

Assessment of Charcoal Producers' Attitude Towards Forest Conservation in Ekiti State, Nigeria.

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Abstract- Forest conservation implies sustainable planting and maintenance of wooded lands for the present and future generations' benefit. However, in an attempt to conserve the forest for sustained yield in perpetuity, the timbers are frequently removed for charcoal production in many communities of developing countries. This study therefore examined the attitudes of charcoal producers towards forest conservation in Ekiti State, Nigeria. The state was stratified into derived savannah and rain forest zones and two communities were selected from each zone. Purposive sampling techniques was used to select the charcoal producers. Data were collected with copies of a semi-structured questionnaire administered on one hundred and twenty (120) charcoal producers. Collected data were analyzed using descriptive statistics. Findings from the study revealed that charcoal production involved the use of earth kiln. Production activities were dominated by males (91.66%). Majority (45.83%) of the producers were within the age range of 31-40 years, while (57.50%) were married and (44.17%) had formal educational up to secondary school level. The result also revealed that the five major tree species, namely: Anogeissus leiocarpus (Igi Ayin), Acacia seyal (Igi Kasia), Albizia coriaria (Igi Ayinre), Terminalia glaucescens (Igi Idi-odan) and Gliricidia sepiu (Igi Agunmaniye) used for charcoal production were mainly sourced from the wild (79.17%). Income generation (47.40%) forms the primary reason for respondents' involvement in the production. The study also showed that (91.45%) of the producers were aware of conservation practices, (88.33%) were aware of consequential effect of charcoal production on the environment. High transportation cost was identified as the major constraint to charcoal production while, 30.80% were involved in afforestation practices irrespective of their high level of awareness, and trees planted were mainly for pole production. It was, therefore, concluded that there should be forest

conservation awareness campaign on tree planting as these identified tree species would suffer massive logging, which could result in extinction if not adequately conserved.

Indexed Terms- Attitude, Charcoal, Conservation, Ekiti, Forest.

I. INTRODUCTION

Forest conservation has been defined as the sustainable planting and maintenance of wooded lands for future generations' benefit [15]. It is a concerted effort to make sensible use of forest resources to fulfill current demand and the needs of future generations. However, in certain regions of developing countries, forests are no longer managed responsibly. A variety of human activities, such as bush burning, indiscriminate tree felling, excessive exploitation of non-timber forest products, farming, and the like, have resulted in deforestation and biodiversity loss in the forests.

Globally, deforestation poses a threat to forest sustainability because it permanently destroys forests and woods. Inevitably, this has resulted in a decrease in stream volume, an increase in surface runoff, and a loss of biodiversity, so distorting the values and healthy functioning of affected ecosystems [5]. In Nigeria, the rate of deforestation has reportedly been high as a result of excessive forest exploitation caused by conflicting usage of forest resources, including wood and non-timber forest products, as a result of the country's growing population. [16] has found that poverty drives individuals, particularly in rural communities, to abuse their environment for energy sources, resulting in environmental deterioration.

Deforestation is a global danger to forest sustainability because it destroys forests and woods irreversibly.

This has inevitably resulted in a decline in stream volume, an increase in surface runoff, and a loss of biodiversity, so altering the values and healthy functioning of affected ecosystems [5]. As a result of conflicting usage of forest resources, including wood and non-timber forest products, and a growing population, the pace of deforestation in Nigeria has reportedly been significant. [16] observed that poverty compels people, especially in rural communities, to use the environment for energy, resulting in environmental degradation. Deforestation is a global danger to forest sustainability because it destroys forests and woods irreversibly. This has inevitably resulted in a decline in stream volume, an increase in surface runoff, and a loss of biodiversity, so altering the values and healthy functioning of affected ecosystems [5]. As a result of conflicting usage of forest resources, including wood and non-timber forest products, and a growing population, the pace of deforestation in Nigeria has reportedly been significant. [16] observed that poverty compels people, especially in rural communities, to use the environment for energy, resulting in environmental degradation.

