

SOIL EROSION, AGRICULTURAL PRODUCTIVITY AND FARMERS ECONOMY IN AFIKPO SOUTH L.G.A OF EBONYI STATE, NIGERIA

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ABSTRACT

The study was set out to evaluate soil erosion and farmers economy in Afikpo-South local Government Area of Ebonyi state. The objectives of the study include determining the impact of soil erosion on the farmer's income level, examining the extent of soil erosion impacts on Crop productivity and identifying the causes of soil erosion in the area. The study made use of the cross sectional research design which enabled the use of questionnaire as the instrument for data collection. 285 farmers were sampled for the study which was drawn from a list of registered farmers in the seven sampled communities in the study area. The data was presented using tables and the hypotheses were tested using the Chi-Square analytical tool. The findings of the study showed that good numbers of farmers have experienced soil erosion and that 66.3% of the total farmers in the area had cases of soil erosion more than three times, heavy rainfall/flooding are the major cause of soil erosion in the area and is ranked the first amongst other identified parameters. Changes in soil fertility status is a major effect of soil erosion as revealed by the study, furthermore soil erosion affects farmer's economy and increases hardship as well as brings about a reduction in the income level of farmers. The study recommended that awareness and enlightenment programmes be carried out among farmers in the area on the short and long term impacts of land degradation and that farmers should be encouraged to do more of alley farming to reduce the losses arising from soil erosion.

Keywords: Erosion, Soil, Agriculture, Productivity, farmers, Economy.

1.0 INTRODUCTION

The removal of top soil layer of the earth by agents of denudation is widespread and has led to the reduction of the productive capacity of the natural environment. In the light of this, increase in population, soil erosion and change in climate have been identified as major environmental challenges globally. In recent times, about 66% of global population is malnourished (WHO,

2000; Pimentel and Satkiewicz, 2013). With global population on the increase, accounting for a population speculated by 2050 to be 9 billion, there will be a need for increased food production (UN, 2010). The task of providing adequate food supplies for the teeming population poses a serious challenge to African countries nowadays. By reason of these shortcomings, some African countries Nigeria inclusive have tended to remain international food basket cases that are perpetually in need of food aid (Food and Agricultural Organization, 2006).

The preservation of cropland and maintaining soil fertility should be of great importance to human welfare, considering the fact that humans worldwide obtain more than 99.7% of their food (calories) from the land and less than 0.3% from the oceans and aquatic ecosystems, each year about 10 million hectare of cropland is lost due to soil erosion, thus reducing the cropland available for world food production, (FAO, 2016). Hence, soil erosion has been identified as one of the most serious threats facing world food production. The loss of cropland is a serious problem, World Health Organization (2000) and the Food and Agricultural Organization (2013) reported that two-thirds of the world population is malnourished. Furthermore, Lal (2007) also reported that the quantity of soil lost per hectare in Agricultural areas is 40 times faster than the rate of soil formation, thereby putting humanities food security at risk.

With the world population now over seven billion and expected to reach 9.3 billion by 2050, more food will be needed (UN, 2010), considering at present that more than 99.7% of human food (calories) comes from the land (F.O.A, 2004), while less than 0.3% comes from the marine and aquatic ecosystems. Maintaining and augmenting the world food-supply basically depends on the productivity and quality of agricultural soils. Human induced soil erosion and associated damage to all agricultural land over many years have resulted in the loss of valuable agricultural land due to abandonment and reduced productivity of the remaining land which is partly made up for by the addition of nitrogen and phosphate fertilizers Pimentel, (2006). This loss of cropland to soil erosion often results in the creation of new cropland out of forestland and pastureland and the need to enrich these new croplands with inputs of nitrogen and phosphate fertilizers. In addition, soil erosion reduces the valuable diversity of plants, animals, and soil microorganisms.

Approximately 50% of the earth's land area is devoted to agriculture: About one-third is planted to crops and two-thirds is grazing land. Forests occupy about 20% of the world's land area. Of these three areas, cropland is most susceptible to erosion because of the frequent cultivation of soils and that vegetation is often removed before the crops are planted which exposes the soil to wind and rainfall energy. In addition, cropland is often left without vegetative cover between planting which intensifies erosion on agricultural lands, erosion rates that are estimated to be 75 times greater than erosion in natural forest areas.

