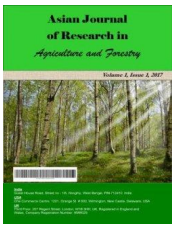

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Effect of Socio-economic Activities on Tree Species and Conservation Trend in Eco-zones of Taraba State, Nigeria

E. M. Abubakar[1], J. H. Dau[2*] and E. K. Rabo[3]

[1]Department of Forestry Technology, College of Agriculture, Yelwa, Bauchi, Bauchi State, Nigeria.
[2]Department of Forest Production and Products, College of Forestry and Fisheries, University of Agriculture, Makurdi, Nigeria.
[3]Department of Agric Extension and Management, Bauchi State College of Agriculture, Nigeria.

Authors' contributions

This work was carried out in collaboration between all authors. Author JHD designed the study, performed the statistical analysis, wrote the protocol and first draft of the manuscript. Authors EMA and EKR managed the analyses of the study and provide the needed financial support. Author EKR managed the literature searches. All authors read and approved the final manuscript, without any conflict of interest.

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ABSTRACT

This study was carried out with the aim to assess the effect of socio-economic activities on tree species and conservation trend Ecological zones of Taraba State, Nigeria. Stratified and simple random sampling designs were used to distribute 270 copies of structured questionnaire to the people. The data were analyzed using descriptive statistics. The results showed that 64% of respondents were not participating in conservation of tree species due to poor infrastructural facilities and poverty in the study area. The majority of the people were involved in various forms of deforestation (farming 46%, fuel wood gathering 22% and settlement 9%). These practices had greatly affected tree species diversity and abundance in the study area; thereby increasing environmental problems such as flooding and soil erosion (16%). Most of the economic tree species (19) were decreasing in availability with *Rauvolfia mitoria* and *Sterculia setigera* endangered. The

**Corresponding author: E-mail: daujaph@gmail.com;*

major factor responsible for tree species decline was anthropogenic activities (67%). Majority of the people were willing to support trees conservation. Thus, there is the need for further research to update the current list of conserved species on national red list species data bases. Also, Government stakeholders should provide more awareness on environmental education and alternative domestic energy in order to minimize indiscriminate felling of trees and over exploitation to prevent extinction of these economic tree species in the study area.

Keywords: Conservation; degradation; threaten; endanger; species.

1. INTRODUCTION

The highest rates of woody plant species loss are in the tropics [1]. Following decades of rapid land cover Conversions the tropical forest vegetation is much fragmented with considerable loss of woody plant species cover [2,3].

The major causes of woody plant species loss are linked to rapid human population growth rates and poverty [1]. These drivers force people to harvest woody plant species using poor methods and at unsustainably high intensities [4]. High intensity of logging and illegal exploitation of woody plant species and other resources has continued to pose serious threat to the country's biodiversity [5].

Increasing human population growth rates and poverty [1] are the major causes of woody plant species loss in developing countries. These drivers are forcing rural community dwellers to harvest woody plant species using poor methods and in an unsustainable ways [4]. High intensity of logging and illegal exploitation of woody plant species and other resources have continued to pose serious threat to the country's biodiversity [5].

Economic trees species play important role in the survival of man on earth thereby, providing array of wood and non-wood products which are significant in sustaining the overall socio-economic wellbeing of human. The protection functions and potential worth for these species have been overlooked or ignored. Some of these species are going extinct at an accelerated rate due to environmental degradation caused by human activities as well as poor conservation status. These are causing loss of habitat, degradation, spread of invasion plant species, pollution and climate change [6]; and also by other genetic and environmental factors [7]. The aim of this study is to assess the economic tree species and conservation status of Eco-zones of Taraba State, Nigeria. The study would help to provide current information on threaten tree species and conservation status of tree species in the study area.

1.1 Study Area

The study was carried out in Taraba State, Nigeria. The State lies between latitudes 6^0 34' 36" N and 9^0 58' 51" N and longitudes $9^0$52' 28" E and 12^0 39' 51" E. It occupies a total land mass of approximately 54,473 km^2. The State is bordered on the northwest by Gombe State, west by Plateau and Nassarawa States and Adamawa State in the northeast; southwest is bordered with Benue State. An international boundary on the east separates Taraba State from the republic of Cameroon. The state is made up of 3 major ecological zones namely: Southern guinea savanna located in the south western part of the State, northern guinea savanna in the northeast and montane Forest in the southeast.

1.2 Data Collection and Analysis

Simple random and stratify sampling designs were used to sample Taraba state. The study area (Taraba State) was divided into three ecological zones namely: Northern ecological zone, Southern ecological zone and Montane ecological zone. Simple random sampling design was used to distribute 90 copies of structured questionnaire in each Eco-zone to respondents living around forest reserves in the 3 ecological zones (Eco-zones) of the study area. A total of 270 respondents were sampled from the three eco-zones. Data collected were analyzed using descriptive statistical tools (Tables, percentages and frequency).