In the past decade, several initiatives to stop deforestation and restore lost forests have gained momentum. Under the T.R.E.E. initiative, community-based afforestation (tree planting) advocacy events were held in numerous Southwest Nigerian local government areas. This program aims to raise awareness and assist many communities by rallying rural residents, particularly women and young people, to oppose deforestation and depletion of forest resources. Large-scale awareness of the detrimental effects of deforestation on the ecosystem and world carbon cycle was approved by the programme described above [18]. In Zambia, additional research indicates a heightened awareness of forest degradation due to charcoal production and its impact on people and the ecosystem [6]. [13] confirmed a high degree of awareness, notably among charcoal processors in the Nigerian state of Ekiti. Despite this awareness, there has been a surge in the exploitation of trees for ongoing production, regardless of the environmental effects. In light of this, it is of the utmost importance to analyze the role of charcoal processors in the state of Ekiti in combatting deforestation through

conservative initiatives aimed at restoring and sustaining forests.

II. METHODOLOGY

2.1 Study area

The study was conducted in Ekiti State, Nigeria. Ekiti is located between longitudes 40°51' and 50°451' East of the Greenwich meridian and latitudes 70°15' and 80°51' north of the Equator, and bounded in the north by Kwara and Kogi states, while Osun state and Ondo state occupies the west and south respectively and extends towards the eastern part. According to [10], the population of Ekiti State have a population of 2,384,212 people. The State enjoys a tropical climate which is characterized with two distinct seasons (raining and dry seasons). The vegetation is tropical hardwood forest with derived savannah at the northern peripheries.

2.2 Sampling techniques and sample size

Data for the study were collected using multi-stage sampling techniques. The first stage involved stratification of the State into the rain forest and derived savannah, followed by a purposive selection of two sampled communities where charcoal production is prevalent in each of the two vegetation zones to give four (4) communities. The sampled communities were Oke-Ako Ekiti and Iyemero Ekiti in derived savannah; Ogotun Ekiti and Ijan Ekiti from the rain forest. Thirty (30) respondents were selected in each of the four communities. A total of one hundred and twenty (120) respondents were sampled and used for the study.

2.3 Data collection

Semi-structured questionnaires which sought information on respondents' socio-demographic characteristics, processing technique, sources of woods/logs used, and the challenges of charcoal production in the study area were administered to respondents. Focus Group Discussions (FGDs) and interviews were also conducted with the producers to assess the implications of charcoal production on their communities and their efforts toward achieving a "Normal" forest.

2.4 Data analysis

Data collected were analyzed using descriptive statistic such as frequency and percentage, and chart, while the challenges encountered was ranked based on the respondents' perceptions.

III. RESULT AND DISCUSSION

Table 1 shows the result of the socio-economics characteristics of respondents in the study area. The study revealed that the majority (91.66%) of the respondents were male, while 8.34% were female. Age distribution of the respondents indicated that 24.17% were between 20 and 30 years, 45.83% were between 31-40years, 18.33% were between 41-50years, and 11.66% were 50years of age and above. The result indicated that majority (70.00%) of the respondents were between the ages of 20 and 40 years which is regarded as the productive stage of development. This implies that the producers are young, energetic, and very active. This corroborates the study of [1] conducted in Niger State, which revealed that charcoal producers were always within productive age. The respondents' marital status showed that 35.00% were single, 57.50% were married, and 7.50% were widowed. The education status of the respondents revealed that 17.50% had no formal education, 32.50% had primary education, 44.17% had secondary education, and 5.83% had tertiary education. At the same time, farming 52.50% was the principal occupation of the respondents.

