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Underscoring the Vulnerability of Livelihood Activities of Rural Households to Soil Erosion in Imo State, Nigeria

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ABSTRACT

The study underscored the vulnerability of livelihood activities of rural households to erosion menace in Imo State, Nigeria. Specifically, the study described the socio-economic characteristics of rural households in Imo State; identified the livelihood activities of rural households in the study area; and ascertained the perceived effects of soil erosion on predisposed livelihood activities of rural households. Data were collected from 90 households selected through multistage sampling procedure using structured questionnaire. Data analysis was performed using percentage, mean score from the result, the sampled household members were dominated (53.3%) by male gender with average age of 44 years and Secondary school qualification (50.0%). In terms of social organization membership, 63.3% of them did not belong to any social organizations, and at the same time 63.3% lacked access to credit, while 46.6% of the households indicated having extension forth-nightly. From the result, majority (93.3%) of the rural households were into crop production. followed by 85.5% who derived their livelihood from livestock production. The result showed that soil erosion is capable of destroying 9 (nine) predisposed livelihood earnings of rural households out of the 19 livelihood activities understudied. These include the tendency of destroying farm lands (Mean = 3.1), reducing crop yield (Mean = 2.9), destroying economic trees (M = 2.8), impoverishing farm lands (Mean = 2.6), increasing of cost hiring farm labour (Mean = 2.6), marketing difficult (Mean = 2.7), decreasing income diversification of rural households (Mean = 2.8), destroying residential buildings and farm structures (Mean = 2.5). The study concluded that rural households in Imo State engage in multiple streams of nonfarm activities that directly or indirectly predispose farm activities to soil erosion. Hence, it is recommended that environmental friendly policies like government's support for soil conservation farming, organic farming should be put in place by the government to increase the consciousness of protecting the soil from actions that predispose it to erosion

Keywords: Vulnerability, Livelihood activities, Rural Households, Erosion, Imo State, Nigeria.

1. Introduction

Farm-based enterprises and nonfarm-based livelihood activities share such mutual relationship that pitches them for or against each other. Farm activities, such as crop production, livestock production and allied activities thrive when the environment is supportive. Unfortunately, the condition that guarantees this balance is often distorted by the phenomenon of climate change and other man-made activities resulting in soil erosion, a major ecological problem in Southern Nigeria. According to Nigeria Erosion and Watershed Management Project (NEWMAP) (2016), soil erosion is a process by which rock fragments and soils are gradually washed and detached from their original sites, transported, and then eventually deposited at some new locality by the activities of man, animals, wind and water. It occurs by the wearing away of the land surface by physical forces such as rainfall, flowing water, wind, ice, temperature change, gravity or other natural or anthropogenic agents that abrade, detach and remove soil or geological material from one point on the earth's surface to be deposited elsewhere (European Union, 2016).

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In terms of devastation, soil erosion is recognized as one of the world's most serious environmental and livelihood problems (Akpokodje *et al.,* 2010; United Nations Environment Program (UNEP), 2016). It systematically removes soil, including plant nutrients from the land surface through the events of agents of denudation (Amangabara, 2012). In agriculture, soil erosion constitutes the main soil degradation process that decrease production (FAO, 2006). Through declined production, it generates strong environmental impacts that results in loss of livelihood (Aniah *et al.,* 2013). In Nigeria and particularly in Imo State, the drastic erosion of soil has earned it a structural classification by NEWMAP (2016) as unstable, especially for agriculture and allied activities. Traditional agricultural practices like bush burning, deforestation, continuous cultivation, and mining on hill side slopes have continued to entrap the area in the menace-cycle of soil erosion (Idah *et al.,* 2008). Sadly, the devastation is more manifest in rural households where many have lost greater proportion of their livelihood activities to erosion menace (Uwanuruochi and Nwachukwu, 2013).

