



ASSESSMENT OF ENDANGERED ECONOMIC TREE SPECIES AND CONSERVATION TECHNIQUES IN JIGAWA STATE, NIGERIA

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ABSTRACT

This study focused on assessment of endangered tree species and conservation strategies in Jigawa State, Nigeria. Multistage sample design was used, while four agricultural zones (Brinin-kudu, Gumel, Hadejia, Kazaure) were considered for the study. One hundred and sixty (160) questionnaires were administered and forty (40) structured questionnaires were distributed to each agricultural zone. Red list indicator was used as a guide to determine the conservation status. Tree species identified include: *Tamarindus indica*, *Adansonia digitata*, *Parkia biglobosa*, *Vitellaria paradoxa*, *Hyphaene thebaica*, *Faidherbia albida*, *Khaya senegalensis* and *Borassus aethiopica* were the most commonly exploited and endangered economic tree species which were used either as fuel wood, timber, mortar and pestle, medicinal purpose, local house furniture, and thus, are considered to be a threat to sustainable environmental and ecosystem management in the study area. However, results show that deforestation had high rate, followed by overgrazing. Low level of education, poverty, unemployment, bush clearing and bush burning are identified as the major factors that are responsible for the involvement of old and young people in the destruction of these endangered economic species tree in Dutse, Jigawa State, Nigeria. Environmental education was chosen the best conservation strategy followed by habitat protection. Law enforcement had least value on the protection of these endangered species. Therefore, it is recommended that forest science and environmental education should be taught at different levels of formal learning; also reliable and cheap sources of alternative energy must be provided, government should recruit forest guard officers, enforce the forest law and fine against the indiscriminate felling of trees and encourage tree planting campaign in the State.

Keywords: Economic; Endangered; Jigawa State; Survey; Tree species.

INTRODUCTION

The major zones of Savanna in Northern Nigeria (Sudan, Sahel, Guinea and Derived) cover an area of 75, 297 km² (Salami, 2017; Salami and Akinyele, 2018). Lafrankie *et al.* (2006) observed that the tropical rainforests are vulnerable to deforestation and degradation. About 10 million hectares of rainforest are degraded each year, with exploitation, felling damage to residual forests and non-timber forest products collection being the major causes. Forest degradation is usually accompanied by species extinction, reduction in biodiversity and decrease in primary productivity (Wilcox, 1995). Due to population growth, exploitation of natural resources in the developing countries of the world is increasing at an alarming rate. The current rate of forest deforestation in the south-west geo-political zone of Nigeria was put at 1.36 % per annum by Salami (2006) when he monitored Nigerian forest with NigerianSat-1 and other satellites

These species have enormous potentials in Northern Nigeria in terms of adaptability, growth, economics and

environmental values while neem and eucalyptus have great importance as sources of industrial raw materials in Nigeria. There is an increasing world-wide concern all over for continuous destruction of the environment by human activities for search of wild fruits, vegetables, and edible insects from the forests for household consumption and/or commercial purpose. The rate at which the environment has been destroyed is of great concern because it exposes human race to more harsh conditions. Polluted air, global warming, polluted water, toxic wastes, destruction of ozone layer just a few hazards of the earth (Abdulrahman *et al.*, 2009).

This zone is also characterized with high temperature, low rainfall, low humidity and loose sandy soil. High temperature is prevalent during the dry season; this raises the rate of evaporation and dries the soil to considerable depth. Among common species in these areas are *Azadirachta indica*, *Dalbergia sissoo*, *Phoenix dactylifera*, *Balanites egyptiaca* and *Eucalyptus camadulensis*. Some of these species had been used for

afforestation programmes and research purposes (Salami and Lawal, 2018).

Deforestation alone is responsible for most environmental problems. Loss of forests resulted in a decline in the predators of some lower animals as well as in food sources for these animals, popular among these are snakes, rats and lizards. The rodents and the likes moved in to more populated areas of human in search for food and shelter (Ogunkunle and Oladele, 2004).

