Effects of Land Degradation on Agriculture in Anambra State: Issue for Agricultural Extension Policy

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Abstract

The study examined the effects of land degradation on agriculture in Anambra state. Two Local Government Areas were purposively selected from the state while a town community was purposively selected from each of the Local Government Areas. Proportionate sampling technique was used to select 50% of the villages in each town and a total of 112 respondents were used for the study. Frequency, percentage and mean score were used for data analysis. Some findings of the study were: erosion (M=2.50), excessive use of inorganic manure and agrochemicals (M=2.45) and construction of roads and houses (M=2.42), were serious causes of land degradation in the area. High cost of input in farming (M=2.52) and rural urban migration were major effects of land degradation in the area. Evidences of the effects of land degradation in the area were: estimated mean monthly income dropped from N35,000 in 2005 to N15,000 in 2009. Mean farm size decreased from 1.5 hectare in 2005 to 0.75 hectare in 2009. Percentage of respondents rearing goat dropped from 80.4% to 41.1% while percentage of respondents growing cassava dropped from 100% to 80.4% within these years. Majority of the respondents pointed out aforestation (77.7%), controlled grazing (75.9%) as strategies they use to prevent land degradation in the area. They sourced information on land management and conservation practices from town criers (M=2.52) and radio (M=2.35).The study enumerated the need to include land management and conservation practices into agricultural extension programme (ADP) so that their clientele(farmers) can be equipped and involved practically in conservation/management of land for improved agricultural output and better future.

Keywords: Effects land degradation policy

INTRODUCTION

Land degradation is a reduction of the biological and economic productivity potentials of rain fed crop land, irrigated crop land or range, pasture and forested land by one or a combination of processes (Amalu, 1998), which include displacement of soil material by wind and water erosion, deterioration of soil physical and chemical properties and long term loss of natural vegetation. It can also be seen as loss of resilence of land, loss of utility or potential utility of land or the decline in soil characteristics as a result of poor management and conservation of land. Degradation is a natural process that sets in as a material is being used. Since physical, chemical and biological properties of the land depreciate with use, soil/land degradation is an expected phenomenon (Kang, 2000).

Causes of land degradation include climatic factors which relate to the amount and intensity of rainfall released on the land, soil erosion, population density, ignorance and reluctance to embrace technologies on land management. Human engagement activities that can cause land degradation are : agricultural activities, mining, deforestation (bush clearing and burning), oil exploration and exploitation, establishment of infrastructure and industrialization.

Increase in world population and other non-agricultural land uses are putting additional pressure on land hence there is progressively less land for food production while demand for food and other agricultural products is increasing, requiring more land which is not available since the earth land area is finite (EL-Swaify, 2002). According to the author, the implications of this are many: the extreme pressure will affect use and management of agricultural land and consequently affect agricultural yield and output. For instance this has started already in Nigeria where the fallow period has reduced to one or zero year. The marginal lands which should be left under grass or forest are being brought into cultivation and this has led to increased erosion (EL-Swaify, 2002). Also there have been increased levels of agricultural input (especially fertilizer and agrochemicals), expansion of area of land under cultivation and consequent distortion of natural ecosystem.

Land degradation can cause human, economic, social and infrastructural losses. In an agrarian economy, it can reduce agricultural output and yield thereby precipitating starvation and poverty (Fagbemi, 2002). Globally, extreme poverty continues to be a rural phenomenon and majority of the rural people depends on agriculture, forestry, fisheries and related activities for survival. Land degradation will remain an important global issue for the 21st Century because of its adverse impact on agronomic soil productivity the environment and its effect on food security and the quality of life (Eswaran and Reich, 2001). Thus revealing the interrelatedness of farmers, agriculture, land degradation and poverty. Land degradation is an overwhelming threat to the future because once it sets in an area, sustainable agriculture and development will be difficult to achieve. Though losses caused by land degradation may not be easy to quantify but it is devastating and demands urgent and adequate attention towards ameliorating it.

In view of the above aforementioned facts, the study was therefore designed to ascertain the effects of land degradation on agriculture in Anambra state. Specifically, the study ascertained causes and effect of land degradation, strategies/measures used for controlling land degradation and sources of information on land management/conservation practices in the area.

