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Research Article
Status of Indigenous Timber Species Used by Saw-Millers in Ore, Ondo State, Nigeria

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Abstract

Background and Objective: Population growth and high demand for wood and wood products in Nigeria is on the increase and subsequently put undue pressure on the forest estates, therefore this research was centred on the identification and status of commonly exploited indigenous timber species by saw millers in Odigbo Local Government Area, Ondo State, Nigeria. **Materials and Methods:** One hundred and twenty well-structured questionnaires were administered in ten different sawmills to obtain information from the respondents using the purposive sampling method. A total of 120 respondents, comprising of 80 males and 40 females with an average age of 45 years were interviewed. About 20 indigenous timber species belonging to 13 families and 16 genera were identified. **Results:** The result reveals that Meliaceae had the highest frequency of 5 (18.5%), followed by Fabaceae with a frequency of 4 (14.8%). It was observed that vulnerable (11), endangered (10), un-evaluated (4), critically endangered (1) and least concern (1), respectively were trees species from the families of (Caesalpinioideae, Meliaceae, Rubiaceae, Combretaceae, Euphorbiaceae and Ochnaceae), Bombacaceae, Fabaceae, Bignoniaceae, Malvaceae, Leguminosae and Sterculiaceae), (Apocynaceae, Moraceae and Fabaceae), (Santalaceae) and (Boraginaceae), respectively. **Conclusion:** The rate at which trees are exploited in this area revealed a tremendous decline in the number of indigenous timber species in the study area and this necessitates an urgent need for proper strategies and policy enforcement to minimize the rate at which indigenous timber species are being exploited in the area to ensure sustainability.

Key words: Indigenous timbers, saw-mill, endangered, over-exploitation, forest estates, vulnerability, sustainability

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Historically forests have played a major role to influence patterns of economic development, supporting livelihoods, helping structure economic changes and promoting sustainable growth for several years before the industrial resolution, forest, woodland and trees were the sources for land cultivation and settlement, of construction materials, of fuel and energy and indeed of food and nutritional well[1]. According to the previous reports[2]. Exploitation has both positive and negative implications. Among the positive implications is its contribution to income, its associated reduction of poverty, creation of employment and a huge contribution to both national and local economies[2]. despite the immense importance of forests, agencies and organizations there have been great losses of the ecosystems due to unfavourable forestry practices all over the world.

The dynamic structure of the Nigerian vegetation can be attributed to anthropogenic activities, which has negative impacts on the forests[3]. The disappearance of urban forest reserves and enclaves have suffered undue depletion, degradation, loss of biodiversity and renewable resources as a result of urbanization and encroachment on areas originally perceived as forest reserves and estates[4]. This has a significant adverse effect on the conservation and sustainable use of plant diversity. Meanwhile, species extinctions and ecosystem composition changes provide important examples of the challenges of multiple stressors interacting with multiple thresholds, past dependence and some-grid-scale dynamics[5]. Natural ecosystems often respond non-linearly to external forces where a small loss of resilience can cascade into large and surprising changes or impossible to reverse. Studies have shown that forest reserves occupy about 10 million ha in Nigeria, which accounts for about 10% of the total land of approximately 96.2 million ha[5]. Land areas once identified as forestlands have been decreasing steadily due to industrial and social development which competes for the same pieces of land on which forest stands exists. Deforestation has global consequences, primarily due to the influence of carbon exchange in the vegetation which in the dry zones averages about 30 tons per hectare declines when the vegetation is depleted[6]. Carbon-rich soils are found in dry zones, hence the destruction of these trees has a very powerful effect on the carbon cycle and the increase in the greenhouse effect. Overexploitation, exploration and another conversion of forest ecosystems or other land use normally result in the decimation of biodiversity as well as in extinction of many valuable indigenous plant species and animals[7,8].

