The Effect Of Forest Degradation On Community Livelihood In The Rainforest Of Cross River State, Nigeria.

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Abstract

The conflict between man and the rainforest ecosystem has over time been very controversial due to man's impact on the forest ecosystem. It is against this backdrop that this paper seeks to evaluate the effect of forest degradation on community livelihood within the rainforest zone of Cross River State. Information on forest products, distance and time require for forest exploitation and forest products harvested were obtained and analyzed using ANOVA and multiple regression. Results obtained shows that the rainforest ecosystem has been degraded due to excessive exploitation of the forest resources which adversely affect the secondary forest and fallows as evidenced in the F-ratio of 52.71 greater than the t-ratio of 3.15 at 0.05 level of confidence. However, it was discovered that there was a significant variation in the amount of income generated across all the stages of the forest which shows that the quantity of forest product and income of the people tend to vary with the degrading condition of the forest ecosystem. Therefore, effective measures should be put in place in order to stop the forest ecosystem from excessive depletion

Key Words: Forest ecosystem, degradation, rainforest, secondary forest, fallows.

Introduction

There has been a serious and growing concern regarding the status and use of natural forests. The rate of forest destruction has accelerated significantly since the turn of' the century. This is most critical in the tropics where over 2.5 billion people depend on the natural forest resources for avariety of services (Park, 1992; Sharma, 1992; Tijani, 2007). Cunningham and Cunningham (2004) report that an estimated 12,5 million km^2 of tropical lands were covered with closed canopy forests a century ago and 9.2 million ha or about 0.6 percent of the remaining tropical forest is cleared each year. According to Waggoner (2000) the Asia-Pacific sub-region has experienced continuing deforestation and degradation. From 1990-95, the sub-region recorded a decline of almost 16.3 million ha of natural forest or approximately 3.25 million ha annually. The largest losses were in Indonesia (5.4 million ha), Myanmar (1.9 million ha), Malaysia (2.0 million ha) and Thailand (1.6million ha). However, The Philippines had the largest rate of deforestation at (3.5 %) annually, followed by Pakistan (2.9%), Thailand (2.6 %) and Malaysia (2.4%), estimates of forest losses in Africa (FAO, 2003) and Nigeria (Okonkwo, Umar and Nwafor, 2002) were observed to be higher. For instance, between 1990 and 2000, the continent lost about 52 million ha of theforest, accounting for about 56 percent of the global reduction of forest cover (FAO, 2001) while FAO (2007) reported a net loss of about 4 million hectares for the period 2000 - 2005. There is considerable variation or forest cover loss among the countries in Africa. For example, three countries of Sudan, Zambia and Democratic Republic of Congo accounted for almost 44 percent. West Africa (43%), North Africa (7.2%) and Fast Africa (20.8%) (FAO, 2001, 2007).

In Nigeria, deforestation rates have not been immuned from the ugly trend. From 1956 to 1986 the country lost about 23,000ha of the gazette forest estates per annum through government de-reservation (Skoup, 1986) and 5 percent of closed forest is converted annually (WR1, 1987).Morankinyo (1991) reported that 60 percent of the forest loss in Nigeria was between 1950 to 1960. Forest clearance in the country is put at an average of 400,000ha per annum, while afforestation has only 32,000ha annually. The cumulative effect of these is that the country has lost 50 million ha of forest in less than 100 years (Nwoboshi, 1987). The increase loss of forest areas implies loss of numerous forest and plant species of value for the sustenance of the people in Nigeria.

However, in Cross River State, Bisong (2007) revealed the rate of annual loss of forest cover in twelve sampled villages in Ikom Forestry charge as 5.68km^2, Akamkpa Forestry charge (5.777km^2) and 4.441km^2 for Oban charge. Furthermore, Dunn and Otu (1994) reported that 20 percent of the tropical high forest was lost between 1972 and 1992 and over 76,000 hectaresrepresenting 19 percent of the forest was lost to agriculture and plantation development. Recent estimates show that between 2000 to 2005, about 20,000ha of reserved areas in the state arc converted to agricultural plantation. At this rate of forest clearance, the Cross River State Forestry Development Department in 1994 observed that the state forest reserves may be completely destroyed by the year 2014. Therefore, the increasing loss of forest ecosystem in the study area affect the quantity and income of the indigenous rural population. Therefore, this paper seek to examine the effect of forest degradation on community livelihood as regards the status of the forest, the product harvest within the forest ecosystem.

