EFFECT OF LAND DEGRADATION ON INCOME GENERATING ACTIVITIES OF FARMERS IN IMO STATE, NIGERIA

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Abstract

Land degradation in south eastern part of Nigeria is becoming widespread because population pressure is increasing, fallow land are unavailable for agricultural activities and even marginal lands are being lost to developmental projects. The problem of land degradation emanated from increase soil erosion, vegetation degradation and hydrological changes leading to loss of land productivity necessitates this study. One hundred and eighty crop and livestock farmers were sampled from a list of 1800 obtained from seven villages randomly selected from Agricultural Development Programme Zones. Instrument used in data gathering was interview schedule. Majority of the respondents are literate and have multiple income generating activities. Crop farming, collection of forest products and goat rearing were the most negatively affected income generating activities. Sex, age, educational level and household size have significant relationship with farmer's involvement in income generating activities. Significant differences exist in farmers' income generating activities before and after land degradation. Indigenous practices adopted in controlling land degradation do not have significant relationship with farmers' involvement in income generating activities. Government, non-governmental organizations and community leaders should intensify efforts at educating farmers on the need for use of environmentally friendly farming system.

Keywords: *Land degradation, Environment, Indigenous practices, Farmers*

1. Introduction

Throughout the history of the world, one of the greatest and persistent threats to human existence has been environmental degradation (Onumadu, *et al.*, 2001). Nigeria has a growth rate of about 2.5 percent with an estimated population of about 130 million (Akegbejo-Samson and Aromolaran, 2000). This population explosion has put significant pressure on the natural resource base available for human sustenance with resultant decrease in fallow period of land, intensification in land use, declining land productivity, rapid soil losses and disruption of water resources (Kuponiyi, 2001). The rapid increase in population means a reduction in the available land space for farming and consequently reduced food production. In many agriculture-based poor economies soil erosion and degradation of agricultural land present a threat to food security and sustainability of agricultural stagnation. According to Shiferaw and Holden (2001), declining per capita, availability of cultivable

land, accompanied by lack of technologies for intensification of land use, force rural people to either expand farming into marginal erodible slopes or the remaining forest.

In Nigeria, it has been found that most people engage in several income generating activities to 'make a living' with various combination of farm and non-farm activities   (Olawoye 2001) . The sustainability of many of these income generating activities is however often not assured under conditions of insecure access to productive and natural resources, environmental degradation and economic instability (Olawoye, 2001).This paper therefore attempts to determine the effects of land degradation on income generating activities of farmers in the area and changes that exist in income generating activities of farmers before and after land degradation in the area.

2. **Methodology**

The study area is Imo state. It lies within latitude 60 8′ and 70N, and longitude 60E. The state is located within the high forest vegetation belt and is characterized by two climatic season; the wet and the dry seasons. The major crops grown in the area are; oilpalm, cassava, yam, maize and cocoyam. Primary data were used in collection of information and gathered with the aid of interview schedule. The population of the study are both crop and livestock farmers in Imo state.

Multi stage random sampling technique was used to sample the respondents. There are 27 LGAs in the study area. In the first stage, purposive sampling technique was used to select 10 of the LGAs which are areas with the most severe land degradation. However, 30% of the affected LGAs were also randomly selected. At the 2nd stage, out of the 3 LGAs namely: Ideato North, Ikeduru and Ehime Mbano, 3,2,and 2 villages respectively given a total number of 7 villages were randomly selected. The third stage involved the selection of seven villages (Umuago, Okwualili, Ndiejezie Avuvu, Amkohia Nsu and Ehime Mbano) from which 180 farmers where randomly sampled proportionate to size (Table 1).

Severity of land degradation was measured by listing 10 of different types of land degradation and this has a minimum score of 10 maximum of 30 and asking respondents to respond to them based on their severity i.e whether mild, serious or very serious problems (1,2 and 3 respectively). However Income generating activities of farmers before and after land degradation was measured by listing 27 of both agricultural and non-agricultural income generating activities with a minimum score of 0 and maximum of 27 and asking respondents to respond to them using a 3 point Likert scale of always, rarely and never (2,1 and 0 respectively). The cumulated score obtained was then categorized as high and low.