Mugagga *et al.* (2010) described a rural household as consisting of one or more rural people who live in the same dwelling and also share meals or living accommodation, and may consists of a single family or some other grouping of people. The place of rural household in Nigeria is critical in livelihood activities as about 60% of the population are members of rural households (Bola *et al.,* 2013). The major livelihood activities of undertaken by rural households according to Mgbada, 2010; Olawuyi and Rahji (2012) include the production of crops like cassava, maize, yam, cocoyam, vegetables; livestock production like poultry farming, sheep and goat rearing, pig farming; and fisheries production. Others include petty trading, teaching, basket making, palm wine tapping, mason, food vending, tree lumbering, food processing, farm labour, carpentry, tailoring. It is in this light that the International Centre for Development Oriented Research in Agriculture (ICRA, 2015), defined livelihood as largely involving generating income, which is a means to reaching other ends. It includes aspects of food security (the ability to feed oneself and one's family), providing a home, health, security (reduced vulnerability to climatic, economic or political shocks, and so forth), sustainability (the ability to continue to make a satisfactory living), power (the ability to control one's own destiny), and others.

It is evident from the above that rural households derive their livelihood from farm-based enterprises and nonfarm activities. Thus, any slight depletion in soil negatively affects farm-based livelihood activities which in many cases in Imo State have resulted in communal land tussle and migration to other parts of the State with less disturbed soils, leading to (Imo State Ministry of Environment, 2011). Unfortunately, activities that predispose rural livelihood have continued unabated amongst rural people as many believe that the debate of loss of rural livelihood to erosion cannot be wrapped round any vulnerability to erosion. They argue that erosion is a naturally occurring phenomenon, and as such the attendant damages to rural livelihoods are inadvertent situations that require coping strategies rather than blame games. Against this backdrop, the study was carried out to underscore the vulnerability of livelihood activities of rural households in Imo State through the following specific objectives:

i. Describe the socio-economic characteristics of rural households in Imo State;
ii. Identify the livelihood activities of rural households in the study area;
iii. Ascertain the perceived effects of soil erosion on predisposed livelihood activities of rural households

2. Methodology

The study was carried out in Imo State, Nigeria. The State is located in the rainforest zone of Nigeria and shares common boundaries with Abia State on the east, Rivers State on the south, and Anambra State on the north and Delta state on the west (Imo State Agricultural Development Program (ADP), 2013). The state lies between Latitudes 5°45′ and 6°35′ North of the equator and Longitudes 6°35′ and 7°28′ East of the Greenwich Meridian (Chineke *et al.,* 2011). Imo State covers an area of about 5,067.20 km^2, with a population of 3,934,899 persons with many subsistence households (National Population Commission (NPC), 2006 and National Bureau of Statistics (NBS), 2007). Imo State belongs to the Benin formation of the coastal plain sands which is of tertiary age, deep, porous, fertile and highly leached with average annual temperature of 28°C, an average annual relative humidity of 80% and an altitude of about 100m above sea level (Imo State ADP, 2013). The State has three agricultural zones namely Orlu, Owerri, and Okigwe. The State is also delineated into twenty-seven

(27) Local Government Areas (L.G.A) (Ministry of Land and Survey, 2013). Okigwe zone has six (6) LGAs, Orlu has twelve (12) LGAs and Owerri has nine (9) LGAs. The total land area of the State is 5,062.20km with five distinct soil types of Lithosol, alluvial, Ferralithic, medium fine altisol and clayey hydromorphic soils with sandy loam soil dominating (Ministry of Land and Survey, 2013).The major livelihood activities of people in the area include crop farming such as cassava, vegetable, cocoyam, oil palm production; livestock production like goat and sheep rearing, pig rearing, poultry; and other formal and informal sectoral activities such as education, tourism, civil service, artisan, petty trading. The economy of the State is majorly driven by the service sector in place of the private sector. This scenario makes government the largest employer of labour in the area.

The study sample was a population of all rural households in Imo State. A multi-stage sampling procedure was used in selecting sampled households for the study. Firstly, all the three agricultural zones of Owerri, Orlu and Okigwe were purposively sampled to achieve a well representative sample. The second stage involved a purposive selection of three Local Government Areas from each zone based on the severity of erosion in the areas. From each LGA, one community was purposively selected in the third stage based on high incidence of gully erosion in the communities. Fourthly, one village each was randomly selected from each of the communities to give 9 villages. Finally, ten (10) households were randomly selected from each village to give a total sample size of ninety (90) rural households for the study.