Earlier researches have shown that about 80% of the inhabitants of Africa use woods for cooking, timber, house/farm fencing and medicinal purposes (Abdullahi, 2013). This scenario has a widespread in developing countries of the world. Therefore, Nigeria is the most populous black nation having about 170 million people the overwhelming majority of Nigerian citizens destroys their own environment simply to survive (Abdullahi, 2013).

Trees are of great importance to the people of Jigawa State. Wood is used to make farming and cooking utensils, for food preparation and as construction material. Palm branches are used for roof construction, beverage preparation and in traditional ceremonies. Fruit, medicinal flowers and nuts are only a few of the many other non-timber products uses of trees in the area. With the level of tree importance to the populace, the act of planting a tree on your farm field is rarely done. The primary reason has to do with land tenure. The main objective of this research is to identify some economic endangered tree species and best conservation techniques for policy making in Jigawa State, Nigeria

MATERIALS AND METHODS

The Study area

This study was conducted in Jigawa state which situated in the north-west part of the country between latitude 11.00⁰ N, to 13.00⁰ N and longitude 8.00⁰ E to 10.15⁰ E. Kano and Katsina States border Jigawa to the west, Bauchi State to the east and Yobe State to the north east. Jigawa shares international border with Zinder in the Republic of Niger, which is a unique opportunity for cross-border trading activities (JARDA, 2005). The population is 4,348,649 persons (National Population Commission, 2006). It has a land area of approximately 22,210 km² or about 2.2 million hectares. Most part of the state lies within the Sudan vegetation zone. On the part of the southern boundaries, some traces of Guinea Savannah exist. The rainfall is higher in the southern part of the state. Jigawa has an average of about 700mm annual rainfall, (JARDA, 2005). The rainy season periods lasts between May to October in the south and in the north, it lasts from June to September (Garba *et al.*, 2011).

The state is considered to be agrarian as more than 90 percent of the working adults engage in agriculture as a means of livelihood (JARDA, 2015). Popular rain fed food crops are millet, sorghum, beans and rice. Crop production during the rainy season is mainly for subsistence with farmers averagely cultivating about 2.5 hectares (Ado, 2012). The topography is characterized by high land area which is almost 750m. Soil tends to be fertile ranging from sandy-loam (Salami and Lawal, 2018).