According to Kendall (2006), worldwide, erosion on cropland averages about 30 t/ha/year and ranges from 0.5 to 400 t/ha/year. As a result of soil erosion, during the last 40 years about 30% of the world's cropland has become unproductive and much of that has been abandoned for growing crops. Furthermore, Pimentel (2006) wrote that nearly 1.5 billion ha of world cropland now under cultivation are almost equal in area to the amount of cropland (2 billion ha) that has been abandoned by humans since farming began.

In developing countries, soil erosion is particularly severe on small farms that are often located on marginal lands where the soil quality is poor and the topography is frequently steep, poor farmers tend to raise row crops such as corn and beans which are highly susceptible to erosion because the crop vegetation does not cover the entire tilled soil surface (Stone & Moor, 2013).

Bathrellos, Skilodimou and Chousianitis (2010), commenting on how soil erosion could impact on farming, states that the main on-site impact of soil erosion is the reduction of soil quality which results from the loss of the nutrient-rich upper layers of the soil and the reduced water-holding capacity of many eroded soils. Soil erosion has enormous negative impact on agriculture. Arising from the illustrations above, it is obvious that soil erosion have far reaching implications on agriculture, since Nigeria is an agrarian society with over 70% of its population employed by the Agricultural sector. This implies that if farmers which constitutes the largest population in the country must continue to remain in business and if food security have to be achieved, then care must be given to the menace of soil erosion as its devastating effects affects every fabric of the society. In the light of this, the attention of this research is on evaluating the effects of soil erosion on the Afikpo South as a case study due to the rising scourge of soil erosion in the area. The conceptual questions which this study is poised to provide answers are; what is the farmers' perception of soil erosion in their area, what are some of the underlying reasons for soil erosion problem in the area? And how does it affect the farmer's economy.

Therefore the study aim is to evaluate soil erosion and farmers economy in Afikpo-South local Government Area of Ebonyi State. The key objectives of this study are to;

1. Determine the impact of soil erosion on the income level of farmers
2. Examine the extent of soil erosion impacts on crop productivity
3. Identify the causes of soil erosion in the area

The following hypotheses are set to guide the study;

1. There is no statistically significant impact of soil erosion on the economy of local farmers in Afikpo South Local Government Area of Ebonyi State.
2. There is no statistically significant impact of soil erosion on income level of local farmers in Afikpo South Local Government Area of Ebonyi State.

2.0 METHODOLOGY

The study used the cross sectional research design. Questionnaire administration, interviews and personal observation were the means of data collection for the study. The study was conducted using a list of farmers obtained from the Agricultural development program in Ebonyi State with interest on the identified communities that are prone to flooding , which are Etiti Edda, Nguzu Edda, Eburnwana Edda, Ekoli Edda, Owutu Edda, Ogbu Edda and Amangwu Edda communities. This gave us a population of 285 registered farmers in the study area, and 100% of the registered farmers were used as the study sample size in each of the 7 selected communities, this is a shown in table 1 below. Data for this study were presented in tables and the hypotheses of the study tested using the Chi-Square statistical tool.

Table 1: Communities, Population of Registered farmers and Sample Population

Communities	Population of Registered farmers	Sample population (100%)
Etiti Edda	28	28
Nguzu Edda	62	62
Eburnwana Edda	41	41
Ekoli Edda	31	31
Owutu Edda	40	40
Ogbu Edda	58	58
Amangwu Edda	25	25
Total	285	285

Source: Researchers fieldwork (2017)

3.0 RESULTS AND DISCUSSIONS

Table 2: Type of Farming system Practiced

Response	Frequency	Percentage (%)
Crop rotation	104	36.5
Shifting cultivation	58	20.4
Mixed cropping	102	35.8
Alley Farming	21	7.3
Total	285	100

Source: Researchers field work (2017)

The type of farming system practiced in the area is as shown in table 2 and it reads that the crop rotation is predominant farming system practiced by the people in the area; as it accounted for 104 respondents representing 36.5% of the study population, 58 respondents representing 20.4% of the study population are into the practice of shifting cultivation, 102 respondents representing 35.8% of the study population practiced mixed cropping while 21 respondents representing 7.3% of the study population practiced the alley farming.

Table 3: Experience of soil erosion

Response	Frequency	Percentage (%)
Yes	234	82.1
No	51	17.9
Total	285	100

Source: Researchers field work (2017)

From the table 2; 234 respondents representing 82.1% of the study population have experienced soil erosion on their farm land while 51 respondents representing 17.9% of the study population said they have not. This therefore implies that good number of the farmers have full understanding of the problem of soil erosion.