Table 1: Socio-economic Characteristics of Respondents

Variables	Frequency	Percentage %
Gender		
Male	110	91.66
Female	10	8.34
Total	120	100
Age (years)		
21-30	29	24.17
31-40	55	45.83
41-50	22	18.33
51-above	14	11.66
Total	120	100
Marital Status		

Single	42	35.00
Married	69	57.50
Widowed	9	7.50
Total	120	100
Educational Background		
No formal Education		
Primary	39	32.50
Secondary	53	44.17
Tertiary	7	5.83
Total	120	100
Occupation		
Civil servant	9	7.50
Farming	63	52.50
Artisan	29	24.17
Trading	12	10.00
Others	7	5.83
Total	120	100

The result on production technique in Table 2 showed that all respondents (100%) reported that charcoal processing in the study area is principally carried out in the Earth kilns. This is in consistent with the finding of [11], which revealed that the largest proportion of charcoal producers in Kenya made use of Earth kiln.

Table 2: Charcoal production methods

Production methods	Frequency	Percentage %
Earth kilns	120	100
Brick kilns	0	0
Metal kilns	0	0
Total	120	100

Table 3 shows the results of five commonly identified highly logged tree species used as raw materials for charcoal production in the study area. *Anogeissus leiocarpus* (Ayin) were utilized by majority (32.50%) of the respondents, 29.17% used *Acacia seyal* (Kasia), 26.67% used *Gliridia sepium*, while 6.67% and 5.00% used, *Albizia coriaria* (Ayinre) and *Terminalia glaucescens* (Idi-odan) respectively. *Anogeissus leiocarpus* (Ayin) is prevalent in Ekiti north senatorial district, while, *Acacia seyal* (Kasia) and *Gliricidia*

sepium (Igi Agunmaniye) are highly predominant species in Ekiti south senatorial district. High utilization of *Anogeissus leiocarpus* (Ayin), *Acacia seyal* (Kasia) and *Gliricidia sepium* (Igi Agunmaniye) by the respondents could be connected with their abundance, the nature of charcoal generated, and availability at different districts in the study area. Respondents' tree preference for charcoal production in the study area agrees with the findings of [11], who noted massive harvesting of any particular tree species preferred for the production of charcoal.

Table 3: Identified Tree species mainly used for charcoal production in the Study Area

Tree Species	Local name	Frequency	Percentage %
<i>Acacia seyal</i>	Igi Kasia	35	29.17
<i>Anogeissus leiocarpus</i>	Igi Ayin	39	32.50
<i>Albizia coriaria</i>	Igi Ayinre	8	6.67
<i>Gliricidia sepium</i>	Igi Agunmaniye	32	26.67
<i>Terminalia glaucescens</i>	Igi Idi-odan	6	5.00
Total	5	120	100

The sources of tree species used for charcoal production in Table 4 revealed that 79.17% of the respondents got their supply from the wild, 6.67% of the respondents got their supply from debris derived from construction site while, 14.17% acquired their collection through purchase. The utilization of these tree species, apart from their abundance and their respective locations, can also be because they obtained them from the forest/wild with little or no charges. The high dependence of charcoal production on trees from the wild, as reported by the respondent, agrees with [4] that charcoal production in tropical countries depends on trees from natural forests.

Table 4: Sources of Tree species used in the Study Area

Sources of Tree Species	Frequency	Percentage %
Wild	95	79.17
Debris from construction sites	8	6.67

Through Purchase	17	14.17
Total	120	100

Figure 1 shows why the respondents decided to remain involved in charcoal-related activities. The result showed that 47.40% of the respondents were involved in charcoal production to serve as a source of income. 33.70% as a source of employment, 11.90% of the respondents were engaged in charcoal activities based on personal interest, and 7.00% on inheritance.

