

DETERMINANTS OF WILLINGNESS TO PARTICIPATE IN FOREST CONSERVATION AMONG COMMUNITIES IN ONDO STATE, NIGERIA

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Abstract

This study assessed willingness of communities to participate in forest conservation in Ondo State, Nigeria. The study specifically described the socio-economic characteristics of respondents in the study area; evaluated the perception of the respondents about forest conservation; and identified factors that influenced the respondents' willingness to participate in forest conservation in the study area. A multi-stage sampling technique was employed to select 200 respondents. The collected data were analyzed using descriptive statistics, Likert Scale and Double-bounded Logit Model. Findings revealed that the average age of the respondents were 42 years indicating they were in their active age and most (49.5%) of them had secondary education. Findings also revealed that respondents agreed that forest protection programmes are necessary to sustain the forest reserve with a mean score of 4.7. The double-bounded logit regression model showed that the amount offered as incentive (bid amount), age, marital status, income and distance of respondents' home to the forests were factors that significantly influenced the respondents' willingness to participate in forest protection. It is therefore recommended that incentives, such as a monetary value, should be placed on forest resource conservation to ensure the willingness of community members to participate conservation to engender continued provision of goods and services by the forests.

Key Words: *Deforestation, Forest reserves, Double-bounded logit, Afforestation, Participatory approach*

Introduction

The increasing rate of forest degradation all over the world is alarming. Over the last 10,000 years, the world has lost one-third of its forests, an area twice the size of the United States (FAO, 2020). These forests have been cleared to grow crops, raise livestock and for use as fuel

wood. Large areas of forests are still being lost in the tropics today and this is particularly tragic because these are regions with the highest level of biodiversity (Ritchie, 2021). Total tropical primary forest loss in 2023 totalled 3.7 million hectares and this represents a 9% decrease from 2022. The rate in 2023 was

nearly similar to that of 2019 and 2021. All this forest loss produced 2.4 gigatonnes of carbon dioxide emissions in 2023, equivalent to almost half of the annual fossil fuel emissions of the United States (Weisse *et al.*, 2024). Despite several environmental activism and awareness that has been done worldwide, the rate of tropical rainforest destruction is escalating.

The forest resources in Nigeria have been substantially depleted, due to uncontrolled human pressure and other environmental challenges, leading to its degradation (NEST, 1991). The level of deterioration of forest resources is as a result of uncoordinated land use policy and other forms of land-use such as agriculture, grazing, industrialization, urbanization and water management leading to formation of deserts, bare surfaces and general environmental degradation. FAO (2016) statistics indicate that 7.2% of Nigeria's land area, 6,583,400 hectares, is covered with forest; and lose up to 350,000 ha of forest and natural vegetation annually (NEST, 1991:132, Adekola *et al.*, 2015).

In the rainforest region, where Ondo State belongs, deforestation has risen to an alarming rate that urgent policy instruments are needed to salvage the forests and reduce its environmental impacts. The government has been factoring into their policies and programme measures for minimizing deforestation. But these efforts by governments and their agencies to protect the forests seem not to have significant impacts. All these have been due to the spread of agriculture, commercial timber felling and local cutting of wood for fuel at will. This is further aggravated by accidental forest fires as well as farming and game related bush burning. To douse

the pressure on Nigerian forests, the FGN (2000) set out some specific targets in the area of forestry. These targets include establishment of 38 new nurseries, 190km of shelter belts, 59km of forestry, 8000 hectares of plantations, production of 20 million seedlings and rehabilitation of 8 forest reserves. To meet these targets, the FGN identifies afforestation, reforestation and conservation of biodiversity and wildlife as the main measures. Specific strategies set out for implementation of programmes aimed at meeting the target include intensification of "Tree for Democracy" Campaign, effective implementation of environmental renewal/initiatives and participatory approach to achieving sound environmental standards.