Deforestation for various reasons is equally evident for the disappearance of many economically valued trees and shrubs species across Nigeria[8-11]. The various roles associated with forests would be lost if they are indiscriminately depleted. For instance, this may lead to food insecurity and environmental problems would be on the increase as there will be heightened climate change resulting in reduced immunity and outbreak of various diseases leading to the eventual death of organisms including man[12]. Deforestation is a contributor to global warming and is often cited as one of the major causes of the enhanced greenhouse effect[13]. Tropical deforestation is responsible for approximately 20% of world greenhouse gas emissions. According to the intergovernmental panel on climate change, deforestation mainly in tropical areas could account for up to one-third of total anthropogenic carbon dioxide emissions. It also reduces the content of water in the soil and groundwater as well as atmospheric moisture[14].

The practice of residents in the Odigbo Local Government Area of Ondo State on the use of indigenous trees as, construction materials, fuelwood and others have to lead to destruction and loss of important indigenous tree species in the area.

This research aimed to identify the status of commonly exploited indigenous timber species by the saw millers in the Odigbo Local Government Area, Ondo State.

MATERIALS AND METHODS

Study area: This study was carried out in the Odigbo Local Government Area of Ondo state. The area occupied a total land of about 1,710 sq km[5]. It lies approximately between latitude 6.30°N and 6.55°N and longitude 4.26°E and 5.14°E. The total annual rainfall is between 1500-200 mm. The temperature varies from 21-29°C throughout the year with an average value of 25°C[15]. the study was carried out within the selected sawmills from March-October, 2020.

Sampling procedure and sample size: The sampling method used in this research was purposive sampling. Ten sawmill industries were purposely selected due to the operations and saw-milling activities in the selected mills within the study area. Twelve questionnaires were administered to the respondents in each of the 10 selected sawmills making a total number of 120 questionnaires administered. The selected sawmills in these locations include, Titilayo sawmill Ore, Erinfolami Sawmill Ore, Akinmusayo Philip Sawmill Irele Road Ore, Iyadunni sawmill Ore, Makinde Temidayo Sawmill Orita

Odibgo, Alhaji Olurimi Sawmill New Odigbo Town, Olufisayo Sawmill Ofosu Benin Road, Abimbola Sawmill Araromi Village, IKB Sawmill Ofosu and God's Sawmill, Ofosu.

Statistical analysis: The data collected from the study were subjected to simple descriptive statistical analysis and the results were presented in tables, frequency, percentages and bar chart.

RESULTS

Socio-economic characteristics of the respondents

Age distributions of the respondents: Table 1, the age range of the respondents falls within 10-20 and 71-80 years, The highest age range of the respondents involved in the activities falls within ages 41-50 years (22.5%), which indicated that majority of the people involved in the work are purely adults, followed by 31-40 years (19.2%), which shows that active adults are more prominent in a job, also followed by age range of 51-60 (16.7%) which also indicated that experienced adult is actively involved in the work, 15% of the respondents fall within the age of 21-30 years which is an indicator that the set of people within the age group is very agile and fit in to be involved in such activity. However, the age range between 71-80 (4.2%) is few which may be due to their old age. Age 10-20 (8.3%) are the youngest, of which their involvement may be due to lack of information or lack of interest due to the nature of the job.

Gender distribution of the respondents: Table 2, it was observed that the gender distribution among the respondents revealed that the males have the highest population (66.7%) which doubles that of the females (33.4%), however, this might be because the job is strenuous and require more energy.

Marital status of the respondents: Table 3, it is clearly shown that the majority of the people involved are married with 53.3% while only 36.8% are single, widowed 13.3% and divorced 2.5%. This indicated that the people doing the job are status balanced maritally.

Educational status: Table 4 likewise, the result shows that 6.7% of the respondents had gone through any tertiary institutions, while 55.8 and 37.5% were secondary school-leavers and primary school leavers, respectively.