METHODOLOGY

Population and sample

The study was carried out in Anambra State. Two L. G. A's Anaocha and Orumba North LGA's were purposively selected for the study because of the conspicuous degraded land in the areas, Agulu town community (selected from Anaocha) and Nanka town community (selected from Orumba North) were purposively selected for the study because of the prevalence of land degradation (caused mainly by erosion) in the areas. Proportionate sampling technique was used to select 50% of villages in the two towns: Ten villages (Amaezike, Amatutu, Amorji,Ifiteani, Isiamigbo, Nkitaku, Nneoha, Uhueme, Ukunu and Umuifite) were selected out of twenty villages in Agulu town while four villages (Agbiligba, Enugu, Ifite and Amakor) were selected out of seven villages in Nanka giving a total of 14 villages for the study Eight farmers were further selected from each of these villages giving a total of 112 respondents for the study.

Data collection and analysis

The instrument used for data collection was structured interview schedule. Data on causes of land degradation were collected using a three point likert type scale of very serious (3), serious (2) and not serious (1) with a mean of 2.0. Some variables highlighted were bush burning, over grazing, excessive use of inorganic manure, agrochemicals and others. Any mean response equal or greater than 2.0 was regarded as a serious cause of land degradation while any mean response less than 2.0 was regarded otherwise. Data on effects of land degradation which highlighted variables like: famine, poverty, food shortages/crises, rural – urban migration were collected using a three point likert type scale. The response options were major effect (3), minor effect (2) and no effect (1) with a mean of 2.0. Any variable with a mean score equal or greater than 2.0 was regarded as a major effect of land degradation while any mean score less than 2.0 was regarded as a minor effect of land degradation in the area. Consequences/evidence of effects of land degradation in the area were captured by collecting data on monthly income (₦), farm size (hectare), number of respondents rearing goat, sheep, cow and others and number of respondents growing crops like cassava, yam, maize, and others as at 2005 and 2009. Respondents were also asked to tick from the options (afforestation, zero/minimal tillage, control, grazing, construction of burrows etc) strategies/measures they use in controlling land degradation in the area.

Data on sources of information on land management and conservation practices were elicited using a three point likert type scale of often (3), occasionally (2) and not at all (1). The decision point was 2.0. Variable with mean scores equal or greater than 2.0 was regarded as source of information on land

management/conservation practices while any variable with a mean score less than 2.0 was regarded otherwise. Some of the variables mentioned in this regard were: television, radio, local government Agricultural Development Programme (ADP)/extension agent and others.

Data were analyzed using descriptive statistics such as frequency, percentage and mean.

RESULTS AND DISCUSSION

Causes of Land Degradation

Data in Table1 show that erosion rated highest among other factors as serious cause of land degradation in the area with a mean score of 2.5. It was not surprising that erosion rated highest among other causes of land degradation in the area. This is because the problem of erosion was glaring in the area leading to soil impoverishment, existence of gullies and loss of farm land. In line with this Akamigbo (1996) posited that the principal cause of land degradation is the loss of the productive topsoil due to soil erosion which is as a result of the transportation of topsoil by wind water or gravity.

Other factors that rated high as serious causes of land degradation in the area were: excessive use of inorganic manure and agrochemicals (M = 2.45), construction of roads and houses (M = 2.42), bush burning (M = 2.32), porous nature of the soil (M= 2.31) heavy rainfall/flood (M = 2.30) and over grazing (M = 2.08). Attempt to use marginal/infertile land for agriculture necessitate use of inorganic manure and agrochemicals that pose adverse effect on the land and quality of agricultural output. Also the course of construction does not only reduce land for agriculture but also destroys the desirable texture and structure of the land either through tillage or through transferring of undesirable particles and chemicals used in construction to the land and nearby land. Factors like climate change (M = 1.53) and industrialization (M = 1.58) might have rated low as causes of land degradation because their destructive nature or negative impact on the soil were not easily noticed and the respondents might be ignorant of their relationship with land.

TABLE 1:   Mean score on perceived causes of land degradation

Causes	Mean	Standard Deviation
Heavy rainfall/flood	2.30	0.91
Topography	1.95	0.78
Porous nature of the soil	2.31	0.89
Continuous cropping	1.94	0.88
Bush burning	2.32	0.68
Over grazing	2.08	0.80
Industrialization	1.58	0.69
Deforestation	1.93	0.78
Erosion	2.50	0.77
Uncontrolled irrigation	1.71	0.61
Excessive use of inorganic Manure/agrochemicals	2.45	0.80
Construction of road/house	2.42	0.71
Climate change	1.63	0.73
Increased population	1.80	0.89
Lack/Poor Management of the land	1.73	0.74

Source: field survey 2009

Effects of land degradation on agriculture

Table 2 reveals that increase in cost of input used in farming (M = 2.52) was rated highest as the major effect of land degradation on agriculture in the area. This may be because as land is degraded, farmers may like to boost fertility of the soil/land by purchasing necessary inputs like fertilizer, agrochemicals, lime, improved seed/seedlings, exotic/certified breeds of animals as well as observing and executing every operations in the farm probably with hired labour in order to ensure bumper harvest. All these increase cost of production and consequently the market price of agricultural products.