Table 4: Frequency of Soil Erosion Occurrence in recent time

Response	Frequency	Percentage (%)
Once	43	15.2
Twice	53	18.5
Thrice and more	189	66.3
Total	285	100

Source: Researchers field work (2017)

On the frequency of soil erosion in the area, 43 respondents representing 15.2% of the study population agreed that they have experienced soil erosion once, 53 respondents representing 18.5% of the study population agreed that they have experienced soil erosion twice and 189 respondents representing 66.3% of the study population agreed that they have experienced soil erosion for about three time and more. This therefore explains that the occurrence of erosion in the area is frequent.

Table 5: Causes of Soil erosion in the Area

Response	Frequency		Percentage (%)		Rank
	Yes	No	Yes	No	
Heavy rainfall/flooding	259	26	89.8	10.2	1 st
Urbanization	98	187	34.3	65.7	4 th
Topography	212	73	74.3	25.7	2 nd
Excessive plowing of the soil	18	267	6.3	93.7	5 th
Deforestation	189	96	66.3	33.7	3 rd

Source: Researchers field work (2017)

Causes of soil erosion as shown on table 4.13, implies that heavy rainfall/flooding which ranks first amongst other causative factors accounts for 259 respondents which represents 89.8% of the total study population accepting that it is the cause of soil erosion in the area. Urbanization report showed that only 98 43 respondents representing 34.3% of the study population agreed to it as a causative factor of soil erosion in the area, hence from the ranking it ranks 4th. Topography as a causative factor to soil erosion is ranked 2nd, with 212 respondents representing 74.3% of the study population that agreed. Excessive plowing of the soil as a causative factor to soil erosion is ranked 5th, with 18 respondents representing 6.3% of the study population that agreed. Deforestation as a causative factor to soil erosion is ranked 3rd, with 189 respondents representing 66.3% of the study population that agreed.

Table 6: Effect of Soil Erosion on Farm Lands

Response	Frequency	Percentage (%)
Loss of top soil	45	15.8
Water logging of farmland	56	19.6
Development of rills and gullies	49	17.1
Washing off of seeds	31	10.8
Changes in soil fertility status	104	36.5
Total	285	100

Source: Researchers field work (2017)

The effect of soil erosion on farmlands in the study area showed that loss of top soil accounted for 45 respondents representing 15.8% of the study population, 56 respondents representing 19.6% of the study population agreed that water logging of farmland is an effect of soil erosion in the area. 49 respondents representing 17.1% of the study population agreed that the development of rills and gullies is an effect of soil erosion in the area, 31 respondents representing 10.8% of the study population agreed that the washing off of seeds is an effect of

soil erosion in the area, while 104 respondents representing 36.5% of the study population agreed that changes in soil fertility status is an effect of soil erosion in the area. From the above, it obvious that the major effect of soil erosion in the area is the changes in soil fertility status that it comes with which definitely affects crop production and hence the economy of the local farmers.

Table 7: Income level before Soil Erosion Occurrence

Response	Frequency	Percentage (%)
25,000-40,000	43	15.1
45,000-60,000	69	24.2
65,000-80,000	94	34.9
85,000 and above	98	34.4
Total	285	100

Source: Researchers field work (2017)

Table 7, shows that 43 respondents representing 15.1% of the study population agreed that their income level was in the range of 25,000-40,00 before they experienced erosion, 69 respondents representing 24.2% of the study population agreed that their income level was in the range of 45,000-60,000 before they experienced erosion, 94 respondents representing 34.9% of the study population agreed that their income level was in the range of 65,000-80,000 before they experienced erosion and 98 respondents representing 34.4% of the study population agreed that their income level was in the range of 85,000 and above before they experienced erosion. From the foregoing it is important to state that as reported on table 4.16, more persons were in the income level range of 85,000 and more before they experienced erosion as it accounted for the highest number of response.

Table 8: Income level after Soil Erosion Occurrence

Response	Frequency	Percentage (%)
25,000-40,000	130	45.6
45,000-60,000	91	31.9
65,000-80,000	33	11.6
85,000 and above	31	10.9
Total	285	100

Source: Researchers field work (2017)

Table 8, shows that 130 respondents representing 45.6% of the study population agreed that their income level is in the range of 25,000-40,00 after they experienced erosion, 91 respondents representing 31.9% of the study population agreed that their income level is in the range of

45,000-60,000 after they experienced erosion, 33 respondents representing 11.6% of the study population agreed that their income level is in the range of 65,000-80,000 after they experienced erosion and 31 respondents representing 10.9% of the study population agreed that their income level is in the range of 85,000 and above after they experienced erosion.

