ECOLOGICAL EFFECT OF TIMBER EXPRACTION IN OHIMINI LGA OF BENUE STATE, NIGERIA

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ABSTRACT

In this study, the ecological impact of timber extraction on the Ohimini Forest in Ohimini Local Government Area of Benue State Nigeria was investigated using block transects and total counts of both trees and wildlife populations, soil microbe and nutrient analysis as well as questionnaire application. Results indicate that timber harvesting in the area has led to significant reduction in plant and animal population and lead to reduction in their diversity. It also indicated that logging leads to decline in soil nutrient availability and micro-flora composition. The socio-economic status of the human settlements around the forest land were also compromised.

INTRODUCTION

Timber extraction and deforestation has in recent times received a lot of attention due to its implication on climate change and global warming. Selective logging is usually regarded as the most common form of forest exploitation in the humid tropics (UNESCO, 1978).

According to Nielsen (2006) about half of the mature tropical forests, Between 750 – 800million hectares of the original 1.5 – billion hectares that once covered the planet have been felled. Wikipedia (2007) reported that many tropical countries such as Indonesia, Thailand, Malaysia, Bangladesh, China, Sri Lanka, Laos, Nigeria, Liberia, Guinea, Ghana, and Cote d'ivoire have lost large areas of their forest due to timber extraction. It also reported that as of 2007, less than 1 % of Haiti's old growth forest remains and that between 1990-2005, Nigeria lost a staggering 79% of its old growth forest. Several countries

notably the Philippines, Thailand and India have declared their deforestation a national emergency. Haileselassie (2004) reported that the major cause of desertification in Ethiopia is deforestation which lowered the chances of rainfall and enhanced wind erosion. Furthermore,. Maddox, (2007) reported that Ethiopia has lost 98% of its forest regions in the last 50 years. There as significantly large areas of forest in Indonesia that are being lost as native forest is cleared by large multi - national companies for timber and pulp (Wikipedia, 2007). According to Wilson (2007) a major source of deforestation is the logging industry driven particularly by China and Japan.

Generally the removal or destruction of significant areas of forest cover has resulted in a degraded environment with reduced biodiversity (Wikipedia, 2007). In many countries massive timber extraction is ongoing and is shaping climate and geography.

logging affects the amount of water in the soil and groundwater and the moisture in the atmosphere. Forests support considerable biodiversity, providing valuable habitat for wildlife. Moreover, forest foster medicinal conservation and the recharge of aquifers (Wikipedia, 2007). Therefore, with forests biotopes being a major, irreplaceable source of new drugs (like taxol), timber extraction can destroy genetic variations irretrievably. As reported by Wikipedia, (2007) shrinking forest cover lessens the landscape's capacity to intercept, retain and transport precipitation. Instead of trapping precipitation, which then percolates to the groundwater systems, logged over areas become sources of water runoff, which moves faster than subsurface flows. That quicker transport of surface water translates into flash flooding.

Malingreau et al (1985) reported that logged over areas become highly susceptible to high temperatures and low humidity and therefore prone to forest fires periodically. In 1987 alone, as many as 8 million hectares of forest got burnt (Booth, 1989).

Tropical trees provide forest animals with shelter, a variety of climbing,

perching and roosting sites, and most importantly, a continual source of food.

Selective logging seriously delimits the capacity of forests to fulfill these basic needs for resident animal populations (Terbogh,1993). In view of all the above, timber extraction goes on in many parts of Nigeria without reference to its consequences. In the present study, the consequences of timber extraction on socio-ecology of a forested area in central Nigeria and the socio-economic status of its community were investigated.

MATERIALS AND METHODS STUDY

STUDY AREA

The study area is the Ohimini forest in Ohimini Local Government Area of Benue State, Nigeria. The area lies within latitude 07° 49'N and 07° 52'N and longitude OS'36'E and OSO 40'E. It is located in the middle belt region of Nigeria and has a derived Savanna type of vegetation. The vegetation is formed from tropical rainforest with remnants of thick rainforest species and newly established savanna species. The thick forest species are multistoried with height as tall as 35 metres with lianas, climbers, scramblers and epiphytes.

DATA COLLECTION

The inventory of the Tree/Woody species and visible wildlife species were collected from both forested and deforested sites by the total count method.

