



DETERMINANT OF UNCONTROLLED EXPLOITATION OF BIODIVERSITY IN THE NIGER DELTA REGION OF NIGERIA: IMPLICATIONS FOR FARMING SYSTEM AND EXTENSION PROGRAMME PLANNING

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ABSTRACT

This study was carried out in the Niger Delta Region of Nigeria to ascertain the factors that prompted forest communities into uncontrolled exploitation of the biodiversity in the study area and expose the implications. Three states in the region were randomly selected for the study. A total of 120 farm households were selected for the study using multi-stage sampling technique. Interview schedule was used to obtain data from the respondents and the data were analyzed using descriptive statistics and multiple regression model. The study revealed that 89.17% of the respondents use fuel wood for cooking and also collect bush meat (game animals), herbs, shelter woods, honey, latex and ropes from the forest, of which fuel wood ranked highest (mean = 3.80). The variables captured in the model, search for fuel wood was a significant determinant of uncontrolled biodiversity exploitation. Implications for extension programme planning to include biodiversity protection and agro-forestry practice in extension programmes for the farming systems of this region.

KEYWORDS: Determinants, Uncontrolled, Exploitation, Biodiversity, Niger Delta Region, Extension Programme planning, Agro-forestry

INTRODUCTION

The biodiversity in the Niger Delta Region of Nigeria is observed to be rapidly depleting since the middle of the 20th century. This observation was also made in a similar study by Akachuku (1997) as he opined that in the last 100 years, the Nigerian environment has been deteriorating at an alarming rate with adverse effects on human, wildlife and livestock and on economic activities of the country. Environmental deterioration involves the degradation of land, water and the atmosphere. Land degradation includes forest degradation, deforestation and decertification etc.

Biodiversity embraces fauna and flora. There are wide ranges, of plant and animal species that are in existence, in the biosphere. The existence of various flora influences the existence of the fauna and vice versa. That is why they depend on each other for one purpose or the other. The alteration of forest structure and composition and destruction of forests alter or degrade micro-and macro-environment and destroy the habitats of living organisms. According to Ayodele and Lameed (1997), (CI, 2005), primates' population has been greatly reduced in the forest because their habitat had been under great pressure mostly from the extraction of minerals, timbers, road construction and other agricultural activities like combined and long term effect of fire, farming and grazing practices. These have significantly, altered the original natural vegetation of the region (ACNP, 1981; Green, 1988). Nevertheless, habitat destruction through human interference is the most important factor threatening the existence of non-human primates (Russel and Dorothy, 1987; TGRUM, 2006).

At the beginning of the 20th century, the area of high forest was about 20 million hectares. About 10% of this now remains as patches of forest found mainly in forest reserves (Roby, 1991). According to Davis (1966), the responsibility of anyone who manages a forest for the

supply of industrial wood and edible fauna is to recommend and usually to determine what, when, where and how much wildlife, timber and other flora to extract from the forest. This is not so in the Niger Delta Region of Nigeria. The exploitation of the forest here is not controlled. This is not because there is no legislation put in place for it, but the attitude of the assigned agency officers. The rural dwellers do not also help matters, they are involved in illegal exploitation of forests for the timber and wildlife. This is compounded by the activities of oil exploring companies who by their activities have almost killed the forest.

Before a solution to a problem can be fathomed, the root causes have to be identified. There is the need to understand those factors that prompt forest and wildlife uncontrolled exploitation.

METHODOLOGY

The study area comprised of the Rain forest belt of Delta, Bayelsa, Rivers, Akwa-Ibom and Cross-River States of Nigeria. The Tropical rain forest in this area has a high diversity of flora and fauna. The area is located in the southern part of Nigeria, with parts of it stretching towards the East and West.

Three states in the study area – Delta, Rivers and Bayelsa states were randomly selected for this study. The multi-stage sampling technique were used to select two (2) Local Government Areas from each state and twenty (20) farm household heads from each of the Local Government Areas randomly. A total of six (6) Local Government Areas and one hundred and twenty (120) farm household heads were selected for the study.

Interview schedule was used to obtain primary data, while secondary data were accessed from literature materials.

Exploitation of biodiversity in the Niger delta region of Nigeria and its implications for farming

The interview schedule was administered by trained secondary school graduate teachers resident in the selected Local Government Areas. Data were analyzed using descriptive statistics such as frequency, percentages and means derived from a four-point Likert's type scale with cut-off point of 2.50 and multiple regression was used.

In this study, multiple regression equation was specified and parameters were estimated by Ordinary Least Squares (OLS). The implicit form of the model was specified as: $Y_c = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9)$. The explicit form of the model takes the form; $Y_c = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + e_i$.