A participatory approach to protecting and conserving forests and biodiversity is highly essential in forest management. Therefore, to enhance rural livelihoods and sustainable management of forest resources, a decentralized approach to forest management has widely been considered as one of the most viable options. Participatory Forest Management (PFM), a form of decentralization has been adopted by more than 21 African states as an alternative method of managing forest resources (Wily, 2001; Mutune *et al.*, 2015). PFM is the local involvement of communities in the management of forests (Agrawal and Ribot, 1999; Mutune *et al.*, 2015). This is done through a process of inclusion, equity, and democratization of governance of the forest resources (Mutune *et al.*, 2015; Agrawal and Gupta, 2005). Often, PFM promises to increase participation in ways that will profoundly affect who manages, uses and benefits from forest resources. Likewise, greater access to decision makers, higher levels of

participation by various social groups in decision making, and the accountability of decision makers are often the claimed effects of participation (Andersson *et al.*, 2004; Mutune *et al.*, 2015).

Where participatory forestry is concerned, the goal of decentralization policies, as for example in the case of PFM, has often been to increase participation of rural households in decision making and benefits related to all aspects of forest management (Schreckenber *et al.*, 2006; Mutune *et al.*, 2015). However, participation is broad-based, and achievement of inclusiveness has been challenging in these processes. Yet inclusiveness is important because it allows broad-based participation in local public decision making for the sustainability of forest management with economic objectives.

Forest and forest sector are essential component of the Nigerian economy, as they have contributed to sustenance of people's livelihoods and generation of income for governments both in the past and present. But it is worrisome that these forests, especially in Ondo State, are progressively declining in size. This decline is possibly worsened by lack or ineffective management plans for forests in the country. These have not only hampered many of the country's forest management strategies, but they have also limited the potential toward many incentives and benefits accruable to countries and communities with increasing forestland cover. A study was carried out in Ondo State by Ministry of Natural Resources in 2017, that loss of biodiversity, from encroachers, flinchers, illegal loggers, Indian hemp growers and unsustainable afforestation projects are serious threats to forests afforestation in the State. However, the causes of

degradation of forest resources were because most of the activities in afforestation such as planting of tree seedlings, security etc. are done by the government and agencies, using top-down approach without carrying the communities around the forest resources along.

Despite the existence of several national management practices in most region of Nigeria especially in Ondo State, rate of forest loss in afforestation through attacks by the encroachers that trespassed into the reserves for agricultural expansion (burning of trees and farming), illegally felled timbers for commercial purposes, is alarming. This may not be unconnected to the fact that most management strategies do not take cognizance of the users in the environment, therefore there is need to identify the best management practices to reduce forest degradation. The communities around forest reserves need to be involved in management structure, since community participation in forest management is a tool to combat degradation.

In the study by Porkharel *et al.* (2015), it was stated that the dependency of the local and indigenous communities on forest resource for their livelihoods in developing countries has motivated policy makers to decentralize forest management to participating local communities. In view of this, it is necessary to seek to know the willingness of the local communities to participate in forest conservation and ensure the protection of the forests from where they derive their livelihoods. This study therefore attempted to assess the perception of the respondents about forest conservation as well as determine the factors that

influence their willingness to participate in forest conservation.

Methodology

Study Area

The study was carried out in Ondo State. The state is one of the 36 states of the Federal Republic of Nigeria. It has an approximate land area of 14,793,723 square kilometers. The State geographically lies between longitude 4⁰3[^] and 6⁰ East of the Greenwich Meridian and latitude 5⁰ 45[^] and 8⁰ 15[^] North of the equator, with population of 3,441,024 million (National Population Commission, 2006). The tropical climate of the state is broadly of two seasons: rainy season (April – October); and dry season (November – March). The temperature throughout the year ranges between 21°C to 29°C and humidity is

relatively high. The annual rainfall varies from 2,000mm in the Southern areas to 1,150mm in the northern areas. The state enjoys luxuriant vegetation with high forest zone (rain forest) in the South and sub-savannah forest in the northern fringe (Figure 1).

Ondo State has forest reserves covering a total area of about 3,200km². Some of the forest reserves in the State are Akure Ofosu Forest Reserve, (a globally accepted World protected area covers 394 km² (152 sq. miles); Ala Forest Reserve, Ifo Osse river park Forest Reserve, Oyinmo Forest Reserve, Ipole/Idoani Forest Reserve, Owo Forest Reserve, Igbo – Olodumare, Okeluse Forest Reserve, Ojigbo Forest Reserve (mangrove) Ese Odo, Island Forest Reserve at Ilaje and Idanre Forest Reserve.