Methodology

The study was carried out in the rainforest communities of Cross River State, Nigeria. The data was collection in two phases; the first phase involved a participatory rural appraisal (PRA) of the communities with forest ecosystem which has undergone severe degradation. and the second phase was mainly household questionnaire survey and field measurement for the eighteen identified sampled settlements. The data collected include the status of forest resources, location of natural forest, types of forest, forest products harvested from different forest categories, volume of harvested products from the different categories, the different forest levels and forest products for sales/consumed. The participatory rural appraisal method was first adopted in the consultation of village heads, elders, youth council and women leaders to collect data to provide background information about communities having interface with the forest , the PRA tools employed were semi-structure interviews, participant observation, direct observation, transect walk and key informant. The direct observation and transect walk were conducted to enable determine forest coverage and distance to where the forest resources are harvested

Information such as data on status of forest resources, type of forest products, volume of forest products and income from different forest levels were capture in the questionnaire. Field inventory and measurement was conducted to determine forest resource boundaries, village territories, volume of trees harvested and quantity of forest products harvested from the sampled communities and matchets for clearing and opening routes for transect walk across forest areas. The study sampled eighteen communities from nine local government areas having forest ecosystem. These includes Akamkpa, Biase, Yakurr, Obubra, Etung, Ikom, Boki, Obanliku and Obudu. The systematically sampling technique was used to select the number of household used for this study Fifty percent sampling proportion was adopted in the selection of households from each village. The questionnaire survey of 1,457 households in the study area was conducted the 1,457 households represent a total household number of 2,906 with the population size of 42,876 for the whole area. The data generated from were analyzed using analyses of variance (ANOVA) and multiple regression. The One-way analysis (ANOVA) was used mainly to analyze of forest products collected across the re-generational levels, with the aim of determining difference in the three forest stages and the relative contribution of these stages of forest to the study population overall quantity of forest regeneration stages on the gross income of the rural population.

Literature review

Recently, evidence is mounting from multiple studies that humans at an aggregate level are exploiting forests at unsustainable rates especially in the tropics (Turner, 1995; Gilson. McKean and Ostrom, 1998; FAO, 2007; Larry. 2007). Sharma (1992) report that issues relating to forestry have become more complex and the status or forest is now a subject of worldwide debate (Cunningham and Cunningham, 2004). The rich and complex ecosystems which has survived millions of years of natural environment are now facing a fight for survival. The people are inflicting more damages on the forests in a matter of few years than the entire forces of nature have done over geological time scale (Park, 1992). Deforestation, especially in the tropical rainforest, has accelerated significantly since the turn of the century. The annual rate of change of forest area in Latin America and the Caribbean from 2000 to 2005 was -0.51%, compared with -0.46% during the 1990s (FAO, 2007). From 1990 to 2005, Latin America and the Caribbean lost abut 64 million hectares of forest. During the period, forest area increased by 11% in the Caribbean and declined in 19% in Central American and 7% in South America. Forest area declined from 51% to 47% of the total land area in Latin America and the Caribbean during 1990-2005. But in North America total forest area remained virtually constant (FAO, 2007). Canada reported no change in forest area from 1990 to 2005, Mexico reported a decrease of 0.52% per year from 1990 to 2005, while United States reported an annual increase in forest area of 0.12% in 1990s and 0.05% from 2000 to 2005 (FAO, 2007).