Table 1: Age distribution of the respondents

Age group	Frequency	Percentage
10-20	10	8.3
21-30	18	15.0
31-40	23	19.2
41-50	27	22.5
51-60	20	16.7
61-70	17	14.2
71-80	5	4.2
Total	120	100

Sources : Field survey, 2020

Table 2: Gender distribution of the respondents

Variables	Frequency	Percentage
Sex		
Male	80	66.7
Female	40	33.3
Total	120	100

Sources: Field survey, 2020

Table 3: Marital status of the respondents

Variables	Frequency	100%
Single	43	35.8
Married	64	53.3
Widowed	10	13.3
Divorced	3	2.5
Total	120	100

Sources: Field survey, 2020

Table 4: Education distribution of the respondents

Level of education	Frequency	Percentage
Primary	45	37.5
Secondary	67	55.8
Tertiary	8	6.7
Total	120	100

Source: Field survey, 2020

Classification of commonly exploited timber species in the study area: Table 5 reveals that the status of the local trees species in the study area depicts that out of twenty-seven trees species, eleven trees species were vulnerable, ten endangered, four were not evaluated, one falls on critically endangered status, while one falls into least concern.

Frequency distribution of the indigenous tree species family: Table 6, the results from the frequency distribution of the indigenous tree species family twenty-seven families of the tree species were identified in the area of study, Meliaceae has the largest frequency followed by Fabaceae while Caesalpinioideae, Sterculiaceae and Combretaceae have the same frequency.

Figure 1, when compared with the International Union for Conservation of Nature (IUCN), indicates that Meliaceae is the most exploited timber species followed by

Table 5: Identification/classification of commonly exploited Indigenous timber species, family names and local names

Timber species	Family names	Local names	Status
Afzelia africana	Caesalpinioideae	Y:Apa, H:Kawo, I:Akpalatae	Vulnerable
Alstonia boonei	Apocynaceae	Y:Ahun, I:Egbu.	Not Evaluated
Ceiba pentandra	Bombacaceae	Y: Araba, H: Rimi, I:Akpuogwu	Endangered
Erythrina senegalensis	Fabaceae	Y:Ologbosere	Endangered
Hymenocardia acida	Phyllanthaceae	Y:Orunpa	Endangered
Khaya senegalensis	Meliaceae	Y:Oganwo, H:Maldachi, I:Abubo,	Vulnerable
Khaya grandifolia	Meliaceae	Y:Gedu	Vulnerable
Khaya ivorensis	Meliaceae	Y:Oganwo, H:Onu, I:Male	Vulnerable
Kigelia Africana	Bignoniaceae	Y:Iyan	Endangered
Lovoa trichilioides	Meliaceae	-	Vulnerable
Mansonia altissima	Malvaceae	Y:Ofun	Endangered
Milicia excelsa	Meliaceae	Y:Iroko, I:Oji, H:Loko	
Nauclea diderrichii	Rubiaceae	Y:Opepe, I:Iwu	Vulnerable
Okoubaka aubrevillei	Santalaceae	-	Critically Endangered
Pericopsis elata	Fabaceae	Y:Ebgin	Endangered
Pterocarpus osun	Leguminosae	Y:Osun	Endangered
Sterculia rhinopetala	Sterculiaceae	Y:Kokoigbo	Endangered
Terminalia superba	Combretaceae	Y;Afara	Vulnerable
Terminalia ivorensis	Combretaceae	Y:idigbo, I:Awunshin	Vulnerable
Triplochiton scleroxylon	Sterculiaceae	Y:opepe, I:Okpopo,	Endangered
Ricinodendron heudelotii	Euphorbiaceae	Y:Omodan	Vulnerable
Antiaris africana	Moraceae	Y:Oriro	Not evaluated
Erythrophleum suaveolens	Fabaceae	Y:Eru	Not evaluated
Lophira alata	Ochnaceae	Y:Ekki (ironwood)	Vulnerable
Brachystegia leonensis	Caesalpiniaceae	Y:Eku	Vulnerable
Elainadoxa spp.	Fabaceae	Y:Parapuru	Not evaluated
Cordia millenii	Boraginaceae	Y:Omo	Least concern

Key: Y:Yoruba, I:Igbo, H:Hausa and Source: Field survey, 2020

Table 6: Timber species family and their frequency distribution

Family	Frequency	Percentage(%)
Apocynaceae	1	3.7
Bignoniaceae	1	3.7
Bombacaceae	1	3.7
Caesalpinioideae	2	7.4
Combretaceae	2	7.4
Fabaceae	4	14.8
Leguminosae	1	3.7
Malvaceae	1	3.7
Meliaceae	5	18.5
Phyllanthaceae	1	3.7
Rubiaceae	1	3.7
Santalaceae	1	3.7
Sterculiaceae	2	7.4
Euphorbiaceae	1	3.7
Moraceae	1	3.7
Ochnaceae	1	3.7
Boraginaceae	1	3.7
Total	27	100

Sources: Field survey, 2020

Fabaceae. The reason might be as a result of their economical value, durability and strength properties.