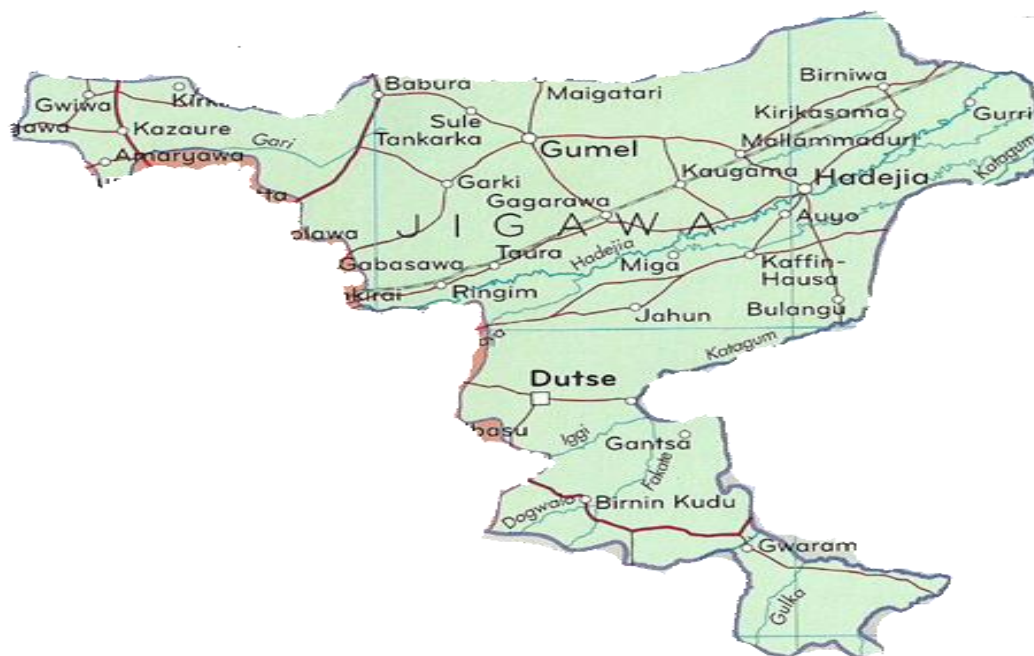


Fig 1: Map of Jigawa State, Nigeria

Table 1: Demographic characteristics of the respondents

Sampling technique and sample size

A total of forty (40) respondents were randomly selected from each agro-ecological zone in Jigawa State. Respondents were drawn out and given questionnaire to address the objectives. One hundred and sixty (160) respondents were selected for the study for their prior knowledge of the relevance of the trees as a result of their occupation. A multi-stage sampling procedure was employed in selecting respondents for the study. The first stage was a purposive selection of all the ADP zones in Jigawa state, Nigeria. The second stage was a simple random selection of two local government areas in each from the 4 ADP zones to give a total of 8 LGAs. The ADPs are: zone 1: Brininkudu (Dutse, Kiyawa), zone 2: Gumel (Maigatari and Ringim), zone 3: Hadejia (Kirikasamma), zone 4: Kazaure (Roni , Garki). The third stage was a simple random selection of 32 communities. The fourth stage was a random selection of 5 rural farming households to make a sample size of 160 respondents for the study,

Data collection and analysis

This research utilized primary data that were collected by means of well-structured questionnaire in line with the objectives of the study and were distributed across the four agro-ecological zones with the assistance of well trained enumerators with the aid of Borokini, (2014) red list indicator for a guide, classification and identification of the tree species within the State. Field survey was conducted by going round the state to extract information from the communities closed to shelterbelts and grazing reserves on some endangered economic tree that are commonly used as timber, fuel wood, medicinal, furniture or are cut down during farm clearing for agricultural purposes or the other. Data were collected on the socio economic characteristic, status of the indigenous economic tree species, utility status of tree species and conservation status of the endangered tree species within Jigawa State. The data were analyzed using descriptive statistics such as frequency and percentage.

RESULTS

Information on demographic features of the respondents is presented in Table 1. Majority respondent age bracket (33.75 %) respondents was within 31-40, while (43.67 %) had Quranic education, (98.75 %) of the gender distribution were male, (81.25 %) of the respondents marital status were married. The prominent religious faith in the study area was Muslims.

	Frequency	Percentage
A. Gender		
Male	158	98.75
Female	002	1.25
Total	160	100
B. Age (years)		
< 20	16	10.00
21-30	22	13.75
31-40	54	33.75
41-50	48	30.00
51 and above	20	12.50
Total	160	100
C. Marital Status		
Married	130	81.25
Single	025	15.62
Divorced	005	03.12
Total	160	100
E. Household Size		
Less than 10	71	44.94
10-20	53	33.54
21-30	24	15.18
31 and above	12	07.50
Total	160	100
F. Farming Experience		
Less than 5 years	16	10.06
5-10 years	49	30.82
11-20 years	44	27.67
21-30 years	36	22.64
31 and above	15	09.37
Total	160	100
G. Educational Level		
Qur'anic school	69	43.67
Adult literacy	29	18.35
Primary school	11	06.87
Junior secondary school	10	06.32
Senior Secondary school	31	19.62
Tertiary education	10	6.32
Total	160	100
H. Farm size (ha)		
Less than 5	28	17.50
5-10	22	13.75
11 – and above	110	68.75
Total	160	100

Source: Field survey, (2020)