Table 1
Villages and Farmers Sampled in the Study Area

Number of LGA	Affected LGA	30% of LGA	Selected local government	No. of Villages	Affected Villages with land degradation	50% village	Sampled village	No. of farmers sampled
			Ideanto-north				Umuago	30
27	10	3		72	6	3	Okwualili	20
							Nidiejezie	30
			Ikeduru	69	4	2	Avuvu	30
							Amakohia	20
			Ehime	61	3	2	Nsu	25
			Mbano				Ehime	25
						Sample size	=	180

3. **Results and discussion**

3.1. *Personal characteristic of the respondents*

Table 2 reveals that 43.2% of the respondents were between 41 – 50 years, 33.9% between 31 – 40 years and 23.9% were between 51 – 60 years. A mean age of 45 years was reported for respondents. This implies that most of the respondents are in active years of their life and would have more time for income generating activities. Almost 60% of the respondents were males while 40% were females. This revealed that there would be greater diversity in income generating activities, with female farmers more involved in less laborious activities than male farmers. Table 2 further revealed that 33% of the farmers had secondary education, 20% had non-formal and primary education respectively while 13.38% had tertiary education. The implication of this is that most of the respondents in the study area are literate and thus would be responsive to land conservation education. However, 57.2% of the respondents had about 6 persons per household while almost 2% had between 11-13 persons per household. A mean household size of about 6 was obtained for respondents in the study area. The implication of this large household size is that more dependants have to be fed. This has negative implication for household food security in the area due to land use intensification and resource depletion from increased income generation drive.

Table 2
Personal Characteristics of Respondents

Variable Categories	Frequency	Percentage
1. Age		
31 – 40	61	33.9
41 – 50	76	42.2
51 – 60	43	23.9
2. Sex		
Male	108	60.0
Female	72	40.0.
3. Educational Level		
Non-formal	36	20.0
Adult-Literacy	23	12.8
Primary education	37	20.6
Secondary education	60	33.3
Tertiary education	24	13.3
4. Household size		
2 – 4	46	25.6
5 – 7	103	57.2
8 – 10	27	15.0
11 – 13	4	2.2

3.2. *Income generating activities*

Most practiced agricultural income generating activities are crop planting ranked 1st, cassava processing ranked 2nd, palm-oil processing ranked 3rd while keeping of local fowl was ranked 4th. It could be reasoned out that there is heavy dependence on primary natural resources (land and water) for sustenance in the area. This has negative implication for land resource conservation in the area. The most practiced non-agricultural income generating activities are petty trading ranked 1st, collection of forest products ranked 2nd, hired labour ranked 3rd while tailoring was ranked 4th. This implies that respondents are involved in non-agricultural income generating activities to supplement income from farm related activities (tables 3 & 4).

Table 3
Agricultural Income Generating Activities of respondents

Activities	Frequency	Rank
Crop planting	162	1st
Palm oil processing	72	3rd
Cassava processing	93	2nd
Keeping of local fowls	65	4th
Poultry production	23	7th
Goat rearing	57	5th
Sheep rearing	24	6th
Piggery production	4	11th
Fishing	6	10th
Hunting	16	8th
Cattle-rearing	1	12th
Oil bean processing	12	9th
Multiple responses		

Table 4
Non-Agricultural Income Generating Activities of respondents

Activities	Frequency	Rank
Basket weaving	5	8th
Food vendoring	15	6th
Hair plaiting	22	5th
Petty trading	118	1st
Tailoring	23	4th
Collection of forest products	111	2nd
Hired labour	48	3rd
Black smithing	4	10th
Cloth-weaving	4	10th
Carpentry	5	8th
Palm-tapping	2	13th
Welding	3	12th
Barbing	1	17th
Teaching	2	13th
Okada	10	7th
Brick layer	2	13th
Traditional medicine	2	13th
Transportation	1	17th

As a result of land degradation changes were seen in agricultural and non income generating activities of the respondents. In agricultural activities crop planting decreased in proportion though still ranked 1st before and after land degradation, crop processing decreased in proportion though still ranked 2nd before and after land degradation, keeping of local fowls decreased drastically in proportion but still ranked 4th before and after land degradation. The implication of this is that there would be decrease in food production in the area. This is in line with Shiferaw and Holden (2001) that land degradation pose a threat to food security and sustainability of agricultural production. The mean score of respondents engaging in crop planting always before the land degradation was 31.8 while the mean score of respondents engaging in crop production after land degradation was 25.4. This is an indication that land degradation actually affects crop planting.