DISCUSSION

Results from the study revealed the status of indigenous timber species are in high demand and often exploited among the saw-millers, the variables used to evaluate respondent's characteristics were, age distribution, gender distribution, marital status, educational distribution, classification of commonly exploited timbers and timber frequency as presented in (Table 1-6).

Results obtained from age distribution symbolically revealed that the active respondents fall within the working

age bracket (22.5%), which indicated that the majority of the people involved in the work are purely adults, (19.2%) shows that the active adults are more prominent in the job, it was also seen that (16.7%) of the respondents were experienced adult is actively involved in the work, 15% of the respondents fall within the age of 21-30 years which is an indicator that the set of people within the age group is very agile and fit in to be involved in such activity. However, the age range of (4.2%) is few which may be due to their old age. It shows (8.3%) are the youngest, of which their involvement may be due to lack of information or lack of interest due to the nature of the job as presented in Table 1 and this study is agreed with reports by previous authors[16,17] that age had great influence in community participation. While this could be attributed to the fact that the respondents were the heads of households and they must provide for their homes. due to traditional beliefs especially in the study area. Respondent's gender distribution depicts that male counterpart was involved and had the highest population 80% (66.75) which doubles that of the females saw miller 40% (33.3%), this agreed with the previous findings[7] meanwhile, this could be attributed to the fact that the energy requirement of the job could further be aligned with the report of previous author[16]. This depicts an inequality that existed in the role gender play in the sawmilling activities in this study area.

Marital status presented in Table 3 reveals that most of the respondents were married 53.3 and 36.8% of the respondents were still single with 13.3% widowed and a small fraction of 2.5% was divorced. This indicated that the people doing the job are status balanced maritally but that the responsibility level should be high with a high number of married respondents.

Education is believed to make it easy to govern the people but difficult to rule. According to an assertion that education is believed to be the bedrock of any society and which make it convenient to lead and manage the people but difficult to rule. Education, therefore, is a vital instrument for effective forest management and efficient utilisation of forest products. Meanwhile, it can be deduced that all the respondents were educated, with tertiary education accounting for the lowest respondents (6.7%), while the highest educated respondents were secondary school leavers with 55.8 and 37.5% were primary school leavers respectively. This observed result is corroborated by the report of scientists[18,19].

This study revealed that the preference for certain timber species could be attributed to their high quality, strength and durability have resulted in the over-exploitation of such species[20]. Meanwhile, it was observed that the status of the

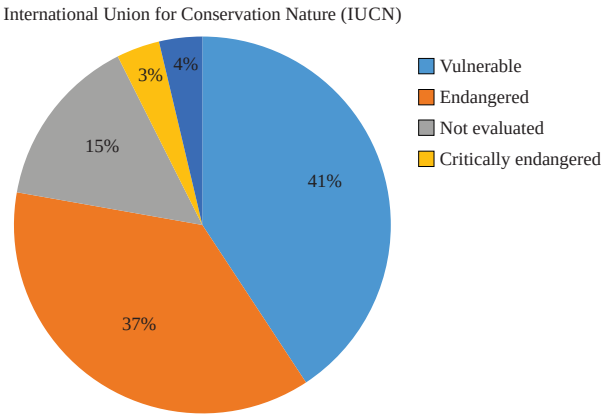

Fig. 1: International Union for Conservation of Nature (IUCN) status of the tree species

local trees species in the study area depicts that out of twenty-seven trees species, eleven trees species were vulnerable, ten endangered, four were not evaluated, one falls on critically endangered status, while one falls into least concern. This was corroborated by the report of the International Union for Conservation of Nature (IUCN), as shown in Fig. 1 indicating that Meliaceae is the most commonly exploited timber species followed by Fabaceae in the study area. This is similar to the report by previous studies[19-22].