Table 9: Soil Erosion affects agricultural productivity

Response	Frequency	Percentage (%)
Yes	213	74.7
No	72	25.3
Total	285	100

Source: Researchers field work (2017)

The table above has shown that 213 respondents representing 74.7% of the study population agreed that soil erosion affects agricultural productivity while 72 respondents representing 25.3% of the study population stated that soil erosion does not affect agricultural productivity.

Table 10: Soil Erosion and farmers Economy

Response	Frequency	Percentage (%)
Yes	229	80.4
No	56	19.6
Total	285	100

Source: Researchers field work (2017)

The table above has shown that 229 respondents representing 80.4% of the study population agreed that soil erosion affects farmer's economy while 56 respondents representing 19.6% of the study population stated that soil erosion does not affect farmer's economy in the study area.

Table 11: Soil erosion increases hardship/reduction in income level

Response	Frequency	Percentage (%)
Yes	223	78.2
No	62	21.8
Total	285	100

Source: Researchers field work (2017)

The table above has shown that 223 respondents representing 78.2% of the study population agreed that soil erosion increase hardship/reduction in income level while 62 respondents

representing 21.8% of the study population stated that soil erosion does not increase hardship/drop in income level.

4.0 HYPOTHESES TESTING

The hypotheses of the study states as follows;

1. The economy of local farmers in Afikpo South Local Government Area of Ebonyi State is affected by soil erosion.
2. Reduction in income level is as a result of soil erosion

Hypothesis 1: this was tested using the Chi-square statistically tool.

Stating the hypothesis in the null form puts it thus; there is no statistical significant impact of soil erosion on farmer's economy in Afikpo South Local Government Area of Ebonyi State.

The chi-square calculated value is 166.27.

X^2 critical value at 95% significance level is 3.841 at 1 degree of freedom.

Decision: Since the Chi- square calculated value of 166.27 is greater than the critical value of 3.841 at 95% significance level, we therefore reject the null hypothesis which states that there is no statistical significant impact of soil erosion on farmer's economy in Afikpo South Local Government Area of Ebonyi State and accept the alternate hypothesis which states that there is a statistical significant impact of soil erosion on farmer's economy in Afikpo South Local Government Area of Ebonyi State.

Hypothesis 2: this was tested using the Chi-square statistically tool.

Stating the hypothesis in the null form puts it thus; there is no statistical significant impact of soil erosion on income level of farmers in Afikpo South Local Government Area of Ebonyi State.

The chi-square calculated value is 133.5.

X^2 critical value at 95% significance level is 3.841 at 1 degree of freedom.

Decision: Since the Chi- square calculated value of 133.5 is greater than the critical value of 3.841 at 95% significance level, we therefore reject the null hypothesis which states that there is no statistical significant impact of soil erosion on income level of farmers in Afikpo South Local Government Area of Ebonyi State and accept the alternate hypothesis which states that there is a statistical significant impact of soil erosion on income level of farmers in Afikpo South Local Government Area of Ebonyi State.

The findings of the study showed the following;

1. Farming as a practice in the study area was done basically for the purpose of consumption and sales.
2. The farmers in the area practiced more of crop rotation and shifting cultivation with yam as the predominant crop grown in the area.
3. Good numbers of farmers have experienced soil erosion and that 66.3% of the total farmers in the area have had cases of soil erosion more than three times.
4. Heavy rainfall and flooding is the major cause of soil erosion and is ranked first amongst other identified parameters.
5. Soil Erosion affects farmer's economy and that it increases hardship as well as brings about a reduction in the income level of farmers
6. There is a statistical significant impact of soil erosion on income level of farmers and thus; on the economy of farmers in Afikpo South Local Government Area of Ebonyi State.

5.0 CONCLUSION/RECOMMENDATION

The study therefore concludes that soil erosion had given rise to reduced/unproductive soils that has negatively affected crop production and the local economy of farmers. The achievement of high crop production in Afikpo-South Local Government Area may not be possible until the menace of soil erosion is well managed, since it was discovered in the course of this research that soil erosion is the major reason for low crop production in the study area. Therefore the study made the following recommendations;

1. There is need for farmers to be trained on the use of modern technologies to improve crop production which will enhance the economy of the local farmers so as to achieve self independence.
2. Awareness and enlightenment programmes should be carried out among farmers in the area on the short and long term impacts of land degradation.
3. Deforestation in this area should be discouraged completely as exposure of the soil increases the rate of soil erosion.
4. Farmers should be encouraged to do more of alley farming in order to reduce losses arising from soil erosion.

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