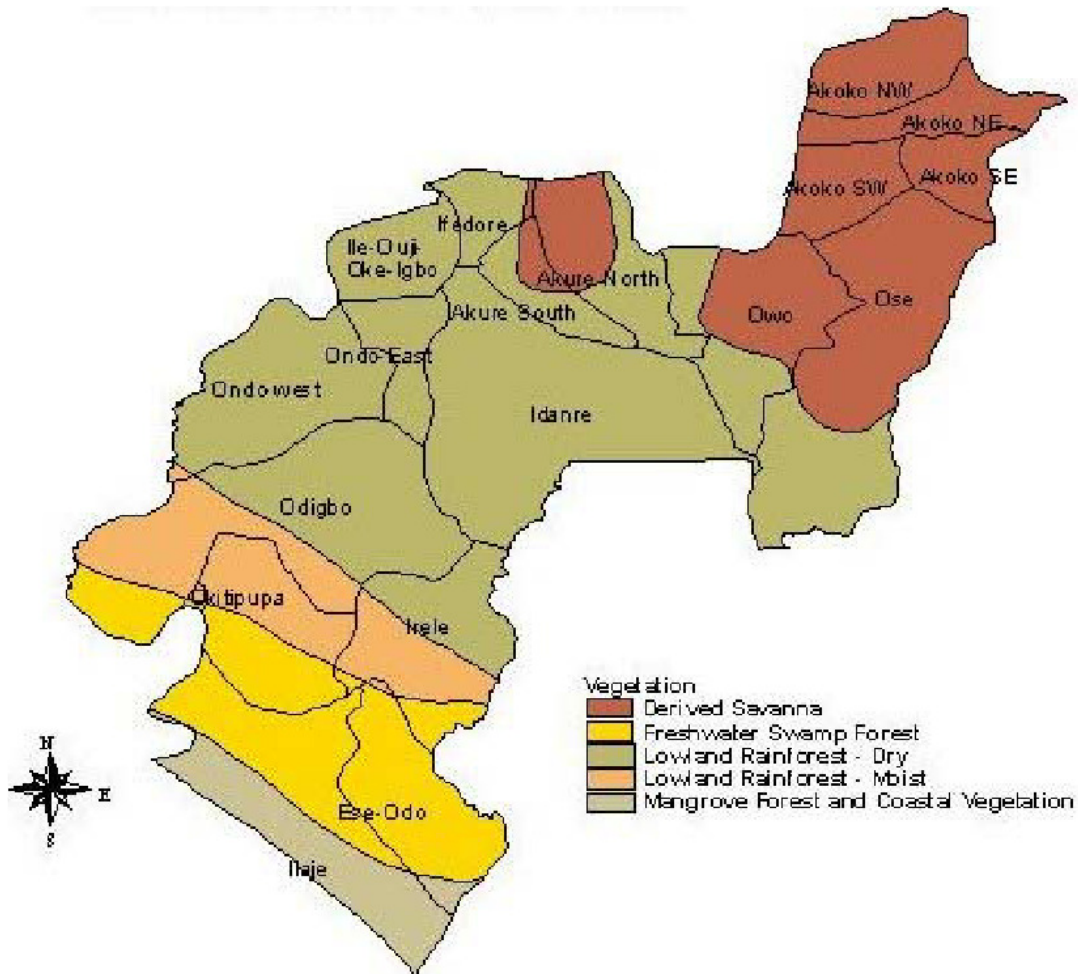


Figure 1: Map of Ondo State showing the vegetation area in all LGAs
 Source: Survey Division, Ondo State (2019)

Data Collection and Sampling Procedure

Data for this study was obtained from primary source. The primary data were obtained through field survey using well-structured questionnaire and interview schedule administered on the residence living around the forest resources in the study area. A multistage sampling procedure was used in the selection of respondents in the study area. At the first stage, two agricultural zones (Owo and Ondo) were purposively selected from the three agricultural zones based on the information from Ministry of Natural

Resources, Akure, Ondo State for occupying the largest square kilometre of forest resources. The second stage involved purposive selection of two Local Government Areas (LGAs) from each of the selected zones that were identified as having forest resources in the State. The third stage involved random selection of five rural communities around the forest resources in the LGAs selected. At the fourth stage, a random sampling technique was used to draw ten (10) households from the selected communities, giving a sample size of 200 households for the study.