2. RESULTS

Table 1 shows the rate at which trees species were being conserved in the study area by the respondents. Based on the result, 13% of respondents used economic trees species for the purpose of food/fruits; 9% of the respondents cleared tree species for the purpose of building homes, houses and other structures; 12% felled

tree species for charcoal and fuel-wood purpose, 17% for cleared forested areas for the purpose of farming while 12% of the respondents do not participate in deforestation in the study area. Those who do not engaged in deforestation conserved these tree species for cultural or religious values. Majority (21%) of the respondents used forests and forest products for the purpose of crafting/carving for income generation as a result of high level poverty.

Based on this result on the level of deforestation in the study area showed high level of deforestation by 33% follow by 24% of the respondents who said there was very high level of deforestation, 235 said the level of deforestation in the study area was low while 20% of the people were undecided on the level of deforestation in the study area (Table 1).

List of trees species assessed in the study area are listed in Table 2. The people around the forest reserve listed the endangered tree species which they thought were declining in availability and those they thought were increasing. Every tree species with increasing frequencies were compared with those with decreasing in availability and the higher of the two frequencies is taken as the status for the species. Based on the results (Table 2), nineteen (19) species were decreasing in abundance while eight (8) are increasing.

The conservation status of the 27 species encountered in the study area (Table 3) was confirmed on the IUCN red list of threatened species. Out of the 27 species, two species (*Rauvolfia mitoria,* and *Sterculia setigera*) were reported to be threatened to extinction, *Khaya senegalensis* was reported vulnerable while 5 species (*Acacia senegal, Albizia gummifera, Allophylus africana, Strychnos spinosa, Vitellaria paradoxa* and *Vitex doniana)* were endangered**.** Some species were reported least concern, while *Anogeissus leiocarpa, Strombosia postulata, Rytigniaum bellatum, Uapaca togoensis* and *Pterocarpus erinaceus* were not found on the IUCN [8] catalogue.

This finding revealed some of the threats to economic tree species conservation in the study area (Table 3). Anthropogenic activities (34%) were the major threat to conservation of trees species in the study area, followed by animal grazing (23%), natural disasters such as droughts, erosions and floods (22%) while poverty and lack of funds to the people was the least factor hindering conservation of tree species in the study area.

The result on level of conserving economic trees species in the study area showed is show on Table 4. Based on the result obtained from this study, the need for forest conservation in the study area was considered very important by 19% of the respondents follow by 41% of the respondents who said the need was important, 18% said the need was fairly important while 22% of the respondents did not see any need for forest conservation in the study area.

The result on level of participation in forest conservation in the study area showed that 8% of the respondents said the level of participation in

Table 1. Socio-economic activities in eco-zones of Taraba State, Nigeria

	Frequency	Percent (%)
Causes of deforestation		
Building	24	8.9
Fuel Wood/Sale	33	12.2
Farming	46	17.0
Do not participating in deforestation	33	12.2
Cultural/Religious values	21	7.8
Medicinal values	23	8.5
Food/fruits	34	12.6
Crafts/carving	56	20.7
Total	**270**	**100.0**
Level of Deforestation		
Very high	65	24.1
High	88	32.6
Low	62	23.0
None	55	20.4
Total	**270**	**100**

Table 2. Economic tree species and their conservation trend in the study area

Species	Occurrence		Conservation trend
	Decreasing in availability	Increasing in availability	
Acacia senegal	26	18	Decreasing
Afzelia africana	32	1	Decreasing
Albizia gummifera	26	4	Decreasing
Allophylus africanus	4	0	Decreasing
Anogeissus leiocarpus	11	39	Increasing
Bombax cosveolens	5	0	Decreasing
Borassus aethiopum	23	0	Decreasing
Deinbollia pinnata	2	8	Increasing
Garciniamithmanii	0	10	Increasing
Hymenocardia acida	9	39	Increasing
Khaya senegalensis	19	12	Decreasing
Pleiocarpapycnantha	2	10	Increasing
Prosopis africana	7	18	Decreasing
Psychotria microphylla	7	1	Decreasing
Pterocarpy erinaceus	53	0	Decreasing
Rauvolfiavo mitoria	8	0	Decreasing
Rytigniaumbellatum	0	10	Decreasing
Schefflera abyssinica	9	1	Increasing
Sterculia setigera	16	1	Decreasing
Strombosia postulata	0	17	Decreasing
Strychnosspinosa	11	3	Increasing
Terminalia irvorensis	24	20	Decreasing
Uapacatogoensis	0	56	Increasing
Vitellaria paradoxa	19	8	Decreasing
Vitex doniana	14	5	Decreasing
Ziziphus mauritiana	7	5	Decreasing
Total	**336**	**286**	

forest conservation was very high follow by 13% who reported that the level of participation was high, 23% stated that the participation level was low and 55% (very low).

