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Evaluation Of The Causes Of Environmental Degradation In Parts Of Southeast, Nigeria

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Abstract: ***The assessment of the environmental degradation in southeast, Nigeria was carried out using data obtained from field observations and questionnaires. The result of the analysed data revealed that deforestation, weathering, rainfall, road construction, overgrazing, agricultural and industrial activities, flooding, soil/types and erosion are the major causes of environmental degradation with calculated Chi square values of 32.83, 32.83, 78.14, 23.32, 19.41, 28.56, 12.65, 1.28 7.76, and 15.96 respectively greater than the critical Chi square value 3.841 at 0.05 level of significant and one degree of freedom. The findings indicate that the variables do not exhibit the quality of independence. There is 98% agreement at 0.05 level of significant and one degree of freedom. The calculated Chi square values for social effects are 38.68, 4.70, 46.37, 9.36, 46.37, 28.83 with the exception of 1.02 and the calculated Chi square values for economic effects are 35.28, 22.94, 46.37, 11.15, 2.25, 15.28 with the exception of 1.020 greater than the critical Chi square value 3.84, both at 0.05 level of significant and one degree of freedom. The study therefore indicates that environmental degradation in the area is caused by human and natural factors with significant socioeconomic implication affecting the means of livelihood of the people in the area.***

Keywords: Environmental degradation, gully erosion, Chi square, anthropogenic activities, hydrogeotechnical factors

I. INTRODUCTION

Environmental degradation is the deterioration and the depletion of the environment. It encompasses the forms of degradation that are induced by natural processes and accelerated by human, through bad engineering practices. This brings about gullies, failure of super structures and destruction of lives and properties. Water plays important role in degradation of our environment. This results in flooding, erosion, landslides, and subsidence. Deforestation also exposes the land and weakens the soil structure. Loss of vegetation results to ecological disaster and enhances desert encroachment. Environmental degradation is further enhanced by the weathering of the topographic highland. Its importance is felt mostly in states ravaged by gullies especially in the eastern states and other parts of Nigeria. Gully erosion and landslide are terminal ecological disasters that destroy landform (Egboka, 1993). The natural environment is vulnerable to the threats of hydrogeotechnical factors prevalent in the area. Destabilization of the soil structure facilitates soil erosion and landslide development**.** The groundwater of the area also affects soil structure especially where the water table is shallow. The socio-economic impact of the problem includes destruction of lives and properties, as well as socioeconomic development. A proper understanding of the environment is important to check, monitor and ameliorate the various forms of environmental degradation.

A. EROSION MECHANISM IN NIGERIA

Erosion is the ability of denudating agents of the environment such as wind, water and man to move soil materials from one location to another. The action of these agents of erosion gradually wears away surface material

forming, rill erosion, sheet erosion, and channel erosion. These types of erosion may progress to form gully erosion. The Gully erosion is particularly severe in southeastern states of Abia, Imo, Anambra, Enugu, Ebonyi. Over 500 active gully erosion sites have been identified in most parts of the affected southeastern states, of Nigeria. Some recorded gully sites are over 30 m deep and extending over 100 m with prominent gully fingers. Most important factors of soil erosion in Nigeria are not only anthropogenic, but geologic processes Ofomata (1964).

Nwajide (1979) studied the Nanka Formation in Anambra State using 57 soils samples, and he observed predominance of medium to coarse (0.56-1.00mm) grain. The soil lacks cement material like iron oxides and carbonates. The Nanka Sands are friable and unconsolidated making it porous and permeable for easy movement of water, thereby promoting soil failure. The gully prone areas of southeastern, Nigeria are significantly underlain by Nanka Formation. Gully prone areas have become bad land environments as people are usually forced to relocate from gully erosion site (Nest, 1999). Over 20% of the land of Anambra State is presently ravaged by erosion (Egboka, 1993) with lives and properties regularly lost.

Floyd, 1965; Ofomata, 1965; Ogbukagu, 1976; 1978; Nwajide & Hoque, 1979 emphasized on the importance of the soil and geologic materials exposed by the removal of vegetation cover and the impact of heavy rainfall on such materials. Anthropogenic activities on the susceptible geologic and soil materials of the area produce prominent complex gullies.

The effects of groundwater and hydrogeotechnical factors have been highlighted as factors especially where mass earth movement is the dominant mechanism Egboka & Nwankwor (1985). The authors indicated that the active gullies are located mostly at the discharge areas of groundwater systems and areas of high pore water pressures. The effective strength of the unconsolidated geologic materials is reduced during the peak of groundwater recharge initiating gully development. Obiadi I.I. et aI, (2011) reviewed the causes and effects of gully erosion in Anambra state and south east Nigeria and proposed specific and multidisciplinary approach to gully erosion control in the area.