Data Analysis

Both descriptive statistics and inferential statistics were used to analyze the data. The descriptive statistics used included frequencies, percentages and

means, while the inferential statistics used was the Double-bounded Logit Model. For the Double-bounded Model, using Hanemann *et al.* (1991) method, the following response probabilities were obtained:

$$P_i^{NN} = 1 - 1 / (1 + e^{-\alpha + \beta \text{ LOW BID}}) \dots\dots\dots 1$$

$$P_i^{YN} = 1 / (1 + e^{-(\alpha + \beta \text{ HIGH BID})}) - 1 / (1 + e^{-(\alpha + \beta \text{ FIRST BID})}) \dots\dots\dots 2$$

$$P_i^{NY} = 1 / (1 + e^{-(\alpha + \beta \text{ FIRST BID})}) - 1 / (1 + e^{-\alpha + \beta \text{ LOW BID}}) \dots\dots\dots 3$$

Where,

- FIRST BID – Starting bid Value
- LOW BID – Follow-up Lower bid value
- HIGH BID – Follow-up Higher bid Value

The double bound log-likelihood function is

$$LDB = \sum i^{YY} \log P_i^{YY} + \sum i^{YN} \log P_i^{YN} + \sum i^{NY} \log P_i^{NY} + \sum i^{NN} \log P_i^{NN} \dots\dots\dots 4$$

i = 1..... n,

where Li, indicates the response category of each respondent i.

With respect to four possible outcome of dichotomous choice the double-double logit, the model is explicitly stated as:

$$\text{Ln} \frac{WTA}{1-WTA} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 \dots\dots\dots + \beta_{12} X_{12} + \epsilon_i$$

- X₁ = Bid offered to the respondents to elicit their willingness to participate in forest conservation, and this is called willingness to accept (WTA) (₦)
 - X₂ = Sex of the respondent (male = 1, female = 0)
 - X₃ = Age (years)
 - X₄ = Nativity of the household (native = 1, 0 = otherwise)
 - X₅ = Year of Formal Education (years of schooling)
 - X₆ = Marital Status (married = 1, 0 otherwise)
 - X₇ = Household size (number of persons)
 - X₈ = Estimated Annual income (₦)
 - X₉ = Main Occupation of respondents (farming = 1, otherwise = 0)
 - X₁₀ = Employment (employed = 1, not employed = 0)
 - X₁₁ = Nearness of respondents to the forest (Distance in km)
 - X₁₂ = Benefit derived (Yes – 1; No – 0)
- μ = Error term.

Results

Table1 depicts the socioeconomic attributes of the respondents where 55.5% of them were male and 44.5% were female. Eighty percent of them were

married and 49.5% of them had secondary education. According to the table, 71% of them had household size ranging from 1-5 members, with 44.5% of them engaging in crop production as their main occupation.

Table 1: Socioeconomic Characteristics of Respondents

Variable	Frequency	Percentage	Mean
Age (Years)			41.90
≤ 20	1	0.5	
21 – 30	15	15.5	
31 – 40	38	33.0	
41 – 50	1	26.5	
51 and Above	24	24.0	
Mean	41.90		
Gender			
Male	111	55.5	
Female	89	44.5	
Marital Status			
Single	25	12.5	
Married	160	80.0	
Separated	1	0.5	
Divorced	2	1.0	
Widow	12	6.0	
Level of Education			
Primary School completed	12	6.0	
Primary School not completed	7	3.5	
Secondary School completed	99	49.5	
Secondary School not completed	49	24.5	
NCE/OND	17	8.5	
HND	11	5.5	
First Degree	5	2.5	
Household Size			4
1 – 5	141	71.0	
6 – 10	58	29.0	
Occupation			
Farming			
Crop Production	89	44.5	
Livestock production	6	3	
Non-Farming			
Civil Services	8	4	
Private Employment	12	6	
Artisan	6	3	
Trading	17	8.5	
Timber logging	44	22	
Years of Residency			19.74
1-5	28	14	
6 – 10	40	20	
11-15	32	16	
16-20	30	15	
21 and above	70	35	