According to United Nations (2005), one fifth of the world's tropical rainforest was destroyed between 1960 and 1990 ranges from 55,630km to 120,000km each year, while FAO (2007) reported that, from 1990 to 2005, the world lost 3% of its total forest area. At tills rate, all tropical forests may be gone by the year 2090. In 1999, satellite data showed more than 31,000 fires in a single month in Brazil and remote sensing experts calculated more than 8 million ha per year were being cut and burned in Amazon basin alone. Consequently, estimates for total tropical forest losses ranges from about 5 million to more than 20 million ha per year. FAO (2000) reported 12.3 million ha per year being generally and widely accepted. Although, the rate of deforestation has increased substantially through the years and the impact has varied from region to region, but investigationshave shown that, there is rapid increase in forest clearance, (FAO, 2007). For instance, in Ethiopia 2.1 million ha resenting 14 percent of the forest has been lost between 1990 and 2005. The country annual loss is about 141,000 ha of natural forest (Mongabay, 2006), Amazon rainforest recorded 37.5 million acres every year and 600 bush fires daily (Larry, 2007), and Costa Rica, Cote d' Voire and Nigeria have lost their closed forests of the humid tropics at rates exceeding 4 percent per year during the 1980s, Whereas, the rate in Brazil was lower, at about 2 percent per year, but the area affected was greater with estimates of about 8 million ha (WRI, 1990). According to UnitedNations (2005), Nigeria has the world's highest deforestation rate of primary forests. It has lost more than half of its primary forest in the last five years. But in Cross River State, Balogun (1994) reports that, twenty five years ago 70 percent of the land was forested and only 30 percent was farmlands but by 1994 the percentage of forested land had fallen to 40 percent and farmlandshad increased to 60 percent. And in 1992, 89 percent of the reserve forest had been converted to farmlands. Recent estimates have shown that the state is loosing about 20,000ha yearly from reserve forests to agricultural plantations. Bisong (2007) observed that deforestation by whatever index of measurement, either by percentage change in the loss of forest cover around the designated forest charges or in the annual rate of loss in forest cover, tended to be greater in community holdings interfaced by forest reserves and national parks that are strictly community or public protected forests.

Although deforestation is one of the most important environmental problems in the tropics (Waggoner, 2004), National Research Council (1993) has earlier observed that the consequences cannot be assessed precisely and the magnitude of the interrelated environmental, social and economic impacts are difficult to determine. Most of the areas of the humid tropics lack reliable data about forest resources exploitation and the management dimensions of the forest people (Balogun, 1994). Some studies such as Westoby (1989); Warner (199l), and Gibson and McKean (1999) have pointed out that unplanned deforestation can generate significant negative externalities such as loss of biodiversity, elevated risk of erosion, floods and lowered water tables, and increased release of carbon into the atmosphere associated with globalclimate change. Importantly, deforestation can decrease the welfare of forest users by eliminating habitat for game species, altering local climates and water sheds, and destroying critical stocks of fuel, fodder, food and building materials (Falconer, 1990). Precisely, Flint (1991) while investigating the rate of biodiversity loss across regions of the world concludes that biodiversity loss is highest in the humid tropical countries where terrestial diversity is highest. But earlier Ola-Adama (1981) reveals that tropical Africa has lost about 1 million km^2 of most forests to shifting cultivation. FAO (2007) reported that, each African country has lost about 7% of native tree species. In Nigeria, about 43.5 percent of the total forest ecosystems have been lost from 1980 to 1982 causing extinction threat to many sources of resources.

Findings

Status of forest resources

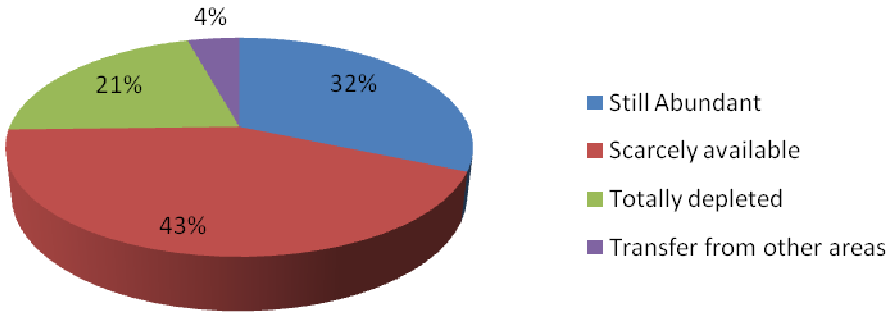
The perception of the study population toward the status of forest resources in the sampled communities varies significantly in the study area. The result of household responses toward the status of the forest presented in table 1 shows that the mean population response to forest resources being scarce, depleted and imported from other places are 35.27, 16.44 and 3.5 respectively. The aggregate mean was 55.21 against 25.72 of the people who still believed that the resources are still in abundance (Table 1). The high standard deviation of population response to forest resources scarcely available indicates high level of disparity in the distribution across the sampled communities. This means that while some villages may record very high distribution (84 and 76), others may have extremely low distribution (0 or 1). The results further show that 43.58 percent of the people confirmed that forest resources are rarely seen, but 31.77 percent still believed that the resources are still in abundance and therefore can continue to exploit them indiscriminately. But 21.34 percent indicated that forest resources are totally depleted (Figure 1). This analysis shows excessive exploitation of forest resources which may result to scarcity of forest products vis-a-vis affects the socio-economic activities of the people in the study areas.

