the study. First of all, stratified sampling technique was applied to stratify the state in line with the 3 educational zones. Next, applying simple random sampling technique, the names of all the LGAs in each educational zone were written on a small piece of paper and folded into a paper ball. Thirdly, purposive sampling technique was used to select four (4) accessible forested communities within each LGA before applying proportionate sampling technique to select 5% of the registered farmers within the communities. Lastly, using the list of registered farmers in the selected communities, systematic random sampling technique was adopted to pick every twentieth (20<sup>th</sup>) name as a respondent for the study and resulted to 499. The instrument titled 'Pattern of Forest Resource Consumption and Biodiversity Conservation among Rural Dwellers Questionnaire (PFRABCARDQ)' used for data collection was a forty items structured questionnaire by the researchers which was subjected to validity test by two (2) experts in Test and Measurement Unit, Educational Foundation Department, University of Calabar, Calabar. Cronbach alpha method was utilized to establish the reliability of the which ranged from .62 to 75%. Simple and multiple regressions statistical tool was used in testing the hypotheses.

## Presentation of results

### Hypothesis 1

There is no significant influence of logging activities on biodiversity conservation among rural dwellers in Cross River State. The test statistic used in testing the hypothesis was Simple /Linear Regression. The results of the analysis are presented in Table 1.

TABLE 1

Summary of Simple Linear Regression Analysis for the predictive validity of the influence of logging activities on biodiversity conservation among rural dwellers in Cross River State.

#### ANOVA<sup>s</sup>

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	25.839	1	25.839	5.124	.024 <sup>b</sup>
1 Residual	2506.285	497	5.043		
Total	2532.124	498			

  

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	13.575	.471		28.847	.000
1 Loggingactivities	.061	.027	.101	2.264	.024

R = .101 R Square = .010, Adjusted R Square = .008

Results of the analysis in Table 1, show that the calculated F-ratio of 5.124 was significant at a p-value of .024 using 1 and 497 degrees of freedom. Results also show a correlation coefficient, measuring the strength of association between the two variables (R) of 0.010, and coefficient of determination (Adjusted R<sup>2</sup>) of 0.008. It means that .08% of the variation in the biodiversity conservation among rural dwellers was as a result of variation in the logging activities they carried out, while the other 99.92% (1-R<sup>2</sup>) was as a result of variables extraneous to the study. The regression equation,  $Y^1 = a + bX + e$ , therefore, is given as:  $Y^1 = 13.575 + 0.101(X) + 0.027$ . The test of significance using the t-statistic (t=2.264) shows significance at .05 level, indicating that logging activities significantly predict biodiversity conservation in the study area. Based on these results, the null hypothesis was rejected.

### Hypothesis 2

There is no significant influence of harvesting of non-timber forest product (NTFPs) on biodiversity conservation among rural dwellers in Cross River State. The test statistic used in testing the hypothesis was Simple /Linear Regression. The results of the analysis are presented in Table 2.

TABLE 2: Summary of Simple Linear Regression Analysis for the predictive validity of the influence of harvesting non-timber forest product (NTFPs) on biodiversity conservation among rural dwellers in Cross River State.

**ANOVA<sup>a</sup>**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	28.811	1	28.811	5.720	.017 <sup>b</sup>
	Residual	2503.313	497	5.037		
	Total	2532.124	498			

  

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	13.383	.525		25.496	.000
	nontimberforestproduct	.072	.030	.107	2.392	.017

R = .107<sup>a</sup> R Square = .011, Adjusted R Square = .009

Results of the analysis in Table 2, show that the calculated F-ratio of 5.720 was significance at a p-value of .017 using 1 and 497 degrees of freedom. It means that .08% of the variation in the biodiversity conservation among rural dwellers was as a result of variation in the harvesting of non-timber forest product (NTFPs) they carried out, while the other 99.91% (1-R<sup>2</sup>) was as a result of variables extraneous to the study. The regression equation,  $Y^1 = a + bX + e$ , therefore, is given as:  $Y^1 = 13.383 + 0.107(X) + 0.030$

The test of significance using the t-statistic (t=2.392) shows significance at .05 level, indicating that harvesting of non-timber forest product (NTFPs) significantly predict biodiversity conservation in the study area. The standardized coefficient (Beta) of 0.107 shows a positive moderate relationship between harvesting of non-timber forest product (NTFPs) and biodiversity conservation. Based on these results, the null hypothesis was rejected.

#### Hypothesis 3

There is no significant influence of harvesting of hunting activities on biodiversity conservation among rural dwellers in Cross River State. The test statistic used in testing the hypothesis was Simple /Linear Regression. The results of the analysis are presented in Table 3.

TABLE 3

Summary of Simple Linear Regression Analysis for the predictive validity of the effect of hunting activities on biodiversity conservation among rural dwellers in Cross River State.