However, on non agricultural activities, collection of forest products decreased in proportion as rank changed from 1st to 3rd after land degradation. However, involvement in petty trading increased in proportion as rank changed from 2nd to 1st after land degradation while traditional medicine increased in proportion as rank changed from 3rd to 2nd after land degradation. This implies that there is diversification in income generating activities of farmers to reduce risk due to environmental degradation. This is in line with Lanjouw and Lanjouw (1995) that non-farm activities help farmers in spreading production risk through diversification in income generating activities (see Tables 5 & 6).

Table 5
Agricultural Income Generating Activities before and after Land Degradation

Activities	BEFORE Always F Rank $\bar{x}$ Sd	Rarely F Rank $\bar{x}$	Never F Rank $\bar{x}$ sd	AFTER Always F Rank $\bar{x}$ sd	Rarely F Rank $\bar{x}$ sd	Never F Rank $\bar{x}$ sd
Crop planting	153 1st 31.8±5.0	6 5th 12.1	21 2nd 24.8±6.0	02 1st 25.4±5.0	41 2nd 19.7±5.4	43 1st 14.4±6.0
Keeping of local fowls	45 3rd	30 2nd	94 1st	6 6th	32 3rd	43 1st
Crop processing	51 2nd	35 1st	5 4th	47 2nd	31 4th	10 3rd
Poultry production	21 6th	3 8th	-	18 3rd	2 9th	4 5th
Fishing	2 8th	4 6th	1 6th	-	5 7th	2 7th
Piggery production	1 9th	2 9th	-	2 8th	3 8th	
Sheep rearing	17 7th	4 6th	-	9 5th	11 5th	
Goat rearing	41 4th	12 4th	6 3rd	14 4th	42 1st	4 5th
Hunting	27 5th	13 3rd	4 5th	5 7th	10 6th	29 2nd

- Multiple responses

Table 6
Non Agricultural Income Generation Activities before and after Land Degradation

Activities	BEFORE Always			BEFORE Rarely			BEFORE Never			AFTER Always			AFTER Rarely			AFTER Never		
	F	Rank	%	F	Rank	%	F	Rank	%	F	Rank	%	F	Rank	%	F	Rank	%
Petty trading	21	2nd	21	48	2nd	38.7	28	1st	37.8	88	1st	56.4	14	2nd	15.9			
Basket weaving	3	5th	3	8	3rd	6.5	-	-	-	7	5th	4.5	3	5th	3.4	2	4th	2.9
Collection of forest products	58	1st	58	54	1st	43.5	2	5th	2.7	10	3rd	6.4	49	1st	53.7	53	1st	77.9
Food vendoring	3	5th	3	2	5th	1.6	16	3rd	21.6	10	3rd	6.4	9	3rd	10.2	1	5th	1.5
Blacksmithing	4	4th	4	2	5th	1.6	1	6th	1.4	5	6th	3.2	2	7th	2.3	7	2nd	10.3
Traditional medicine	6	3rd	6	5	4th	4.0	17	2nd	23	16	2nd	10.3	8	4th	9.1	5	3rd	7.4
Pottery	1	8th	1	-	-	-	1	6th	1.4	3	8th	1.9	-	-	-	-	-	-
Hired labour	1	8th	1	-	-	-	1	6th	1.4	1	12th	0.6	-	-	-	-	-	-
Brick laying	-	-	-	2	5th	1.6	-	-	-	2	11th	1.3	-	-	-	-	-	-
Palm-tapping	-	-	-	-	-	-	1	6th	1.4	1	12th	0.6	-	-	-	-	-	-
Welding	2	7th	2	-	-	-	1	6th	1.4	3	8th	1.9						
Barbing	-	-	-	-	-	-	1	6th	1.4	1	12th	0.6	-	-	-	-	-	-
Okada cycling	-	-	-	-	-	-	3	4th	4.1	3	8th	1.9	3	5th	3.4	-	-	-
Tailoring	1	8th	1	2	5th	1.6	1	6th	1.4	4	7th	2.6	-	-	-	-	-	-
Hair plaiting	-	-	-	-	-	-	1	6th	1.4	1	12th	0.6	1	12th	0.6	-	-	-
Transportation	-	-	-	1	9th	0.8	-	-	-	1	12th	0.6	-	-	-	-	-	-