The symbols in the model are explained as shown in Table 1

TABLE 1. Description of symbols in the multiple Regression equation

Model	Description	Expected	Unit of measurement
Symbol		sign	
Y_c	Exploitation of forest	+	number of items collected from forest
X_1	Age of household head	-	years
X_2	income	+	Naira
X_3	Education	+	years
X_4	size of family	-	number
X_5	Cost of refined fuel	+	value
X_6	Marital status	-	Dummy (married=1, Otherwise=0)
X_7	Distance of home to the nearest forest	-	Kilometers
X_8	Extension contact	+	number of visits by extension agent
X_9	Contact with forest guards	+	number of encounter with forest guards
E_i	Error term		
B_0-b_9	Regression coefficient		

RESULTS AND DISCUSSION

Social – Economic characteristics of Household Heads

The results of the study revealed that 66.67% of the respondents were males and 33.33% female. This implies that majority of the household heads in the rural settlements were males and the few female household heads were those women whose husbands work in far

away cities and towns. This is in consonant with FAO (2005) as they opined that few women are formally identified as household heads because their husbands are migrants to cities for white collar jobs and the women become the *de facto* heads. The heads of the rural households have much to do with the supply of household needs as the 'bread winners'.

TABLE 2. Socio- Economic Characteristics of Respondents (n=120)

Variables	Frequency	Percentage (%)
Gender		
Male	80	66.67
Female	40	33.33
Marital Status:		
Married	117	97.50
Single	3	2.50
Age (years):		
21 – 30	21	17.50
31 – 40	23	19.17
41 – 50	40	33.33
Above 50	36	30.0
Education:		
No formal education	30	27.5
Primary	38	31.67
Secondary/TC11	20	16.67
OND/B.SC	16	13.33
HND/B.SC	13	10.83
Higher Degree	0	0.00

Income (monthly) (₦)		
5,000 – 10,000	40	33.33
11,000 – 20,000	45	37.5
21,000 – 30,000	25	20.83
Above 30,000	10	8.33
Size of Household		
1 – 5	20	16.67
6 – 10	72	60.0
11 – 15	26	21.67
16 – 20	2	1.66
Type of Fuel Used		
Kerosene	13	10.83
Gas	0	0.00
Wood	107	89.17
Electricity	0	0.00

Majority (97.50%) of the respondents were married while 2.50% were not. Age wise, 63.3% of them were 41 years old and above. Those at the middle age of 31 – 50 constituted 52.5%.

The implications of the aforementioned facts were that they had responsibilities to their households. A great majority (72.50%) of the respondents had formal education ranging from primary to tertiary education (HND/B.SC).

With respect to income, 91.66% had monthly income ranging from ₦5, 000.00 – 30,000.00. This income is not enough for the up keep of the household and the household head have no option than to source for additional source of income and locally source some of their needs.

Most (60%) of the respondents had household of the sizes of 6 – 10 persons, 16.67% had household sizes of 1-5 persons, 21.67% had 11-15 persons while just 1.66% had 16 – 20 persons. The size of the households is important in planning the livelihood of every household.

A great majority (89.17%) of the respondents relied on fuel wood for cooking. The implication is that they rely heavily on the forest for fuel wood with which they make fire for their cooking's in the kitchen. Humans rely on the variety of food, shelter and goods for their livelihood. Yet, humans put increasing pressure on species and their environments (FAO, 2004). As a result many plants and animals are at risk, as well as essential natural processes such as pollination by insects and the regeneration of soils by micro-organisms.

TABLE 3. Items Collected from Forest by Respondents

Items	Mean	Rank
Fuel	3.80*	1
Wild animal (bush meat)	2.80*	5
Herbs	3.30*	2
Shelter woods	3.20*	3
Honey	3.13*	4
Latex	2.20	7
Rope	2.60*	6

*Met cut – off score

≥ 2.50 = major item collected from forest

< 2.50 = net major item obtain from forest

What Respondents Obtain from the Forest

Fuel wood (fire wood) rank highest among the major items collected or extracted from the forest by rural household heads (Table 3) with a mean of 3.80. Other major items collected from the forest include herbs (\bar{x} =3.30), shelter wood – timber, fronds, stakes, etc (\bar{x} =3.20), Honey (\bar{x} =3.13), wild animals for meat (\bar{x} =2.80) and rope (\bar{x} =2.60). Latex had the lowest mean score as an item extracted from the forests by rural household heads. This is because the rubber business is not stable for now. This implies that a great majority of the households depend on wood for cooking. This they extract from the forests without control, especially now that the population pressure is high and the level of poverty is also high, so

that many of the households use fuel wood as an alternative to kerosene and cooking gas.