**ANOVA<sup>a</sup>**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	47.525	1	47.525	9.507	.002 <sup>b</sup>
	Residual	2484.599	497	4.999		
	Total	2532.124	498			

  

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	13.163	.482		27.331	.000
	Huntingactivities	.085	.028	.137	3.083	.002

R = .137<sup>a</sup> R Square = .019 Adjusted R Square = .017

Results of the analysis in Table three show that the calculated F-ratio of 9.507 was significance at a p-value of .002 using 1 and 497 degrees of freedom. It means that 1.7% of the variation in the biodiversity

conservation among rural dwellers was as a result of variation in the hunting activities they carried out, while the other 98.3% ( $1-R^2$ ) was as a result of variables extraneous to the study. The regression equation,  $Y^1 = a + bX + e$ , therefore, is given as:  $Y^1 = 13.163 + 0.137(X) + 0.028$ . The test of significance using the t-statistic ( $t=3.083$ ) shows significance at .05 level, indicating that hunting activities significantly predict biodiversity conservation in the study area. The standardized coefficient (Beta) of 0.107 shows a positive moderate relationship between hunting activities and biodiversity conservation. This means that hunting activities hampers biodiversity conservation among rural dwellers in Cross River State. Based on these results, the null hypothesis was rejected.

### **Discussion of finding**

This research hypothesis which addressed the influence of logging activities on biodiversity conservation among rural dwellers revealed that there was a significant influence of logging activities on biodiversity conservation among rural dwellers in Cross River State. The result of the analysis shows that the calculated F-ratio of 5.142 was significant at a p-value of 0.24 using 1 and 497 degrees of freedom.

The result shows that excessive logging activities impacts biodiversity conservation negatively. This result is in tandem with Pauline (2018) who noted that logging is the process of cutting trees, processing them and moving them to a location for transport, stressing that it is the beginning of a supply chain that provides raw material for many products used for housing, construction, energy and consumer paper products. Reliable institutions mandated to protect these natural environments need to be strengthened and supported.

The research hypothesis which addressed the influence of harvesting of non-timber forest product (NTFPs) on biodiversity conservation among rural dwellers revealed that there was a significant influence of harvesting NTFPs on biodiversity conservation among rural dwellers in Cross River State. Result of the analysis shows that the calculated F-ratio of 5.720 was significant at p-value of 0.17 using 1 and 497 degrees of freedom. For multiple-use forestry to be applied broadly, forest policies need to be cross-sectorial and scale sensitive to lessen regulatory obstacles for small holders and for common pool/property systems. This enormous exploitation has continued to cause harm to biodiversity conservation. NTFPs cannot be measured by monetary estimations alone, as they have significant subsistence and socio-cultural importance and are commonly one part of multi-faceted adaptive livelihood strategies with influence witnessed in harming the ecosystem. In spite of the harmful influence on the ecosystem, both rural and urban people continue to use selected timber and non-timber forest resources for medicine, crafts, rituals and food.

Research hypothesis three which addressed the influence of hunting activities on biodiversity conservation among rural dwellers revealed that there was a significant influence of hunting activities on biodiversity conservation among rural dwellers in Cross River State. Result of the analysis shows that the calculated F-ratio of 9.507 was significant at a p-value of .002 using 1 and 497 degrees of freedom.

This result supports Murphy (2017) who noted that hunting is a cultural practice in most communities that relate with attitude towards forest resources conservation. Hunting is an important economic activity in the Savannah ecosystems, and most hunters set fires to drive out game in hunting. In the forest ecosystem, indiscriminate bush burning has been one of the major factors in the change of forest to woodland, woodland into Savannah and Savannah into Shrub land. However, it might take many years to solve the forest resource problems so as to obtain effective results, because human beings have to rely on forest resources for their survival.

### **Conclusion**

Based on the findings, it was concluded that each of (i) logging activities inhibit biodiversity conservation in the study area (ii) harvesting of non-timber forest product (NTFPs) hinders biodiversity conservation in the study area. (iii) Hunting activities impedes biodiversity conservation in the study area and influenced biodiversity conservation among rural dwellers in Cross River State.

### **Recommendations**

On the basis of the findings of the study, the following recommendations were made:

- i. The Government should implement and enforce strict regulations on the amount and frequency of logging activities in forests. This will help to prevent overexploitation of timber resources and promote sustainable management practices.
- ii. Promote sustainable alternative livelihoods: In many cases, non-timber forest product harvesting is driven by economic necessity. Governments should promote sustainable alternative livelihood options for local communities, such as ecotourism, sustainable agriculture, and non-destructive use of forest resources.
- iii. The Governments and local communities should work together to develop and promote sustainable hunting practices. This could include setting limits on the number and types of animals that can be hunted, promoting traditional hunting methods, and implementing seasonal hunting bans to allow wildlife populations to recover.

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**Authors' contributions:**

AEAO, AOU, DUA and IES were involved in Conception/design, and data collection,

KJU, EO, LBA, EIO, JNM and BUK were involved in interpretation of data, and Result presentation.

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