Table 2: Distribution of Respondents Perception about Forest Conservation

Perception of households about forest conservation	Strongly agree		Agree		Undecided		Disagree		Strongly disagree		Mean score	Inferences based on mean class
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%		
Protection of forest resources is important	122	61	75	38.5	0	0	1	0.5	0	0	4.6	Strongly Agree
Forest cover has been declined over the past decades	90	45	61	30.5	1	0.5	27	13.5	21	10.5	3.9	Agree
I have responsibility to protect the forest	105	52.5	89	44.5	3	1.5	1	0.5	2	1	4.5	Strongly Agree
Resource extraction fees are necessary to sustain the resources	100	50	56	28	27	13.5	15	7.5	2	1	4.2	Agree
Establishing the protective Area is necessary to sustain the forest in my area	113	56.5	85	42.5	2	1	0	0	0	0	4.6	Strongly Agree
Forest conservation is necessary for future benefit	126	63	72	36	1	0.5	0	0	1	0.5	4.6	Strongly Agree
Livelihoods are affected positively by the forest improvement	134	67	62	31	3	1.5	0	0	1	0.5	4.6	Strongly Agree
Livelihoods are affected negatively by the forest improvement	16	8	36	18	60	30	56	28	32	16	2.7	Disagreed
I am aware that government has given due recognition to forest conservation	105	52.5	80	40	8	4	6	3	1	0.5	4.4	Agreed
Forest protection programme is necessary to sustain the forest in my area	151	75.5	47	23.5	2	1	0	0	0	0	4.7	Strongly Agree
GRAND MEAN											4.3	

Table 3: Factors Influencing Respondents' Willingness to participate in Forest Conservation

Variables	Coefficient	Standard Error	P-value
Bid Amount	1.117***	0.014	0.000
Sex	696.564	912.644	0.445
Age	-108.778*	55.381	0.050
Nativity	59.419	869.774	0.946
Years of formal education	20.864	229.557	0.928
Marital Status	1892.580**	847.909	0.026
Household size	116.054	268.670	0.666
Income	-0.061*	0.032	0.055
Main Occupation	94.225	917.959	0.918
Employment status	463.973	898.119	0.605
Forest Distance	-530.269**	269.110	0.049
Derived Benefit	475.606	1066.667	0.656
Constant	-281.043	4252.611	0.947
Number of Observations	200		
Log Likelihood	-233.846		
Prob > Chi2	0.000		
LR Chi2(12)	6345.38		
Pseudo R ²	0.5065		

***Significant at 1%, **Significant at 5%, *Significant at 10%

Discussion

From Table1, most (33.5%) of the respondents were between 31 and 40 years old. The mean age was about 42 years. This implies that respondents are in their productive/active age. This indicated most of the respondents are within their productive age and are likely to be actively involved in forest conservation programs. This corroborates the findings of Suleiman *et al.*, (2017) that majority of communities living around forest reserve are between the age group of 20 and 49 years. It can also be observed that most of the respondents (55.5%) were male while 44.5% of the respondents were female in the study area. This implies that the male counterparts were more in number, and they are more likely to take the risk of going into the forest reserve to prevent people from depleting forest resources compared to women in the study area.

The distribution of respondents by their marital status shows that majority (80.0%)

of the respondents were married. This is an indication that majority of the respondents had more responsibilities to cater for. Consequent upon this, they are more likely to support forest conservation than the unmarried. This is because forests and forest resources form significant part of their source of livelihood.

From the table, it can also be observed that the respondents had one form of formal education or the other, with majority (49.5%) of them having access to secondary education. This implies that majority of the respondents had formal education and it is expected that education would provide people with opportunities to access information, enable them to adopt one or more innovative practices and understand the advantages of conserving forest resources in the study area. It is assumed that the high level of education of respondents would lead to extraction of fewer forest products since education opens up alternative

employment opportunities and diverts people from subsistence livelihoods activities such as the gathering of forest products from the forest reserves. This corroborates the findings of Muchapondwa (2003) and Newton *et al.* (2016) that the level of education attained by the household head is expected to influence the nature of his/her economic activity and consequently the level of his/her income. Furthermore, education would make it easier for households to comprehend negative externalities and passive user values of natural resources.