Table 2: Some endangered economic tree species in the study area

S/N	Botanical name	Common and Local name	Uses	References
1.	<i>Tamarindus indica</i>	<i>Tsamiya/Tamarind</i>	As fuel wood, roofing materials, for preparation of local food, medicinal and livestock feed	Jibo <i>et al.</i> , (2021); Salami and Lawal, (2018a)
2	<i>Adansonia digitata</i>	<i>Kuka/Baobab</i>	As fuel wood, making rope, medicinal and for preparation of food, livestock feed	Salami <i>et al.</i> , (2020); Salami and Lawal, (2018a); Wickens and Lowe, (2008)
3	<i>Parkia biglobosa</i>	<i>Dorawa/locust bean</i>	As fuel wood, roofing materials, utilized locally as food, livestock feed and medicinal	Salami and Lawal, (2018a); Devineau, 1999); Olayemi <i>et al.</i> , (2021)
4	<i>Vitellaria paradoxa</i>	<i>Kadanya/Shea tree</i>	As fuel wood, medicinal, local roofing materials, fruits is utilized as food and as livestock feed	Salami and Lawal, (2018a); Olayemi <i>et al.</i> , (2021)
5	<i>Hyphaene thebaica</i>	<i>Goriba/Doum palm</i>	As fuel wood, fiber, medicinal, local roofing materials, fruits is utilized as food and as livestock feed.	Hossam <i>et al</i> (2017)
6	<i>Faidherbia albida</i>	<i>Gawo/Apple ring</i>	As fuel wood, medicinal, local roofing materials, fruits is utilized as food and as livestock feed.	Ilu <i>et al.</i> , (2020)
7	<i>Khaya senegalensis</i>	<i>Madachi</i>	As fuel wood, medicinal, local roofing materials, fruits is utilized as food and as livestock feed.	Falko and Drijfhout., (2010)
8	<i>Borassus aethiopum</i>	<i>Giginya/African fan palm</i>	As construction, fuel wood, medicinal, local roofing materials, fruits is utilized as food and as livestock feed.	Salako <i>et al.</i> , (2018)
9	<i>Diospyros mespiliiformis</i>	<i>Kanya/West African Ebony</i>	As fuel wood, medicinal, local roofing materials, fruits is utilized as food and as livestock feed.	Salami and Lawal, (2018a)
10	<i>Vitex doniana</i>	<i>Dinya/Black plum</i>	As fuel wood, medicinal, local roofing materials, fruits is utilized as food and as livestock feed.	Salami and Lawal, (2018a)

Source: Field Survey, (2020).

Major methods of conservation

Environmental education (30) was found to be the best conservation method followed by habitat protection (11) while, law enforcement (2) was found to be the least in the study area (Figure 1).