In each site, five hectares block of 100m by 100m was measured with tape and sampled. The sampling involved the investigators working through the sample plots in a straight lines and identifying and counting each tree species within 20m left

and right of the transect. Soil samples were randomly collected to a depth of 0.15cm from both the forested and deforested areas. The soils were immediately bagged and transferred to the laboratory. They were passed through 2mm sized sieve. Microbial analysis of total bacteria, fungi and actinomycetes counts were carried out using serial dilution plate count. 10g portion of each soil sample was added to 95ml sterile tap water and the suspension shaken for ten (10) minutes on a reciprocal shaker at 150 oscillations per minute. Serial dilutions were prepared from this original for pour plating. Duplicates of (10)g samples of each soil were oven-dried at 105°c for 24hrs and the microbial population calculated on oven-dry basis. The media used were soil extract agar for bacteria, acid agar for fungi and egg-albumin for actinomycetes (Pramer and Schmidt, 1965). The duplicates plates per dilution were incubated at 28°c for six (6) days. The bacteria and fungi were identified according to Breed et al (1956) and Danisch and Gams (1972) respectively. Soil pH, total nitrogen, phosphorus, calcium and organic matter were analyzed using standard laboratory methods (Jackson, 1958).

The welfare loss by the villagers due to deforestation was estimated by the opportunity cost born by the households as a result of log harvesting using a structured questionnaire with relevant questions administered to 1,598 individuals in ten (10) villages namely; Akwunu, ohugbane, emichi, Ebuh, Akpewo, Ai-ogwuche, Awune, ugene and ikikla which all lay within 5.5km forest boundary.

Data analysis

The Shannon-weaver diversity indices of the plant species diversity of the two communities was calculated and compared. Chi-squared test was used to analyze the significant differences between animal species in the two sites while percentages were used to analyse. Soil nutrient variables as well as socio-economic factors affecting the communities.

RESULTS

Table 1 showing woody plant species and their densities

SIN	Scientific Name	Common Name	Density In Forested Area	Density in Deforested Area
1	*Chlorophora excelsa*	Iroko	0.70	0.63
2	*Afzelia africana*	Mahogany	0.64	0.40
3	*Entandrophragma cylindricum*	Sapele Mahogany	0.64	0.75
4	*Ficus bengalensis*	Banyam	0.92	0.85
5	*Khaya ivorensis*	Mahogany	0.99	0.51
6	*Quercus alba*	White Oak	0.78	0.40
7	*Khaya senega/ensis*	Savanna Mahogany	0.68	0.57
8	*Trip/ochitin scleroxy/on*	Obeche	0.76	0.74
9	*Termina/ia ivorensis*	White Afara	0.69	0.34

The Shannon -weaver diversity index indicates that the forested site has a value of 5.29 while the deforested site has a value of 2.846, which means the forested site has twice the density and diversity of species as compared to the deforested site.

Table 2. Showing the Animal species counted in both the forested and deforested sites.

SIN	Scientific Name	Common Name	No Counted in Forested	No Counted in Deforested
1	*Anomatarus peli*	Flying Squirrel	15	3
2	*Bubo lectus*	Eagle Owl	16	2
3	*Cercebus torguatus*	Red Crowned Mangaby	24	4
4	*Protozerus strangeri*	Forest Squirrel	31	19
5	*Helix aspera*	Snail	49	36
6	*Manis ericuspis*	Tree Pangolin	17	1
7	*Cricetomys gambianus*	Grambian giant Rat	4	12
8	*Tragelaphus scriptus*	Bush buck	7	1

Table 3. Showing some physical and chemical properties of both forest and deforested soils.

Area PH Organic Matter		Total Nitrogen	Available Phosporus	in K	my/100 g ca	m g
Deforested 6.6	2.6	0.16	5.5	0.13	46.8	3.2
Forested 6.6 4.1		0.19	6.6	0.15	50.4	5.6

Table 4. Showing the bacterial, fungal and actinomycetes count in the experimental sites.

Area Bacterial (X10'_g)		Fungi (X10'_g)	Actlnomyceles ($X10^{419}$
Deforested	15.5	5.4	1.6
Forested	30.0	59.1	4.9

Table 5. Showing the socio-economic dependency of the respondent to their use of the forested, Deforested or both areas of the forest.