The study used primary data obtained from field survey using structured questionnaire. Data were analyzed using frequency distribution, percentage, mean and standard deviation. Precisely I and II were achieved frequency and percentage. While, objective III was captured using 19 item statements rated on a 4-point Likert-type scale of Strongly agree = 4, Agree = 3, Disagree = 2 and Strongly disagree = 1. The values of the likert scale rating was added and divided by the number of scales to obtain a discriminating index of 2.0 (thus, 4+3+2+1/3 = 2.5). Hence, items with mean score equal or greater than 2.5 were taken in affirmative and vice versa.

$$\text{The Mean Score } (\bar{X}) = \frac{\sum fx}{n}$$

Where:
$\bar{X}$ = Mean score
$\sum$ = Summation sign
f = Total number of respondents under each category (frequency)
x = Value of each response option (4,3,2 or1)
n = Sample size

3. Result and Discussion

3.1. Socio-economic characteristics of rural households

3.1.1. Age:

Table 1 is the distribution of rural households by socioeconomic characteristics. From the result majority (38.9%) of the household members were within the age range of 40-50 years, and average age of 44 years, expressing them as young households populated by middle aged members. This finding falls within the productive age of the average Nigerian as reported by the National Bureau of Statistics NBS (2007), and as such, inclines them to adopt innovative measures of cushioning the effect of erosion on their livelihood activities.

3.1.2. Sex:

The male gender dominated (53.3%) the sampled rural households. This finding contrasts several studies that have ascribed majority of rural production activities to female gender. For instance, finding by Okwusi *et al.* (2005) reported that the female sex dominated production, processing and utilization of agricultural food products in Imo State. Considering that erosion control measures are usually exerting, this result implies that erosion menace will be easier to control in the area since those to do the work are available.

3.1.3. Educational status:

Secondary school education constituted the major qualification (50.0%) of the rural household members. The high proportion of literate respondents among the rural dwellers allays the fears of Ani (2004) who considered many rural dwellers as being unfavourably disposed to acquire formal education. The education profile of the people will enable them become aware, adopt and diffuse innovations helpful in cushioning the effects of soil erosion in the area. This is so given that with sound educational background, households can understand, be aware, participate and adopt in a positive way for increased output and income that translate to improved livelihood (Ebukiba, 2010).

3.1.4. Membership of social organization:

From the result, 63.3% of the sampled household members did not belong to social organizations. This finding contrasts the report of Okezie and Amaefula (2005) which pitched rural dwellers with social organization membership. Implicitly, the lose opportunity garner resources and experience from social organizations towards protecting their livelihood activities from erosion menace.

3.1.5. Access to credit:

In terms of access to funds to sustain their livelihoods, the result revealed that 63.3% of the household members did not have access to credit. This strongly confirms the report of Federal Ministry of Agriculture and Rural Development (FMARD, 2011) that credit facilities for rural livelihood activities is increasingly becoming farfetched, thereby prompting households to resort to personal savings which is hardly enough to finance their livelihood activities. Imo State Ministry of Environment, (2011) added that poor financial base of the rural household may compel the rural dwellers to abandon their livelihood activities in the face of erosion menace (Imo State Ministry of Environment, 2011).

3.1.6. Frequency of contact with extension agents:

The result also shows that 46.6% of the household members who receive extension service had contacts with extension agents every forth-night. Agbamu, (2011) corroborates this result when he stated that the visit of rural households by extension agents has become abysmally less frequent, thereby creating room for poor interpretation and application of research recommendations in their livelihood activities.