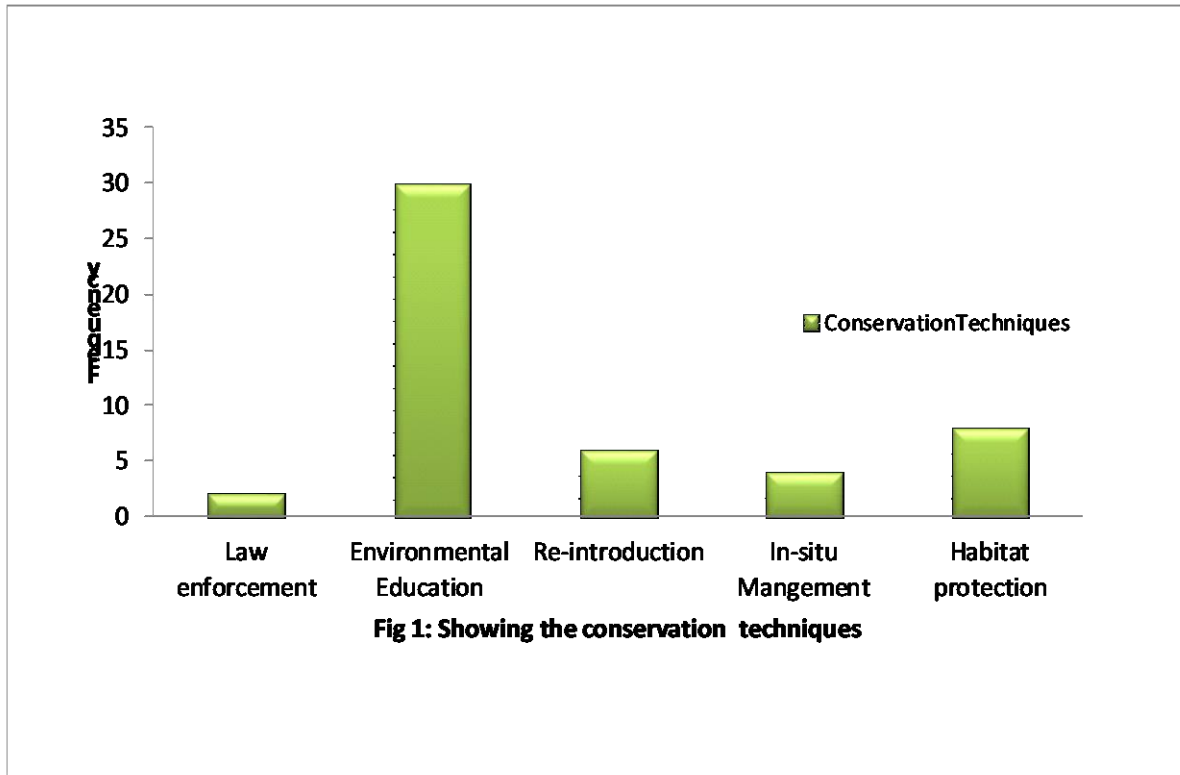


Fig 1: Showing the conservation techniques

Major causes of endangered tree species in the study area Deforestation (30) was found to be the major cause of tree diminution followed by overgrazing (11) while, other means (1) of tree attenuation were found to be the least in the study area (Figure 2).

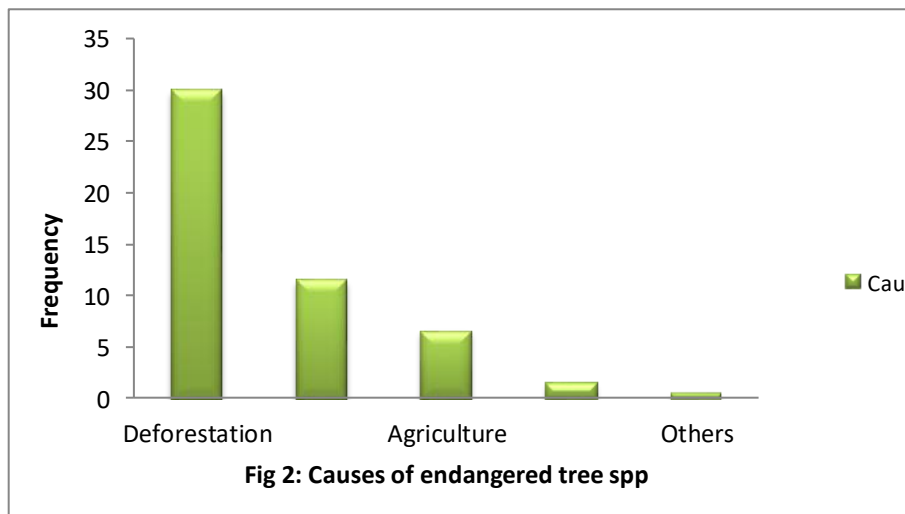


Fig 2: Causes of endangered tree spp

DISCUSSION

Socio-economic Characteristic of Respondents

The result in table 1 shows that most 99 % of the respondents were male. The result also shows that 34 % of the respondents were within the age bracket of (31-40) years. This implies that they have considerable years of using the economic tree as source of fuel wood and also at their active and most productive stage in life and has a high risk bearing ability. Also, majority (81 %) of the respondents was married, 16 % were single and 3 % were divorced. The finding of this study is in line with Jibowo (2000) that a high percentage of rural population is married. Household size indicated that majority (79 %) had between 1-20 family members. The result further indicated that 59 % of the respondent had between 5-20 years of farming experience. This also implies that they have idea of cutting trees for fencing their houses or during land clearing. Most (69 %) of the respondents were small scale farmers, having farm sizes of between 0.5-4.00 ha. Also, 44 % of the respondent had acquired Qur'anic education. This may largely be connected to their religious inclinations that every child must have attended local Islamic studies. Tertiary education comprises of 20 % of the respondent and those with adult literacy constitute 19 %. This result agreed with the findings of (Olaniyi *et al.*, 2013) in their study on the contribution of Non-Timber Forest Products to Household Food Security among Rural Women in Iseyin Local Government Area of Oyo State, Nigeria. Lawal *et al.*, (2018) also agrees with the findings of this study by discovered higher percentage of male (95%), married (78 %) and number of respondents (43 %).