The impact and implication of anthropogenic forces on the unstable geologic platform of parts of Anambra and Imo state southern, Nigeria was discussed by (Egboka and Okoyeh 2016). They stated that the unstable platform is stressed by intensive urbanization, deforestation, agricultural and industrial activities that have extensively denuded and elluviated the total environment.

One fact is clear from the several studies and from a close field investigation of the affected areas; the development of the gullies is progressive through at least four main stages; formation of rills, development of incipient gullies, formation of shallow gullies (<15m deep) and development of deep gullies (<15m deep).

The unprecedented flooding of the study area in recent times due to prolonged heavy rainfall attributed to climate change (Welch et al 1977, Adeja, 2008, Aderogba 2011) also has implications of environmental degradation (Fig. 1 and 2).

Figure 1: Typical gully site in parts of the study area

Figure 2: Flooding in the study area

II. MATERIALS AND METHODS

A. SAMPLING PROCEDURES

Sampling procedures is to draw a definite sample from a specified population, by survey design, observations, oral interview and distribution of questionnaires. The population of the study comprises of 400 respondents.

The sample size is determined using the Taro Yamine (1994) formula, given below;

$$S = \frac{N}{1+N(e)^2}$$

Where;

S = Sample size, N = Population of study, E = Error, which is assumed as 20%

1= Theoretical Constant

B. DATA ANALYSIS TECHNIQUES

The hypotheses were tested and subjected to statistical analysis with the aid of Chi square, which measures the differences between the observed frequencies and the expected frequencies. Chi square is determined using the formula below,

$$x^2 = \frac{\sum(0-E)}{\sum E}$$

Where; x^2 is Chi Square, O is observed frequency, E is Expected frequency

The Chi-square involves two sets of values presented in tables 1 and 2 which are relevant for decision making. Another important consideration as to the use of Chi square is the level of confidence or margin at 0.05 level of significant and one degree of freedom.

III. RESULTS AND DISCUSSION

A. TEST OF HYPOTHESES ONE

The calculated value of Chi square from Table 1 below are 32.83, 32.83, 78.14, 23.32, 19.41, 29.56, 12.65, 7.76, and 15.96 with exception of 1.28 are greater than the Critical Chi square value of 3.841. There is 98% agreement at 0.05 level of significant and one degree of freedom.

DECISION 1: Reject Ho if calculated x^2 > critical x^2. The findings indicate that the variables do not exhibit the quality of independence.

S/N	Response Description	%Yes	%No	X^2Cal	X^2Critical	DF	Decision
1	deforestation	80.4	23.1	32.83	3.841	1	Reject
2	Weathering	80.4	23.1	32.83	3.841	1	Reject
3	Rainfall	94.1	5.7	78.14	3.841	1	Reject
4	Roadconstruction	84.1	15.8	23.32	3.841	1	Reject
5	Agriculture	81.1	18.8	19.41	3.841	1	Reject
6	Flood	88.4	11.5	29.56	3.841	1	Reject
7	Soil/types	74.9	24.6	12.65	3.841	1	Reject
8	Industrialactivities	58.0	42.0	1.28	3.841	1	Accept
9	Bush burning	30.4	69.5	7.76	3.841	1	Reject
10	erosion	78.7	21.7	15.96	3.841	1	Reject

DF: Degree of Freedom.

Table 1: Causes of Environmental degradation

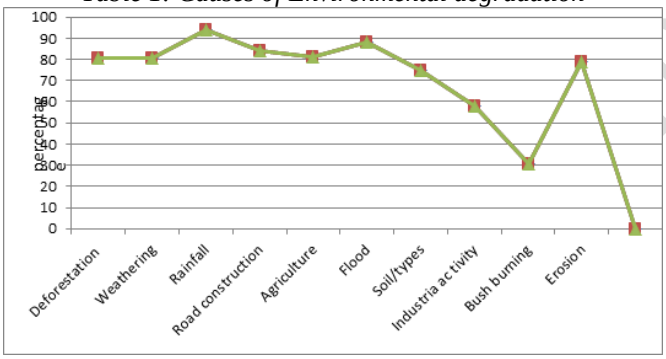

Figure 3: Percentage causes of environmental degradation

B. HYPOTHESES TEST TWO

HO2: There is no significant difference between the responses on socio-economic activities affected by environmental degradation in Nigeria. There is 98% agreement at 0.05 level of significant and one degree of freedom.

DECISION 1: Reject Ho if calculated x^2 > critical x^2. This means that there is a relationship between social-economic activities affected and environmental degradation.