3.3. *Land degradation activities*

Majority (55%) of the respondents indicated intense rainfall as causes of land degradation. Also, 14% said intense land cultivation causes land degradation while 8% said tree-logging. This implies that a large proportion of land degradation in the area is caused by natural forces of water. This is in line with Uzokwe (2000) that running water is the main agent of land degradation in southern Nigeria. Moreover, it was revealed that the most negatively affected agricultural income generating activities are crop planting which was ranked 1st, goat rearing was ranked 2nd, keeping of local fowls was ranked 3rd while sheep rearing was ranked 4th. The implication of this is that there would be a decrease in agricultural production and food insecurity in the area. However, non-agricultural income generating activities most negatively affected by land degradation are collection of forest products which was ranked 1st, hired labour was ranked 2nd while petty trading was ranked 3rd. It shows that non-agro based income generating activities are also affected by land degradation despite the fact that they do not have direct influence on land. The implication of this is that farmers' livelihood activities are adversely affected by land degradation (tables 7, 8 & 9).

Table 7
Causes of Land Degradation

Causes	Frequency	Percentage
Bush firing	12	6.7
Intense rainfall	99	55.0
Sand mining for building	9	5.0
Road construction activities	9	5.0
Intense land cultivation	25	13.9
Fuel wood extraction	12	6.7
Logging	14	7.7

Table 8
Effect of land degradation on agricultural Income generating Activities

	Negative	Effect		No	Effect		Positive	Effect	
Activities	F	Rank	%	F	Rank	%	F	Rank	%
Crop planting	156	1st	50.6	2	8th	1.6	2	1st	
Keeping of local fowls	44	3rd	14.3	25	2nd	20.3	-	-	
Poultry production	3	7th	1	20	3rd	16.3	-	-	
Crop processing	18	5th	5.8	58	1st	47.2	-	-	
Sheep rearing	21	4th	6.8	3	6th	2.4	-	-	
Hunting	18	5th	5.8	1	9th	0.8	-	-	
Fishing	1	9th	0.3	4	5th	3.3	-	-	
Piggery production	2	8th	0.6	3	6th	2.4	-	-	
Goat rearing	45	2nd	14.6	7	4th	5.7	-	-	

* Multiple responses $\overline{X} = 34.2$ $\overline{X} = 13.7$

Table 9
Effect of Land Degradation on Non-agricultural Income Generating Activities

Activities	Negative Effect			No	Effect		Positive	Effect	
	F	Rank	%	F	Rank	%	F	Rank	%
Basket Weaving	1	6th	1.1	1	13th	0.6	3	5th	7.0
Brick laying	1	6th	1.1	2	11th	1.1	-	-	
Food vendoring	2	4th	2.2	10	5th	5.6	-	-	
Collection of forest products	68	1st	76.4	24	2nd	13.4	-	-	
Petty trading	4	3rd	4.6	85	1st	47.5	9	2nd	20.9
Blacksmithing	-	-		3	8th	1.7	-	-	
Hired labour	9	2nd	10.1	15	4th	8.4	14	1st	32.6
Tailoring	-	-		17	3rd	9.5	5	4th	11.6
Hair plaiting	-	-		6	6th	3.4	3	5th	7.0
Cloth-weaving	-	-		5	7th	2.8	-	-	
Carpentary	-	-		2	11th	1.1	-	-	
Palm-tapping	2	4th	2.2	1	13th	0.6	-	-	
Welding	-	-		3	8th	1.7	-	-	
Barbing	-	-		1	13th	0.6	-	-	
Teaching	-	-		3	8th	1.7	-	-	
Transportation	-	-		-	-		1	7th	2.3
Traditional medicine	1	6th	1.1	1	13th	0.6	-	-	18.6
Okada (cyclist)	1	6th	1.1	-	-		8	3rd	-