Herbs are collected from bush to prepare medicines for different ailments. A lot of people, in these days of alternative medicine, have resorted to the use natural medicinal herbs for cure again. This is also helped by the fact that hospitals and clinics are always far away from the rural communities and the bills are often out of the reach of the rural populace.

The woods and palm fronds for roofing and stakes collected for building the walls of mud houses. The woods are sawn and made into plants. They are mostly used in the urban while fronds and stakes are widely used in the villages. The palm fronds are used for making thatches for

roofing. Population growth has led to much exploitation of the forest for this purpose.

Honey collected from bee hives are always collected using the crude method of burning. This kills a lot of the bees; it is not conservation friendly and does not encourage sustainability.

Many household heads supplement their domestic meat supply with hunted wild animals from the forest. This is done with the aid of either the gun or traps. This has really reduced the population of animal species in the forest.

Ropes are made from trailing climbers in the forest. These are used by the rural dwellers in the process of building the skeleton of their mud houses, yam storage and for the packaging of their farm produce like kola-nut for the market.

The population of humans increases every year and this means extraction of these items by man impacts negatively on the forest resources. According to Umar (2004), humans put increasing pressure on species and their environment. As the trees are cut down for fuel wood and timber uncontrolled, the fauna species are affected negatively. The animals migrate as these vegetation which forms their natural habitat are depleted by humans. All

animals depend on vegetation for food and shelter, but elimination of this requirement will force them to move to the immediate protected area (Harthron 1980).

The rate at which animals are hunted in the forest is too high for their natural replacement by way of procreation. For the tide to be stemmed, there has to be a balance between the rate of extraction and replacement. That is, there should be an equilibrium between exploitation and natural build up so that sustainable use of the forest will be guaranteed.

Determinant Variables of Uncontrolled Forest Exploitation

Since calculated F – value (10.15) is greater than the corresponding critical value (2.37) we can say that the variables captured have significant joint relationship with uncontrolled exploitation of biodiversity in the study area. In the estimated regression model, an attempt was made to identify the specific coefficients of the selected variable which provide statistical contribution to the specified model was evaluated by means of t – test at 5% level of significance (table 4) Out of the nine parameters captured in the model, one was significant.

TABLE 4. Result of Regression Analysis

Model	Un-standardized Coefficients		Standardized Coefficients	
	B	Std. Error	Beta	T
(Constant)	1.462	1.118		1.307
Age	-9.6E-03	.025	-.046	-.383
Distance	.445	.328	.099	1.355
Education	-8.2E-0	.058	-.201	-1.417
Extension contact	-1.2E-02	.150	-.006	-.080
Family size	6.056E-03	.078	.009	.078
Forest guard contact	9.177E-02	.198	.034	.464
Fuel cost	3.872	.627	.504	6.173*
Income	-1.9E-05	.000	-.087	-.677
Marital status	.295	.643	.043	.459

*Significant at 0.05 level

The statistical significant of the individual explanatory variables in the model is discussed as follows:

Age (X₁) years

Age turned out to be one of the variables that did not determine uncontrolled exploitation of biodiversity in the Niger Delta Region. The coefficient of variable is negative and is not in conformity with apriori expectation. This is because with progression in age, activities of individuals dwindle. This result is in consonance with relationship with participation in activities. This is because; with age increase people tend to become weak.

Distance (X₂) Km.

The coefficient of distance of home from the forest was positive in the uncontrolled forest exploitation equation, but not significant. This is because the distance of the forest from home is far. The farther the distance, the less the tendency to exploit it.

Education level (X₃) years

The level of formal education coefficient was negative and not significant in the uncontrolled biodiversity equation. The negative sign indicates that the higher the level of

education, the lesser the tendency to exploit biodiversity indiscriminately. This is for the fact that with education, people have become aware of the danger inherent in depletion of biodiversity. The relationship is not significant. Although the forest communities have low level of education; lack of adequate awareness did not make them to engage in massive forest exploitation.

Extension contact (X₄)

This variable turned out to be negative and not significant in the variable exploitation model. The negative sign implies that the more the extension contact, the lesser the tendency to engage in uncontrolled forest extraction. But extension contact is encouraging. This means that they did not exploit the forest because they have awareness from the extension contact. This agrees with Hamidu, *et al.* (2006) as they posited that the major source of afforestation innovation awareness is extension agents.

Family Size (X₅)

Family size was positive but not significant because this was not large enough as to cause the family to seek alternative means of more income. This is contrary to *a priori* expectation for that reason. Average household size will not warrant seeking alternative means. Another reason is that the elder children were away in towns and cities in search of western education especially at the secondary and tertiary levels. According to Ekong (2003), people migrate in search for education.

Presence of Forest Guard (X₆)

This variable was positive and not significant in the biodiversity exploitation model. The presence of forest guards was a discouraging factor to the forest communities. The presence of this officers scare people away for fear of being prosecuted.