Table 3. Threats to tree species distribution and conservation in study area

Factors	Frequency	Percent (%)
Anthropogenic activities	92	34.1
Animals grazing	61	22.6
Natural disasters	60	22.2
Poverty/lack of funds	57	21.1
Total	**270**	**100.0**

The result on level of achievement on tree species conservation in the study area (Table 4) showed 49% level of achievement was very low follow by 28% low level of achievement in tree species conservation, 13% high achievement while 10% level of achievement on tree species conservation in the study area.

3. DISCUSSION

This finding implies that there was high level of deforestation which could lead to desert encroachment, soil erosion, land degradation or species extinction in the study area. Deforestation could be responsible for the decrease in the availability of economic trees species in the study area. This observation agrees with FAO [1] and McCarty [9], who reported that human population growth is the major cause of plant species loss.

Population growth poses a serious threat on plant species due to anthropogenic activities. This implies that some economic tree species will be endangered and there could be soil degradation in the area. This result also agrees with Akinyemi et al. [10], who reported that anthropogenic activities are the major causes of soil degradation which in turn reduce the population of plant species. Increasing human population growth rates and poverty level [1] are the major causes of woody plant species loss in

Table 4. Level of conservation of tree species in eco-zones of Taraba State, Nigeria

Levels	Frequency	Percent (%)
Need for Forest Conservation		
Very Important	52	19.3
Important	111	41.1
Fairly Important	49	18.1
Not Important	58	21.5
Total	**270**	**100.0**
Participation in forest conservation		
Very high	22	8.1
High	36	13.3
Low	63	23.3
Very low	149	55.2
Total	**270**	**100**
Level of achievement in Tree Species Conservation		
Very high	27	10.0
High	36	13.3
Low	76	28.1
Very low	131	48.5
Total	**270**	**100**

developing countries. These drivers are forcing rural community dwellers to harvest economic tree species using poor methods and in an unsustainable ways [4]. High intensity of logging and illegal exploitation of tree species and other forest resources have continued to pose serious threat to the country's biodiversity [5].

Most of the respondents in the study area were not conserving trees species for various reasons; thus, very few of the respondents participate in forest conservation in the study area. The reasons for tree species deforestation include: fuel-wood/charcoal, medicinal, food/fruits purposes while cultural/religious importance and ecological services were some of the reason economic tree species were conserve in the study area. This result agrees with the report of Vallenjo et al. [11], which reported that tree species are considered essential to economic development and the maintenance of all forms of life.

Economic tree species play vital roles in the survival of man on earth thereby, providing array of wood and non-wood products which are significant in sustaining the overall socio-economic wellbeing of human. The protection functions and potential worth for these species have been overlooked and ignored by the people in the study area. The conservation of tree species has become less important in our society due to high interest attached to farming, fuel-wood extraction, settlement and industrial development as a result of the increasing human population and other selfish interest/wants. The result of this finding is in accord with Al-min [12], he reported that the declined in tree species cover will affect all aspects of daily life of the people, especially the rural dwellers. Neelo et al. [13], reported that excessive anthropogenic disturbances, such as logging or felling of trees, usually result in an immediate decline in species diversity or distribution.

The level of tree species conservation in the study area was regarded as common and unserious practice among people in most developing countries especially in Nigeria (in the study area). Though there were few people in the study area that participate in forest conservation. Most of the people in the communities are ready to support tree conservation strategies and minimize the rate of tree felling in the area if concerned stakeholders (Government and NGOs) will support the communities through the provision of basic social amenities needs. Economic tree species in the study area were declining; this could be connected to the low level of tree species conservation, low achievement on tree species conservation and lack of interest (and funds for) on economic tree species conservation in the study area. Those tree species that were increasing in the study area could be as a result of efforts or support from Government stakeholders and Non-Governmental Organizations. The increase on some of the tree species in the study area could also be associated with natural regeneration and law enforcement which help to preserve or conserve the increasing species.

4. CONCLUSION

The level of participation in conservation of forests and forest products in the study area was very low. Government stakeholders and NGOs' efforts to conserve these tree species was achieved in a very low rate. The low achievement was proof with 27 tree species listed as endangered species with 19 species decreasing and 8 species increasing in availability in the study area. The decreasing number of economic tree species in the study area with low interest in participation on forest conservation could result to extinction of these tree species. Most of the people that participated in conservation of tree species were for their selfish interest or to satisfy their need such as: medicinal, farming, building food/fruits, cultural and religious purposes. Anthropogenic factor was the major threat to tree species conservation in the study area. Based on this finding, there is urgent need to encourage people on the need for conservation of tree species in the study area. This can be achieving through frequent orientation, re-orientation and legal prosecution of forest laws offenders.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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