Factors	Strongly	Agree	No Opinion	Disagree	Strongly Disagree
EJdent of dependency on forested area Equal use of both forested and deforested areas Equal use of both forested and deforested areas Annual Agricultural yield from deforested area	60%	20%	10%	5%	5%
	55%	20%	5%	15%	5%
	55% Very Satisfactory	20%	5% Satisfactory No Opinion	15% Unsatisfactory	5% Very Unsatisfactory
	30%	30%		20%	20%

Table 6. Showing some Agricultural produce in the years 2000 and 2004 Year 2000 Year 2004

S/N	Produce	Quantity	Mean Price	Quantity	Mean Price In Naira
1	Yam Guinea-	655180 tubers	14,350	639,200 tubers	2000
2	Com Rice	53932 bags	3.150	4794 bags	3,600
3	Beniseed	3196 bags	5,998	2397 bags	600
4	Maize	3,995 bags	2,399	3675 bags	9,198
5		38352 bags	2,399	1677.5 bags	1,679

DISCUSSION

The earth has experienced unprecedented high rate of destruction of forest worldwide (Wilson, 2002). This destruction evidently affects the biodiversity of the forest. This study indicates a significance difference in the occurrence of species of economic importance in both forested and deforested areas (Table 1). This is consonant with the findings of Wilson (1975) who in his studies showed that having a small number of timber trees can destroy up to 5.5% of the residual stand, and seriously damage an additional 3.0 - 6.00/0 of the standing trees. The Shannon -weaner index indicate that the forested site has twice the diversity of trees as compared to the logged over site. Apart from diversion forested areas (Table 1) also has higher densities of the species than the, deforested area.

Another finding of the study is that there is a significant ($P<0.05$) difference between the animal population in both the forested and deforested sites. This is consistent with the work of Terbogh (1993) who showed that a small - keystone" plant species provide food resources necessary to sustain different animal population during food scarcity. Wikipedia (2007) reported that deforestation can cause the destruction of habitats that support biodiversity. This is reflected in the differences in population of species in the forested and logged sites (Table 2). Whereas 24 monkeys where sited in the forested area, only 4 where counted in the deforested area, also while 31 forest squirrels where counted in the forested area, only 19 where counted in the logged area. Evidently selective loggings seem to interfere with the capacity of the forest to provide, shelter, perching sites and foods for these animals.

The chemicals properties of Nigerian soils have been well described in a number of publications (Nyle and Greenland, 1990; Ahn 11970; Jones and wild 1975; Kowal and Kassam, 1978). The bulk of the soil chemical properties are determined by the product of rock weathering and organic

The results (Table 3 and 4) indicates that the logging impact on the soil nutrients

and micro flora composition. The higher organic content in the forest area might be due to the accumulation of decomposing plants in the topsoil The decline in soil nutrient in the logged over site was accompanied by a drop in organic matter. This may be due to loses through leaching and run off water, thus emphasizing the role of organic matter in improving soil aggregation and supplying nutrients and hence the need for forest cover. Decline in micro flora (table 4) is not unconnected with decline in soil nutrients. The forested area clearly indicated a higher micro flora population. The study also indicates that logging greatly affects the socio-economic and cultural ties of the human communities around Ohimini Forests. As indicated in Table 5, 60% of the respondents accepted that they depended on the forestland for agriculture practice, (Agroforestry). In the year 2000 (table 6) when selective logging was lower farmers mean annual harvest was higher than that of the year 2004, when logging activity was in the increase. The mean annual harvests for two years were 3402.9 and 420.4 respectively. The higher mean annual harvest of the year 2000 was due to the fact that selective logging activity was low; consequently soil nutrients and organic matter were much more available for the crops. This confirms the report of Wikipedia (2007) which reported that deforestation decreases soil retention capacity allowing erosion of the fertile top soil and reducing the productivity *aI* the land. As a result most of the respondent would prefer farming along the fringes of the fertile area.

CONCLUSION

Forest structure and biological diversity is negatively impacted by timber extraction. This impact affects not only the species density and diversity but also wildlife Population, soil nutrients and micro flora composition, as well as the human communities that lives and depend on the forest.

The Jewish National fund states that the only country to come out of the twentieth century with more trees than it had at the start of the period was Israel. With the

current global concerns over timber extraction, global warning and climate change, we need to look at the Israeli actions in order to launch a state policy on afforestation.

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