The table also showed the household size of respondents in the study area. It can be observed that most (71.0%) of the respondents in the study area have household sizes between 1 and 5 persons. The mean household size was found to be 4. This implied that most of the respondents in the study area have a small number of people within their individual households that will likely participate in forest conservation management. The distribution of respondents from the table revealed that most (44.5%) of the respondents practice crop production as their primary occupation in the study area. About 22.0% of the respondents were into Timber logging and 8.5% were into Trading. However, 7.5% of the respondents were into agro processing, as their main occupation. This result shows that majority of the respondents are into crop production. This implies that agriculture is the main source of livelihood of the people living around the forest reserve. The implication is that the respondents may likely be using the forest reserve to practice Agriculture and may want to conserve it from going into extinction because of the benefit they derived from the reserve.

The number of years of residence of the respondents showed that most (35.0%) of the respondents have lived in the communities for above 20 years. The mean year of residence is 19.74. This implied that most respondents have significant knowledge and are more familiar with forest reserves in the study area. The finding also indicated that a number of people living around forest reserve is likely to embrace productive program on forest conservation management.

The factors influencing respondents' willingness to participate in forest conservation are presented in Table 3. The Table revealed five variables that significantly determine the respondents' willingness to participate in the conservation of forest resources in the study area. These are bid amount (that is amount offered to respondents to participate in the conservation), age, marital status, income, forest distance to home.

The bid amount has a positive significant relationship on the respondents' willingness to participate in forest conservation in the study area. This indicates that as the bid amount increases, the respondents' willingness to participate in the conservation of forest resources in their locality increases. That is, as bid amount increases by one unit, the respondents' willingness to accept it and participate in the conservation of forest resources also increases by 1.117 at 1% significant level. This shows that the bid amount highly influences the respondents' decision to participate in the conservation of forest resources in the study area. This result is in line with the findings by Ha Nguyen (2015), where it was stated that the higher the compensation offered, the higher the willingness of people to accept.

In addition, age is statistically, but negatively significant at 10%. A unit increase in the Age of a respondent tends to decrease their willingness to participate in the conservation of natural resources. This indicates that the older the respondent is, the less likely they are willing to conserve the natural resources. This is possibly due to the fact that they view the forest resources as their only means of survival, since they may be too old to engage in any salaried or paid job. Therefore, any policy formulation to shut them out of accessing the forest resources may not be welcomed by them. This corroborates findings by Grany *et al.*, (2014). Furthermore, marital status of respondents had a positive and significant relationship with their willingness to participate in the conservation of forest resources. This implies that married respondents had higher likelihood of participating in the conservation of forest resources. This may not be unconnected to the fact that married respondents have more members of the households to cater for and see the forest resources as their source of livelihood that must be protected, to continue to enjoy sustainable access to the resources.

Income of the respondents also had statistical but negative significance with their willingness to participate in the conservation of forest resources in their locality at 10% level of significance. That is, a unit increase in the household income would reduce their willingness to participate in the conservation of forest resources in their locality. This implies that as households' disposable income increases, their dependency on natural resource as source of livelihood reduces, and they are likely to bother less about whether forest resources are conserved or

not. In addition, distance of the respondents' home to the forest is statistically but negatively significant to their willingness to conserve forest resources at 10% level of significance. That is, the farther the respondents are to the forests, the less likely they are willing to participate in the conservation of forest resources, irrespective of the incentives that may be offered.

Conclusion and Recommendation

Findings from the study show that respondents in the study area were mostly farmers who were still in their productive age. It was also discovered from the study that people living around the forests use them for agricultural activities. Therefore, they were fully aware of forest degradation and the importance of conserving, protecting, and sustain forest resources. Findings also revealed that the people in the study area were willing to participate in the conservation of forest resources if favorable policies are formulated by the government and needed incentives provided. It was also discovered from the study that factors that influenced the respondents' decision to participate in the conservation of forest resources included the amount offered as incentives (bid amount), age, marital status, income as well as the distance of the respondents' home to the forest.

It is therefore recommended that incentives, such as a monetary value, should be placed on forest resource conservation so as to ensure the willingness of community members to participate in the conservation, in order to engender continued provision of goods and services by the forests for the benefits of the people and the environment.

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