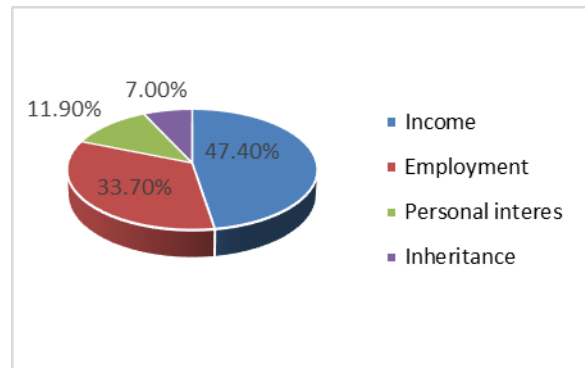
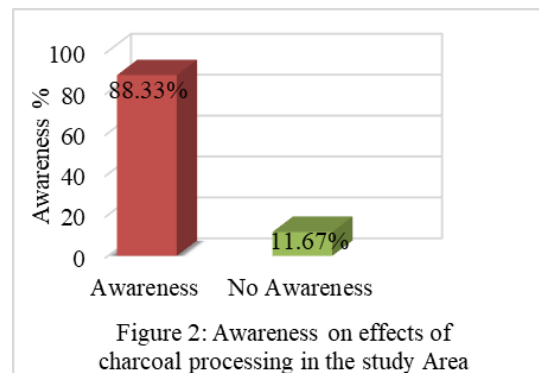


Figure 1: Reasons for involvement in charcoal production

The result on awareness of the effects of charcoal processing in Figure 2 showed that 88.33% of the respondents were aware of the consequential impact of charcoal on humans and the environment. In comparison, 11.67% were unaware of the effects. The result indicated that most of those involved in charcoal production and awareness other related activities were aware of the negative impact of charcoal production on them and their environment. This aligns with [6], who reported that most people were becoming aware of the harmful effects of charcoal production on the environment and forests in Zambia.



The effects of charcoal processing in the study area presented in Table 5 shows that 38.34% of the respondents reported farmers' displacement due to loss of forest cover as the significant effect. This condition may push the farmers further in search for fertile land for crop cultivation. It might also increase the cost of farm produce due to a hike in transportation costs in connection with farm distance from home. Also, 25.83% reported pollution and 35.83% identified deforestation as other effects in the study area, respectively. This is in line with the report of [9] and [7] that charcoal production is one of the activities leading to the destruction of forest cover.

Table 5: Effects of Charcoal processing in the Area

Effects	Frequency	Percentage %
Pollution	31	25.83
Farmers' displacement	46	38.34
Deforestation	43	35.83
Total	45	100

Table 6 shows the challenges encountered by the producers in the course of charcoal processing. The major (23.92%) identified challenge was high transportation cost. This is followed by security operatives (22.68%). The security problem could be from the forest officials bent on enforcing forest conservation principles [8]. 21.85% reported poor road network, 14.23% indicated shortage of labour, and 17.32% revealed inadequate wood supply as problems encountered because it was reported that some producers travelled outside their communities to procure logs for their production. Also, all respondents (100%) revealed that charcoal production is not influenced by season, contrary to [3] on the seasonality of the charcoal business.

Table 6: Respondents' challenges to charcoal processing activities

Challenges	Frequency	Percentage %
Poor road network	106	21.85
High transportation cost	116	23.92
Shortage of labour	69	14.23
Seasonality	0	0
Security/Forest official	110	22.68

Inadequate wood supply	84	17.32
Total	485*	

Note: * = Multiple response

It was revealed in Figure 3 that 91.45% of the respondents were aware of forest conservation, while 8.55% were unaware in the study area. The high proportion of respondents' level of awareness could be due to their educational background, which is intertwined with the respondents' age and experiences.