Table 1: Household responses toward the status of forest resources

Status of forest resources	Total responses	Mean	Standard deviation	Minimum	Maximum
Still Abundant	463	25.72	15.30	10	68
Scarcely available	635	35.27	19.82	8	76
Totally depleted	311	16.44	19.34	1	84
Transfer from other areas	63	3.5	4.74	0	17

Source: Field survey, 2012

Fig. 1: Response to the status of forest resources



Source: Field survey, 2012

Distance and time required for forest exploitation

The menu distance of 12.6km is required to get into the high forest for collection of forest products, this distance requires a time frame of about three hours continuous trekking. The distance and time varies according to the settlements involved. The investigation shows that in Iko Ekperem, Idoma, Orimenkpang, Odonget, Iyametet and Ibogo, the distance to the high forest was about 500 metres away from the settlement ten years ago, but people now walked 12km to 16kin to collect forest resources from the high forest. Similarly in Iwuru central, Okorshie and Akparabong, people trek for about 16 km to 20km and takes 4.5 to 6 hours to harvest forest products (Table 2). The long distance to the forest and the lime used in search of forest resources were attributed to the degrading conditions of the natural forest ecosystem due to excessive exploitation of the resources, expansion of farmlands, timber exploitation etc.

Table 2: Distance and time required for forest exploitation

Sampled communities	Distance (km)	Time (hours)
Agbokim	7	1.8
Ajassor	8	2
Akparabong	20	5
Okuni	15	4
Abo Ebam	6	1.5
Orimenkpang	16	4
Odonget	12	3
Iyametet	14	3.5
Agoi Ekpo	13	3.3
Ibami	12	3
Ibogo	15	3.8
Idoma	12	3
Iko Ekperem	13	3.3

Iwuru central	20	5
Bayatong	12	3
Okorshie	18	4.5
Bendi 1	6	1.5
Busi I	8	2
Total	227	32.2
Mean (x)	12.6	3.00

Source: field survey2012

Result analysis

The analysis of variance of the impact of forest regeneration stages on the quantity of forest products harvested by the rural population produced an F-ratio of 52.71 > 3.15 at 0.05 level of confidence. Thus. since the calculated F- value greater than the table value, our null hypothesis (H_0) is rejected. This analysis confirms that there is a statistical difference in the quantity of forest products collected from high forest, secondary forest and fallows. Further investigation using the mean quantity shows that significant number of the products collected is from the high forest (Table 3). This means that the study population depends more on the high forest for resources than other regenerational stages. The resources decrease from the high forest into fallow lands, thus affecting the benefits of the people. It is evident that the number of forest products collected at any regeneration stage determines the benefit to each household. The greater the number and quantity of products collected, the more income benefits to the rural population.

Table 3: Number of forest products harvested across forest levels

Source of variance	Sum or squares	df	Menu square	F
Between groups	460.04	2	230.02	
Within groups	222.56	61	4.44	52.71
Total	682.59	53		

Source: Data analysis, 2012

Spatial analysis

Spatial analysis shows that Agbokim, Abo Ebam, Iyametet and Iko Ekperem have the highest number of forest products gathered from the high forest than Iwuru central, Bayatong, Bendi, Busi that have the least (Table 4). The result also shows that the average number of forest productsharvested from high forest is 10.33, while 5.39 and 3.39 is harvested from secondary forest and fallows respectively. The study concludes that sustainable forest resources management in the study area should aim at improving the number of forest products gathered by households across secondary forest and fallow land. This may increase the overall benefits and reduce pressure from the high forest.