Cost of Fuel (X₇)

This variable turned out to be positive and significant in the equation and it is in congruent with *a priori* expectation. The scarcity and high cost of refined fuel for cooking made the respondents to seek alternative source of fuel in fuel wood in the forest. The perpetual hike in the price of fuel forced the rural dwellers to move massively into the forest in search of alternative means for generating fire for domestic purposes. International centre for integrated Mountain Development (2001) opined that to meet fuel needs of the ever increasing population, forest were exploited without control.

Income (X₈)

This variable turned out to be negative and not significant. This was owing to the fact that the income of the rural forest communities was just enough to take care of their humble style of living as they produce what they eat. The average rural dweller is easily contented with what he or she has.

Marital Status (X₉)

The result of the study showed that 97.5% respondents were married and definitely had much to do with forest resources. The variable was positive and not significant in biodiversity exploitation equation. This implies that change in marital status increases ones dependence on biodiversity needs for livelihood, but this variable is not the cause of uncontrolled biodiversity exploitation. In many African countries where polygamy is the culture, as a result of the number of wives a man marries, his income becomes low and the wives seek alternative source of income to supplement what the husband gives to them (Ofuoku, 2010).

Factors of Uncontrolled Biodiversity Exploitation

From the above information, it is evident that the most prevalent cause of biodiversity exploitation is the quest for fuel wood prompted by high cost of refined fuel. Though there were other reason which include low level of education, poor extension contact, family size, inefficient forest guards, poor income and marital status, these were not the major reasons for entering the forest at will and frequently to extract flora and fauna resources.

As a result of this uncontrolled exploitation many species of plants and animals are threatened. According to Salim and Ullsten (1999) 12.5% of plant; 44% of birds 57% of amphibian; 67% of reptiles and 75% of mammal's species are threatened by decline of forests and other natural

habitats. One source of poverty is the over exploitation of natural resource of which has resulted in the destabilization and depletion of the biodiversity (Agbogidi and Ofuoku, 2006). The extraction of our resources was not controlled and is still not controlled, they further said.

The attitude of environment law enforcement agents is a problem to biodiversity conservation. These officers keep blind eye to illegalities that take place in forests. Official corruption has written death warrants for many forests for a bribe (Agbogidi and Ofuoku, 2006).

The study area contained a wide range of biodiversity, but today, the forest genetic resources of this region are greatly threatened both in diversity and in richness mainly by human activities without knowing that any influence which diminishes the richness and diversity of our environment diminishes the fullness and perhaps the span of our lives.

Implications for Farming system and Extension Programme Planning

It is important to note that a lot of research efforts have been put into sustaining biodiversity and different services have a vital role to play in the protection of the biodiversity of the Niger Delta Region of Nigeria. Through their linkage role between researchers and beneficiaries, much can still be done.

Farming System extension services have been known to focus heavily on agriculture to the detriment of our forests. Most of the extension programme planning are focused on agricultural development to the detriment of forest development and hence biodiversity. Extension programme planning should be widened in scope to embrace programmes that will ensure the protection and conservation of biodiversity in the Niger Delta. According to Adekunle (2005), saving biodiversity means taking steps to protect gene species, habitats and ecosystem. The best way to maintain species is to maintain their habitats (FAO, 1995).

Farming system extension programme planning should include programmes that will ensure agro-forestry practices for the prevention of degradation of key natural ecosystem, as well as their effective management and protection that is maintenance of diversity on lands and water that have been disturbed. Foskett and Foskett (2004) suggested protection of diversity on land and water that have already been disturbed and restoration of lost species to their former habitats and preservation of species else where in gene banks, zoos, botanic gardens and other off-site facilities (Ola-Adams, 1996).

In view of the above implication, the following recommendations which are expected to give rise to interest equilibrium were given:

- (a). Education of rural communities on the natural roles and importance of biodiversity and agro-forestry by extension services. This will prompt awareness of the rural communities on dangers of depleting the forest.
- (b). Room should be given for community participation in forest and aquatic management through agro-forestry practice. This will create a sense of recognition in the community and thus motivate them to act in order to protect our forests. This will spur them to institute regulations locally.

- (c). Farming systems extension services should ensure that biodiversity conservation attitude and agro-forestry practices are imbibed at individual household/village/community/local government/regional levels.
- (d). Rural dwellers should be encouraged to fetch only the dead trees or branches of trees and only trim trees in their farming areas instead of felling then off. This will control/prevent massive felling of trees. This can form part of the regulation to be made by the communities.
- (e). Alternative source of cooking fuel in the manner of saw mill wastes should be drawn to the attention of households in the rural communities. The wood shavings and dust are good fuel for cooking as they burn very well.

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