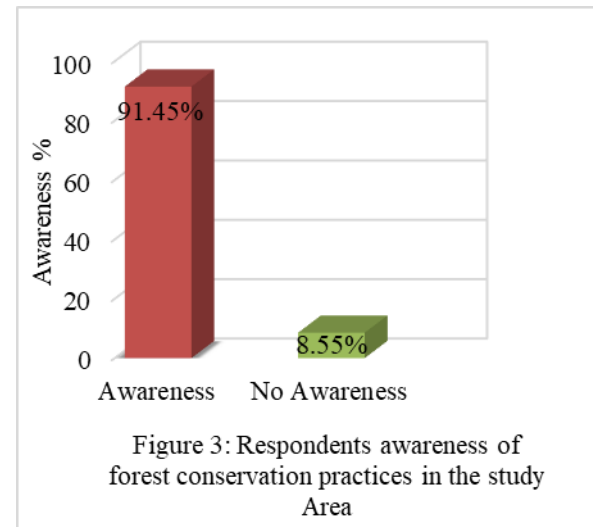


Table 7 shows the result of various adopted conservation practices in the study area. The result indicated that 30.83% of the respondents' practiced afforestation, 34.17% logged trees with specified girth, 20.00% of loggers were licensed, and 6.67% were involved in fire control measures. On the contrary, 69.17% of the respondents were not engaged in afforestation. Also, 65.83% were indiscriminate in tree harvesting. They log trees without considering the girth size, while 80.00% were loggers without an authorized permit, and 93.33% were non-licensed loggers.

Table 7: Adopted conservation practices by producers

Conservation practices	Yes		No	
	Frequ ency	Perce ntage %	Frequ ency	Perce ntage %
Afforestation	37	30.83	83	69.17
Logging of trees				

with specified				
girth	41	34.17	79	65.83
Licenced logging	24	20.00	96	80.00
Fire control				
measure	8	6.67	112	93.33

The result in Table 8 showed that 56.76% of charcoal producers were involved in teak (*Tectona grandis*) planting while 43.24% planted Gmelina (*Gmelina arborea*).

Table 8: Tree species planted by charcoal producers

Tree species	Common name	Frequency	Percentage %
<i>Tectona grandis</i>	Teak	21	56.76
<i>Gmelina arborea</i>	Gmelina	16	43.24
Others		0	0
Total		37	100

The reasons for tree planting in Table 9 revealed that the 40.54% of the respondents raised trees for electric poles production, 27.03% planted for the production of lumber, 21.62% raised trees for sale at stump area while 10.81% preferred tress planting for environmental protection purpose.

Table 9: Reasons for tree planting

Reasons	Frequency	Percentage %
Pole production	15	40.54
Lumber	10	27.03
Environmental protection	4	10.81
Sales	8	21.62
Total	37	100

CONCLUSION

The study identified some common tree species used for charcoal production, which could suffer massive logging resulting in extinction when not adequately regenerated or conserved. The study revealed that *Anogeissus leiocarpus* are prevalent in the derived savannah (Ekiti north) zone, while *Acacia seyal* and *Gliricidia sepiu* were abundant in the Rain-forest (Ekiti south) zone. Charcoal production had constituted a great upheaval to the environment and the people in the study area. Farmers were displaced and relocated due to soil exposure because of forest

cover removal, loss of soil fertility, and environmental pollution. High transportation costs and security were the significant challenges encountered in producing charcoal.

The production is characterized by illegal activities such as indiscriminate logging irrespective of tree girth by unlawful operators without recourse to reforestation and fire control measures. Respondent's reliance on charcoal production is relative to some interconnecting factors like availability of raw material (wood) in the forested Area, income generation, and high level of unemployment. With the evidence of processors' relatively high level of awareness both on forest conservation practices and the consequential effects of charcoal production on the environment, little effort was put into conservative forest measures by the respondents. The tree species planted which are Teak (*Tectona grandis*) and Gmelina (*Gmelina arborea*) were purposely for electric poles production, lumber production, environmental protection and sales at the stump area. The little contribution achieved towards conservation was made by those that complement farming with charcoal processing.

Consequently, the following policy directions were recommended: there should be a forest conservation awareness campaign on tree planting and the consequential effects of deforestation on both the people and the environment at large. Also, efforts should be intensified both by the government and private individuals towards job creation, human empowerment, and the implementation of the policy framework that will guard against indiscriminate tree felling and encourage sustainable forest management.

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