Table 4: Average number of forest products harvested from forest regeneration stages by households

Sampled communities	High forest	Secondary forest	Fallows
Agbokim	14	6	4
Ajassor	12	5	3
Akparabong	13	7	4
Okuni	10	8	2
Abo Ebam	14	9	6
Orimenkpang	12	6	4
Odonget	12	5	2
Iyametet	14	6	4

Agoi Ekpo	10	4	3
Ibami	12	5	3
Ibogo	9	4	3
Idoma	8	5	4
Iko Ekperem	14	7	5
Iwuru central	6	4	3
Bayatong	6	4	2
Okorshie	8	5	4
Bendi 1	6	3	2
Busi I	6	4	3
Total	186	97	61
Mean (x)	10.33	5.39	3.39
Std Deviation	3.07	1.58	1.09

Source: Field survey, 2012

The income data from high forest (x_1), secondary forest (x_2) and fallow land (x_3) (independent variables) and the gross income of the people (dependent variable) was analysed, and regression equation obtained for the relationship (Table 5). $Y = 1084.56 + 0.53x_1 + 0.29x_2 + 0.58x_3$... (Equation 3). This regression model shows that the gross income of the people (y) is dependent on the income from high forest (b_1), secondary forest (b_2) and fallow land (b_3).

Table 5: Regression analysis of forest regeneration stages and population income

Variables code	Variables description	Standardized coefficient (Beta)	t-ratio	
Var.1	High forest	0.53	9.21	
Var. 2	Secondary forest	0.29	4.94	
Var. 3	Fallow lands	0.58	13.50	
	Constant	1084.56	1.31	
Summary of regression model				
Multiple R	R-squared (R^2)	Adjusted R^2	Df	f-value
0.986	0.975	0.969	3.14	179

Data analysis,2012

Further analysis, using the multiple regression model is to determine the effect of forest regeneration stages (independent variable) on the gross income of the rural population (dependent variable). The assumptions of the regression model were extensively considered in section 3.2.10.1. From Table 5 the result shows that a combination of income from independent variables such as high forest (b_1), secondary forest (b_2) and fallows (b_3) predict the gross income of the rural population. This yielded multiple regression coefficient (R) of' 0.986 and a coefficient of determination (R^2) of 0.975. The multiple regression (R) shows a positive relationship of the people's income from forest resources across the different stages of forest regeneration in the area. But, as the income from the different stages increase, the population's total income improves. The coefficient of determination (R^2) shows that 97.5 percent of the variations in the people's gross income are caused by the combined effect of income from all stages of the forest. The F-ratio of 179.003 was significant at 0.05 level, indicating that there is significant variation in the amount of income generated across the different forest levels, thus rejecting hypothesis three of this study that the quantity of forest products and income of the study population tend to vary with thedegrading conditions of the forest ecosystem. To determine the relative contributions of each stage of the forest to the gross income of the study population, a test of regression weight was applied as shown in Table 5. The result shows that the standardized regression weights ranged from 0.29 to 0.58, while the t-ratio ranged from 4.936 to 13.501. The result reveals that all the Beta weights were statistically significant at 0.05 levels. The beta weight of income from fallow/farms contributes more (0.59). This is followed by high forest (0.53) and secondary forest (0.285). The implication is that the rural population generates more income from fallow/farms than high forest and secondary forest.

Conclusion

Today, the Cross River rainforest ecosystem which has been seriously encroached due to human activities have raised concern to many scholars. Beside, human population which increase geometrically especially in rural communities in Cross River State has caused great impact on forest ecosystem base on the high demand of the forest resources for livelihood sustenance. Furthermore, it was observed that a high proportion of the communities depends solely on the rainforest resources for livelihood sustenance . Accordingly, 97.5percent of the variation in the people's gross income are gotten from the forest resources .However, since Cross River State forest ecosystem serves as a livelihood sustenance, there is urgent need for the various stakeholders to ensure it sustainability

Recommendations

The level of man's intervention in the rainforest ecosystem of Cross River State has been very overwhelming Therefore, the following recommendations are hereby put forward if the rainforest ecosystem must be sustained.

- The various communities within the Cross River State rainforest zones should be educated on the significant of conserving the forest ecosystem.
- They should also be educated on the negative implication of over exploitation of the forest resources.
- The government should constitute a taskforce that would help monitor excess exploitation of the forest resources
- The government and other agencies should provide a mechanism and framework that would ensure the sustainability of the forest ecosystem
- The government and other agencies should provide other alternative to community livelihood in the areas.

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