Table 1: Distribution of rural households by Socioeconomic Characteristics

Socioeconomic variables	Frequency	Percentage
Age		
40-50 years	35	38.9 (X = 44)
Gender		
Male	48	53.3
Educational status		
Secondary education	45	50.0
Membership of social organization		
Non-member	57	63.3
Access to credit		
No	60	63.3
Frequency of contact with extension agents		
Forth nightly	112	46.6

Source: Field survey data (2019)

3.2. Livelihood activities of Rural Households

Table 2 shows the distribution of rural households by livelihood activities. From the result, majority (93.3%) of the rural households were into crop production. This was followed by 85.5% which derived their livelihood from livestock production, while 55.5% were masons. Furthermore, 48.8% engage in formal employment and hair dressing. The food vendors among them constituted 46.6%, with 42.2% engaged in fish farming, while 24.4% undertake artisan works like cloth sewing, painting and

carpentry. It could be inferred from the result that the rural households had multiple streams of livelihood earnings in agreement with the earlier findings of Onweagba (2011) which observed that rural areas in Imo State are swarming with multiple livelihood activities with the intent of complementing farm income. According to Odili (2010) nonfarm livelihood activities if not consciously managed can deplete the soil making farm activities vulnerable to erosion and other attendant problems. For instance, sand mining, lead mining, indiscriminate lumbering, bush burning for charcoal production, automobile parts burning, metal mining are among nonfarm livelihood activities that predispose agricultural lands to flooding and erosion. According to Ifeanyi-Obi (2013), to achieve sustainable livelihood that is insulated against erosion menace, rural households should be made to pursue their multiple streams of livelihood in a mutually complementing manner. Thus, in considering economic development policies and interventions, livelihood activities like flower gardening, mason/civil construction, waste disposal, water supply, trading, civil/public service environmental conservation practices like minimum soil disturbance, de-silting of drainage system, aforestation, storage, processing, transportation, financial services, among other enterprises that do not disrupt the elements of sustainability should be prioritized over of erosion predisposing enterprises.

Table 2: Distribution of rural households by livelihood activities

Livelihood activities	*Frequency	Percentage
1. Crop production	84	93.3
2. Livestock production	77	85.5
3. Palm oil production	6	6.6
4. Craft making	12	13.3
5. Cloth sewing	22	24.4
6. Formal employment	44	48.8
7. Farm labour	10	11.1
8. Trading	20	22.2
9. Artisan	9	10.0
10. Fishing	38	42.2
11. Food vending	42	46.6
12. Herbal medicine	19	21.1
13. Carpentry	22	24.4
14. Hair dressing	44	48.8
15. Hawking	19	21.1
16. Painting	22	24.4
17. Business	25	27.7
18. Mason	50	55.5
19. Welding	12	13.3

Source: Field survey data, 2019 * Multiple responses recorded

3.3. Perceived effects of soil erosion on predisposed livelihood activities of rural households

Table 3 is a distribution of perceived effects of soil erosion on predisposed livelihood activities of rural households. Based on 2.5 discriminatory index, the result showed that soil erosion is capable of destroying 9 (nine) predisposed livelihood earnings of rural households out of the 19 livelihood activities understudied. These include the tendency of destroying farm lands (Mean = 3.1), reducing crop yield (Mean = 2.9), destroying economic trees (M = 2.8), impoverishing farm lands (Mean = 2.6), increasing of cost hiring farm labour (Mean = 2.6), marketing difficult (Mean = 2.7), decreasing income diversification of rural households (Mean = 2.8), destroying residential buildings and farm structures (Mean = 2.5). The standard deviation value of the responses which varied ranged from 0.4 to 1.5 indicated the heterogeneous perception of the sampled household members regarding what soil erosion can do to predisposed livelihood. This finding aligns strongly with the report of Imo State Ministry of Environment (2011) in which erosion was reported to have destroyed livelihood sources of rural households by washing away farm lands, road networks, cash crops, livestock facilities, aggregation centres, ancestral homes, residential buildings. The report added that areas where erosion disaster occurred in Imo State were in locations where erosion predisposing activities like sand mining and tree lumbering were highest. This fact validates the argument that without activities that predispose rural livelihoods to soil erosion livelihood shock will be minimal. Ifeanyi-Obi (2013) summarized the effects