Table 6, the results from the frequency distribution of the indigenous tree species family twenty-seven families of the three species were identified in the area of study, Meliaceae has the largest frequency followed by Fabaceae while Caesalpinioideae, Sterculiaceae and Combretaceae have the same frequency, other families observed has one each recorded frequency as also presented in Fig. 2, which is also in line with the findings[23-25].

It was established among several other factors that the rate at which trees were been exploited revealed a tremendous decline in the number of indigenous timber species and this necessitates the following recommendations: Urgent need for sensitization, proper strategies and policy enforcement to minimize the rate at which pressure is been put on available indigenous timber species. Indiscriminate harvesting of indigenous timber species should be discouraged and timber merchants should be educated based on the present status of some important indigenous tree species. Department of State Forestry (DSF), Forestry Research Institute of Nigeria (FRIN) should also embark on mass production and establishment of plantations based on the indigenous tree species in the study area. Private or individual plantations on indigenous/multipurpose trees should be encouraged.

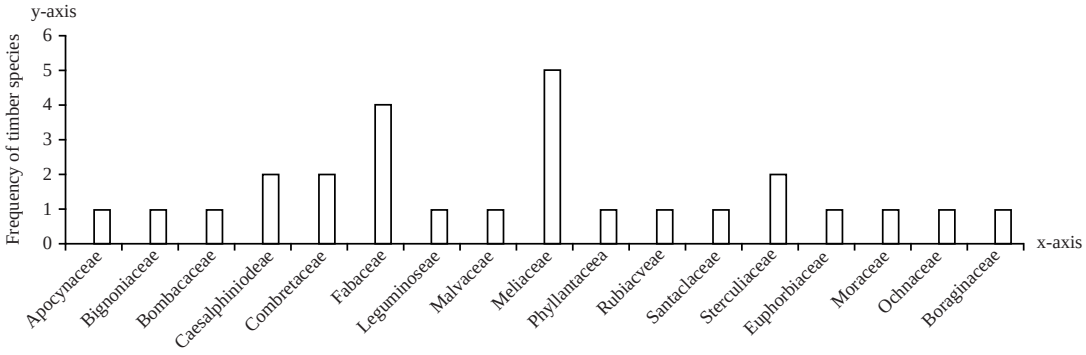

Fig. 2: Bar chart showing the frequency distribution of timber species families

Government should enact a policy/law that attracts huge penalties/charges on individuals who engage in harvesting premature indigenous trees and the policy of cutting one tree and planting ten must be put in place. Forest extension workers should educate the populace and the citizenry on the need to conserve and valued indigenous trees species and timber merchant association on the danger of the disappearance of these vital local trees species to prevent them from sudden disappearance.

CONCLUSION

The rate at which trees are exploited in the study area revealed a tremendous decline in the number of indigenous timber species and this necessitates an urgent need for proper strategies and policy enforcement to minimize the rate at which indigenous timber species are being exploited in the area to ensure sustainability. Incessant harvesting of timber without an adequate plan to replenish will lead to the forest that is degraded both genetically and systematically. Therefore, a clarion calls to rethink and earnestly bring to play the tenets of sustainable forest management which is the way out of the total collapse of our forests. Thus, the onus is on all stakeholders, forest managers, policymakers and the society at large to fraternize to manage our forest in a way that we can use them now and the future generation can still have access to this gift of nature. This way, we will prevent the looming danger that emanates from indiscriminate forest resource exploitation.

SIGNIFICANCE STATEMENT

This study discovers the influence of population increase and demand for the preferred wood product is on high demand as a result of their mechanical characteristics to the end-wood users, builders and industrialists. This study would help the policy-makers to uncover the critical area of demand and utilization that many researchers are yet to explore. Thus, as a new theory indicates that indiscriminate harvesting of currently endangered timber species due to over-exploitation is expected to be high, their total extinction is imminent and may soon be arrived at.

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