Loss of soil nutrient (M = 2.42), rural – urban migration (M = 2.40), poverty (M = 2.37), increase in food prices (M = 2.37), loss of useful land mass (M = 2.33), discouragement of investment in agriculture (M = 2.31), food insecurity (M = 2.27), decrease yield and output (M = 2.27) and famine (M = 2.21) were also major effects of land degradation in the area. The findings tend to suggest that land degradation causes loss of soil nutrient and actual soil loss and threatens the survival of human race.

TABLE 2:   Effects of land degradation on agriculture

Effects	Mean	Standard deviation
Famine	2.21	0.73
Poverty	2.37	0.78
Food insecurity	2.27	0.77
Rural – Urban migration	2.40	0.49
Loss of soil nutrient	2.42	0.71
Loss of useful land mass	2.33	0.47
Increase in cost of input	2.52	0.50
Increase in food prices	2.37	0.63
Discouragement of investment in agriculture	2.31	0.80
Decreased yield and output	2.27	0.69
Livestock are prone to health hazard	1.99	0.80
Agricultural task more labourious	1.86	0.86

Source: field survey 2009

Evidence of effects of land degradation on agriculture

Table 3 indicates that as at 2005, the majority (62.5%) of the respondents earned more than ₦30, 000 as monthly income while as at 2009 majority (75%) of the respondents earned ₦20,000 or less as their monthly income. The respondents mean monthly income as at 2005 and 2009 were ₦35,000 and ₦15,000 respectively. This shows that monthly income of the respondents had reduced drastically within these years. Land degradation and consequent reduction in agricultural output and income accruing from it might have contributed to this decrease, thus confirming the fact that economic impact of land degradation is extremely severe in densely populated south Asia and sub-Saharan Africa (Eswaran and Reich, 2001).

Table 3 also shows that the majority (86.6%) of the respondents cultivated more than one hectare of land in 2005 while in 2009 majority (91.1%) of them cultivated one hectare of land or less. The mean farm size cultivated by the respondents was 1.5 hectare in 2005 and 0.8 hectare in 2009. This decrease in farm size cultivated is a threat to the basis of many farming communities and their livelihood.

Table 3 further shows that percentage of respondents growing crops had reduced within these years under consideration. All (100%) of the respondents grew cassava, yam, maize and cocoyam in 2005 while, in 2009 80.4% of the respondents grew cassava, 87.5% grew yam, 60.7% grew maize and another 60.7% grew cocoyam. Also percentage of respondent growing pepper had

reduced from 76.8% in 2005 to 25.9% in 2009 while that of plantain had reduced from 90.2% in 2005 to 33.0% in 2009. Currently, there have been reduction in agricultural output when compared with the rate of population increase especially in developing countries. This may always be attributed to yield and output excluding the fact that withdrawal of farmers from growing certain crops and rearing of some animals probably due to land degradation is a contributing factor. In agreement with this, Sanchez, Shepherd, Soule, Place, et al (1997) and Lynam, Nandwa and Smaling (1998) in Muchenna, Onduru, Gachini and de. Jager (2003) noted that land degradation especially due to declining soil fertility is the fundamental biophysical cause of declining per capita food production in sub-Saharan Africa.

In the table also, the percentage of respondents rearing domestic animals had also reduced in 2009 from what it was in 2005. In the case of goat, 80.4% of the respondents reared goat in 2005, while only 41.1% reared it in 2009. Also 65.2% reared sheep in 2005 while only 42.0% reared it in 2009. In the cases of rabbit and pig rearing, percentage of respondents rearing them had reduced from 33.9% in 2005 to 0% in 2009 and 33.0% in 2005 to 0% in 2009 respectively. The slight decrease in percentage of respondents rearing poultry (58.9% in 2005 and 54.5% in 2009) within these years under consideration might be because poultry rearing in rural area is usually done under extensive management system with little or no input/expenses from owners hence it is likely that farmers will drop the business easily.