The result from the study reveals that all the identified economic tree in the study area were the endangered species hence, they were either used for timber as local roofing materials, use the leaves, stem, bark or roots as medicinal as well as sources for fuel wood. There is strong evidence that the poorest of the rural poor are mostly dependent on forests and woodlands to meet their domestic energy needs for cooking and other purpose. Olayemi *et al.*, (2021) and ; Ilu *et al.*, (2020) showed that rural people in the Northern part of Nigeria depend largely on fuel-wood and charcoal as a dominant biomass energy sources and also aware of mitigating methods. Researchers statistically examined the dependency of forest dwellers on NTFPs and the relation between household characteristics and cash income generated by NTFPs collection (Quang and Anh, 2006). Many households greatly depend on NTFPs for subsistence or income. Women from poor households generally rely on them most for household use and income. However, men tend to cultivate NTFPs than women because they own land, while women rely on collection from the field (Olayemi *et al.*, 2021). Neumann and Hirsch, (2000); Belcher, (2003) revealed

that the poor men frequently depend on their collection on this resources as an 'employment of last resort'. Regardless of the real and potential importance of tree, national institutions are not carrying out standard monitoring of these resources or assessments of their socio economic contribution.

Study had been conducted. The finding from the study showed that deforestation was the major causes of the lost of economic tree species followed by overgrazing. Ilu *et al.*, (2020) discovered that deforestation was the key causes of endangered tree in the study area. N E O, (2017) and Ilu *et al.*, (2020) agreed that direct causes of endangered tree species are agricultural expansion, wood extraction (logging and charcoal), and infrastructure expansion such as road and building construction, and urbanization. Most often, multiple processes work concurrently to cause loss of tree spp. Indeed Faleyimu and Oluwalana (2008) stated that in many parts of the world, trees are being cut down faster than they are replanted. Popoola *et al.* (2009), revealed that mankind make use of many species for economic benefits which results in serious reduction in biodiversity and many species becoming extinct more rapidly than researchers can study them. However, despite the fact that, these native trees have slow growth rate and long gestation period, they are generally noted as good sources of medicinal products used in the treatments of certain ailments that are difficult to cure by using the conventional drugs. Thus, Popoola *et al.* (2009), purported that strong wind occur in areas with little or no vegetation, often in areas where there is insufficient rainfall to support vegetation. Findings from the results shows that the conservation techniques. Environmental education had the highest value out of the five different methods. There was a wide gap between the best method and re-introduction techniques which followed the environmental method. Seed and plant collection was the least out of the methods. Some of the most important available tools for conservation are habitat conservation, ex-situ conservation and law-enforcement (USDA, 2022).

CONCLUSION

Increase in human population and poverty call for the high demand of insufficient renewable resources like trees in the savannah region. Over-dependent on this resource (timber) lead to the depleting of some important tree species such as *Tamarindus indica*, *Adansonia digitata*, *Parkia biglobosa*, *Vitellaria paradoxa*, *Hyphaene thebaica*, *Farderia albida*, *Khaya senegalensis* and *Borassus aethiopica*. Environmental education and proper law enforcement are the preferred measures to restore and improve endangered tree species. Failure to take the necessary actions will lead to serious environmental problems and climatic change. Therefore, individuals, Non-

governmental Organizations and Government at different levels should support environmental activities through different means

RECOMMENDATIONS

In order to attain the effective mean and workable strategies of preventing endangered tree species in Jigawa State, the following methods must be taken:

- i. The best strategy (output) from the research must be conveyed to the state government (Ministry of Environment or Forestry) through proposal for policy making.
- ii. Government should provide cheap alternative sources of energy to discourage most Nigerians from using fuel wood as a source of energy which has caused the reduction of forest resources over the years.
- iii. Sufficient documentation and publicity of the endangered economic tree species should be done so that the general public can also help in their protection and conservation.
- iv. Substantial replanting programs by both government and private individuals to check the effect of climate change and environmental degradation which is responsible for loss of biodiversity should be encouraged.

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