Table 10
Land Degradation Indigenous Control Measures

Indigenous Practices	Always Use		Occasionally Use		Rarely Use		-	
	Freq	%	Freq	%	Freq	%	Total	%
Crop residue	155	(86.1)	24	(13.3)	1	(0.6)	180	100
Sand filling of gullies	150	(83.3)	30	(16.7)	-	-	180	100
Shifting cultivation	44	(24.4)	108	(60.0)	28	(15.6)	180	100
Bush follow	7	(3.9)	63	(35.0)	110	(61.1)	180	100
Minimum tillage	135	(75.0)	34	(18.9)	11	(6.1)	180	100
Zero tillage	17	(9.4)	60	(33.3)	103	(57.3)	180	100
Ridging across slope	114	(63.3)	33	(18.3)	33	(18.3)	180	100

* Figures in parenthesis are percentages

Nevertheless, several indigenous methods were observed as measures used in the study area in controlling land degradations. This include the use of crop residues (86%) in controlling land degradation and 83% carried out sand filling of gullies, 75% practiced minimum tillage (that is, moderate soil loosening with hoe) while about 63% make ridges across slope to control land degradation. This shows that farmers are aware of happenings in their environmental situation and make effort at controlling land degradation (Table 10).

3.4. *Relationship between variables in the study*

Table 11 presents the test analysis result of relationship between variables. Chi-Square analysis reveals that there is significant relationship between sex (x^2 = 3.85, $p \leq 0.05$), educational level (x^2 = 13.19, $p \leq 0.05$) and income generating activities. Correlation analysis also shows that age (r = 0.160, $p \leq 0.05$) and household size (r = - 0.157, $p \leq 0.05$) are significantly related to income generating activities. This is in line with Lanjouw and Sheriff (2002) that significant relationship exist between personal characteristics and farmers participation in own enterprises and non-farm employment. However, household size is at variance with *apriori expectation* that household size is positively associated with involvement in income generating activities. This may be due to the fact that in the long run, dependants generate income to support family subsistence.

T- test analysis revealed that there is significant difference in income generating activities of farmers before and after land degradation (t = 4.54, $p \leq 0.05$). From the mean score obtained, it shows that more respondents are involved in income generating activities before land degradation (x before = 6.58), compared to after land degradation (x after = 5.79). The resulting differences in income generating activities (before and after) may be due to the adverse effect of land degradation on livelihood activities of farmers in the area. This is in line with the findings of Uzokwe (2000) that soil degradation result in a change in production level, income level, labour use as well as household food security and all these affect the socio-economic status of farmers. Further analysis shows that there is no significant relationship between indigenous practices adopted in controlling land degradation and farmers involvement in income generating activities (r = - 0.103, p > 0.05). This implies that farmer's involvement in income generating activities decreases as use of indigenous practices increase. This is in consonance with USDA (1999) that societies may gain from a reduction in negative externalities of the environment due to use of conservation measure, but farmers have to pay the price in time loss for income generation.

Table 11
Test of Relationship between Variables

A. Relationship between personal characteristics and level of involvement in income generating activities

Variables	Chi-square value	r	Df	P	Decision
Sex	3.85		1	0.05	Significant
Education level	13.19		4	0.01	Significant
Age		0.160	N = 180	0.05	Significant
Household size		0.157	N = 180	0.05	Significant

B. Difference in income generating activities before and after land degradation

Variable	N	Mean	Std. dev.	t-value	P	Decision
Activities before	174	6.58	2.50	4.54	0.00	Significant
Activities after	174	5.70	1.96			

C. Relationship between indigenous practices and farmers involvement in income generating activities

Variable	R-value	N	P	Decision
Indigenous practices	- 0.103	180	0.170	Not significant

4. **Conclusion**

Most farmers are literate and actively use indigenous measures in controlling land degradation. Also, personal characteristics such as sex, education level, age, and household size influence farmers involvement in income generating activities. Furthermore, agro-based income generating activities are the most negatively affected by land degradation. However, significant difference exists between income generating activities of farmers before and after land degradation in the area. It is however, recommended that government and non-government and non-government agencies and community leaders should as a matter of urgency intensify efforts to educating farmers on the need for the use of environmentally friendly farming systems such as multipurpose tree on crop land and multipurpose wood lot for soil protection and in the area of indigenous measures used in controlling land degradation. They should also be encouraged to practice the techniques more, and cross fertilization of ideas between extension and farmers groups on sustainable use of natural resources should be intensified.

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