TABLE 3: Evidence of effects of land degradation on agriculture

Evidence	percentage 2005	mean	percentage 2009	mean
Monthly Income (₦)				
≤ 10, 000	-		48.2	
10, 001 - 20, 000	22.3		26.8	
20, 001 – 30, 000 15, 000	15.2	35, 000	5.2	
30, 001 – 40, 000	19.6		2.7	
40, 001 – 50, 000	23.3		7.1	
Above 50, 000	19.6		-	
Farm size Cultivated (ha)				
≤ 1.0	13.4		91.1	
1.1 – 2	49.1	1.5	6.3	0.8
Above 2	37.5		2.6	
***Crops grown**				
Cassava	100		80.4	
Yam	100		87.5	
Maize	100		60.7	
Cocoyam	100		60.7	
Pepper	76.8		25.9	
Plantain	90.2		33.0	
Okra	65.2		27.7	
Pineapple	41.1		27.7	
Potato	33.0		15.4	
***Animals reared**				
Goat	80.4		41.1	
Sheep	65.2		42.0	
Cow	13.4		3.6	
Rabbit	33.9		-	
Poultry	58.9		54.5	
Fish	24.1		7.1	
Pig	33.0		-	

*multiple responses   Source: field survey 2009

Strategies/measures used by the respondents in controlling land degradation

Table 4 reveals that majority (77.7%) of the respondents practiced afforestation while 75.9% practiced controlled grazing as strategies/measures they used in controlling land degradation in the area. Also 72.3% of the respondents avoided bush burning while 70.5% and 64.3% in their respective order accounted for respondents that practiced planting of leguminous cover crops and mulching of farm land as strategies/measures they used in controlling land degradation. Other measures used by the respondents in controlling land degradation were: construction of burrows along farmland (63.4%), ridging (59.8%), zero/minimal tillage (51.8%), making mound during cultivation (55.4%) and prevention of indiscriminate cutting of trees (57.8%). The finding has shown that only soil degradation awareness campaign was not used by the respondents in controlling land degradation in the area. This may be because it is not practically done in the farm and they will rarely engage in this activity that is not in their domain.

TABLE 4:   Strategies/measures used by the respondents in controlling land degradation

* Strategies/Measure	Percentage (n=112)
Afforestation	77.7
Zero/minimal tillage	51.8
Control grazing	75.9
Ridging of farmland	59.8
Avoidance of bush burning	72.3
Making of mounds	55.4
Mulching of farmland	64.3
Planting leguminous cover crops	70.5
Prevention of indiscriminate cutting of trees	1.8
Soil degradation awareness campaign	40.2
Construction of burrows along farm land	63.4

* Multiple responses   Source: field survey 2009

Sources of Information on Land Management/Conservation Practices

The respondents' sources of information on land management and conservation practices were town crier (M = 2.52), radio (M = 2.35), friends (M = 2.17), television (M = 2.13), Local government (M = 2.10), sign post (M = 2.10), newspaper/magazine (M = 2.17) and indigenous knowledge and practice (M = 2.01) (Table 5). This finding shows that inspite of the emphasis on information communication technology (ICT) in this modern age, local means of communication still play crucial role in transmission of information especially in rural areas. It is obvious from the table that agricultural extension programme (M= 1.90) did not serve as source of information on land management and conservation practices to these farmers. This suggests the ineffectiveness of extension in discharging information/technologies on land management/ conservation practices.

TABLE 5: Sources of information on land management/conservation practices

Sources of information	Mean	Standard deviation
Television	2.13	0.52
Radio	2.35	0.60
Symposium/lectures	1.69	0.76
Sign post	2.1	0.81
Local government	2.10	0.79
Town crier	2.52	0.5
Family members and relations	1.68	0.86
Newspaper/magazines	2.07	0.74
Friends	2.17	0.96
ADP/extension agent	1.90	0.80
Indigenous knowledge and practice	2.01	0.76

Source: field survey 2009

CONCLUSION

The study had shown that erosion and excessive use of inorganic manure and agrochemical were serious causes of land degradation in the area. Increased cost of input and loss of soil nutrient were major effects of land degradation while decrease in monthly income, farm size cultivated were perceived consequences of land degradation in the area. Also afforestation and control grazing were strategies/measures used in controlling land degradation while Agricultural Extension Programme (ADP) did not serve as a source of information on land management/conservation practices in the area.

There is the need to include land management and conservation practices into Agricultural Extension Programme (ADP). This will help to educate the masses especially farmers thoroughly on land degradation specifically on those activities of human (excessive use of inorganic manure and agrochemicals, over grazing, construction activities etc) that predisposes land to degradation as well as emerging strategies for controlling land degradation. The alertness and knowledge gained will help to equip the farmers and involve them practically in management and conservation of land. Government should provide logistics, develop and implement policies that encourage sustainable land use and management. This will assist in the greater use of land resources and management information from extension, retain farmers in agriculture and ultimately boost sustainable agriculture for better future.

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