S/N	Response Description	%Yes	%No	X^2CAL	X^2CRITICAL	DF	Decision
1	Socio effect	81.1	18.8	38.68	3.841	1	Reject
2	Socio effect	60.8	39.1	4.70	3.841	1	Accept
3	Socio effect	15.9	84.0	46.37	3.841	1	Reject
4	Socio effect	44.9	55.0	1.02	3.841	1	Accept
5	Socio effect	78.2	21.6	9.36	3.841	1	Reject
6	Socio effect	84.0	15.9	46.37	3.841	1	Reject
7	Socio effect	76.8	23.1	28.83	3.841	1	Reject

DF: Degree of Freedom

Table 2: Social Activities Affected

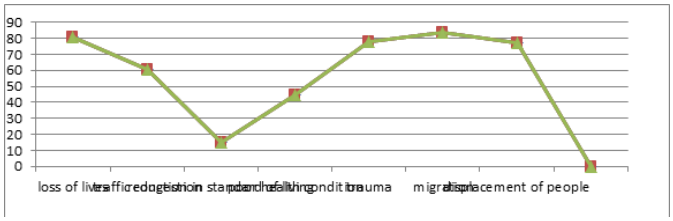

Figure 4: Percentage of social effect

S/N	Response Description	% Yes	% No	X^2 CAL	X^2 CRITICAL	DF	Decision
1	Eco effect	79	20.3	35.28	3.841	1	Reject
2	Eco effect	44	55.%	1.02	3.841	1	Accept
3	Eco effect	73.9	26	22.94	3.841	1	Reject
4	Eco effect	84	15.9	46.37	3.841	1	Reject
5	Eco effect	33.3	66.7	11.15	3.841	1	Reject
6	Eco effect	42	57	2.25	3.841	1	Accept
7	Eco effect	69.5	30.4	15.28	3.841	1	Reject

DF: Degree of Freedom.

Table 3: Economic Activities Affected

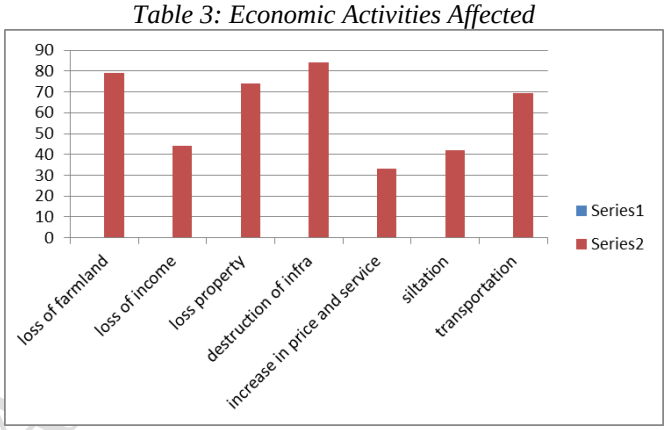

Figure 5: Percentage of economic effect

The results in tables 1 and 2 revealed that there is a strong agreement that deforestation, weathering, rainfall, road construction, overgrazing/agriculture, industrial activities, flooding, soil/types and erosion are the major causes of environmental degradation with calculated Chi square values of 32.83, 32.83, 78.14, 23.32, 19.41, 28.56, 12.65, 1.28, 7.76, and 15.96 respectively greater than the Chi square value of 3.841 at 0.05 level of significant and one degree of freedom. Deforestation exposes the weak acidic and lateritic soil of the area as well as the unstable geological formation to severe degradation.

The social effects from tables 1and 2 are loss of lives, traffic congestion, reduction in standard of living, poor health, psychological trauma, migration, and displacement of people with calculated Chi square values 38.68, 4.70, 46.37, 9.36, 46.37, 28.83 and exception of 1.02 greater than the critical Chi square value of 3.841 at 0.05 level of significant and one degree of freedom. The economic effects are loss of farmland, loss of income, loss of properties, destruction of infrastructures, increase in prices of goods and services, siltation of water bodies and transportation with calculated Chi square values 35.28, 22.94, 46.37, 11.15, 2.25, 15.28 and exception of 1.020 greater than the critical Chi square value 3.841 at 0.05 level of significant and one degree of freedom.

This information deduced from the responses justifies the opinion of Egboka (2003) and Onwuka (2008) that gully erosion menace has mental, social and economic implications.

IV. CONCLUSION

Deforestation and its attributes of urbanization, industrialization and land use pattern may result in long term damage to the ecosystem. Continued pollution may strain the limit of ecosystem resilience. Poor road constructions, deforestation, bush burning, poor drainage channels trigger and aggravate soil erosion and eventually lead to environmental degradation in southeastern, Nigeria. Environmental degradation facilitated by hydrogeotechnical factors has impacted on both social and economic activities as well as impairs sustainable development in Nigeria. The findings indicate that the variables do not exhibit the quality of independence. There is 98% agreement at 0.05 level of significant and one degree of freedom.

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