of destruction of the rural environment when he stated that the livelihood of rural households is derivable from natural, human, financial, physical or social resources/capital of the rural area, hence, when rural farm lands are lost, soil fertility impoverished, ancestral homes lost the financial resources of the people are lost, human capital is lost. Additionally, continuous loss of farm lands among rural households is capable of precipitating social conflicts and communal crises in the affected areas resulting from competition and tussle on the few available farm land (Okpala-Okaka, 2009). In other words, environmental degrading activities do not only predispose rural households to loss of livelihood and economic hardship but also predispose them to social conflict and insecurities. For instance, the attendant problems of land fragmentation aggravate each time available land fragment is washed away by erosion. The destruction of roads networks prevents the transportation of commodities and other non-farm activities like trading, transport business.

Table 3: Distribution of Rural households by perceived effects of soil erosion on redisposed livelihood

Perceived effects on livelihood	Strongly Agree	Agree	Disagree	Strongly disagree	Mean	SD
1. Loss of farmland	63	4	0	23	3.1*	0.4
2. Reduction in crop yield	53	6	0	31	2.9*	1.3
3. Destruction of economic trees	41	20	0	29	2.8*	1.1
4. Death of livestock	24	16	4	50	2.2	0.9
5. Reduction in soil fertility	34	8	3	48	2.3	1.4
6. Reduction in land productivity	31	20	3	44	2.6*	1.0
7. Decrease in household income	35	7	2	34	2.2	1.1
8. Loss of farm labour (due to forced migration)	31	15	3	46	2.4	0.3
9. Increased in the cost of hiring farm labour	39	17	0	34	2.6*	1.2
10. Destruction of rural roads	37	7	0	46	2.4	0.6
11. Makes it difficult to visit friends/relatives	48	5	0	37	2.7*	1.5
12. Increased in risk and uncertainties in farming	29	19	0	42	2.4	0.9
13. Increased in stress related sicknesses (such as stroke, high blood pressure)	39	9	0	42	2.5*	0.8
14. Decrease in income diversification option	44	12	0	34	2.8*	1.3
15. Destruction of ancestral sites such as shrines, common forests, reserves, etc	38	17	2	35	2.4	0.3
16. Destruction of markets and other infrastructure	27	23	0	40	2.4	0.4
17. Destruction of residential buildings and farm structure	38	12	0	40	2.5*	1.1
18. Increase in the cost of transporting goods/farm produce to the markets	35	14	0	41	2.4	1.0
19. Siltation of rivers/death of fish	12	13	0	65	1.6	1.0

Source: Field survey data, 2018 $X \geq 2.5$ (Effect *), $X < 2.5$(No effect)

4. Conclusion

The household members were majorly male who are within their active age, with poor social capital and access to credit. Majority of the rural households were into crop and livestock production. Others included masons, formal employment and hair dressing, food vendors, fish farming and artisan works like cloth sewing, painting and carpentry. Livelihood activities that predispose rural households to soil erosion increases the tendency to destroy their farm lands, reduce crop yield, destroy economic trees, impoverish farm lands, increase cost of hiring farm labour, makes marketing difficult, decreases income diversification of rural households, destroys residential buildings and farm structures.

5. Recommendations

Based on the findings of the study, it is recommended that:

1. Environmental friendly policies like government's support for soil conservation farming, organic farming should be put in place by the government to increase the consciousness of protecting the soil from actions that predispose it to erosion. If the cost of using conservation practices like easy procurement of organic fertilizer is within the reach of the resource – poor households, they are likely to patronize the practices
2. Government should not pay lip services to erosion control activities. It should rather equip extension agents serving in the rural areas to train and assist rural dwellers contend erosion menace.
3. The fight against erosion menace should be based on the principle of prevention rather than control. Hence, government and intervention agencies should look inwards and identify indigenous groups and measures of ensuring compliance with soil conservation practices among rural dwellers. This approach will give the rural households ownership of their own environment as well as control degrading activities like soil mining.

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