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Effects Of Gully Erosion On The Livelihood Of Nanka Community, Anambra State, Nigeria

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ABSTRACT

Gully erosion has remained a critical environmental challenge in many parts of Nigeria, particularly in the Southeastern region. This study investigated the impact of gully erosion on the livelihood of Nanka community in Anambra State, Nigeria. Specifically, the study identified and mapped major gully erosion sites, assessed the socio-economic, psychological, and environmental effects of gully erosion on the community, and examined strategies adopted by residents to mitigate the problem. A descriptive survey research design was adopted, and data were collected from a sample of 395 respondents, selected using a multi-stage sampling technique. Structured questionnaire, field observations, and secondary data sources were utilized for data collection. Frequency, percentage, mean scores and standard deviation analyses were utilized to interpret the responses. The results shows that the gully sites were concentrated mainly around the southern and central portions of Nanka, particularly in areas with steep terrain and extensive human settlement. The findings indicated significant socio-economic effects, including destruction of homes (76%), loss of farmlands (82%), reduction in income, and displacement of families. Psychological effects such as anxiety (81%), fear, and emotional stress were also reported among a large portion of the population. Furthermore, environmental degradation was evident through massive land loss, biodiversity destruction, and loss of vegetation. The residents perceived the erosion as a direct threat to their livelihood and general well-being. Community members suggested various coping and mitigation strategies, such as the construction of effective drainage systems, afforestation, application of engineering structures like retaining walls, and the active involvement of government and non-governmental organizations. Based on the findings, the study concluded that an integrated approach is necessary to tackle the menace of gully erosion in Nanka. It recommended the urgent construction of sustainable drainage systems, large-scale afforestation projects, community sensitization campaigns, and stronger policy interventions by government authorities.

Keywords: Gully erosion, drainage systems, biodiversity, environmental degradation and Nanka

1.0 INTRODUCTION

Gully erosion is a severe form of land degradation that has gained global attention due to its devastating environmental, economic, and social impacts. Around the world, soil erosion by water, particularly gully formation, has been linked to loss of arable land, decreased agricultural productivity, and disruption of human settlements (Poesen et al., 2003). The United Nations Convention to Combat Desertification (UNCCD) identifies soil erosion as a key driver of land degradation affecting about 33% of the Earth's surface, thus threatening the livelihoods of nearly 1.5 billion people globally in many regions, gullies create dangerous landscapes that render land uninhabitable and disrupt transportation and communication networks. The effects are particularly pronounced in areas characterized by intense rainfall, poor land management practices, and vulnerable soil structures, exacerbating poverty and food insecurity.

Globally, gully erosion is not merely a physical phenomenon but a multidimensional issue intersecting with climate change, deforestation, and unsustainable agricultural practices. Studies conducted in parts of Asia, South America, and Oceania reveal that gully erosion often escalates under conditions of heavy deforestation, overgrazing, and poorly planned urbanization (Valentin et al., 2005). In Australia, for example, gully erosion has been responsible for the loss of millions of tonnes of soil annually, affecting the productivity of pasturelands and water quality in river systems (Bartley et al., 2015).

Focusing specifically on Anambra State, the threat of gully erosion is both widespread and severe, earning the region the unfortunate designation of being the "gully erosion capital" of Nigeria (Okoye et al., 2010). Within Anambra, communities such as Nanka have been at the epicentre of this environmental crisis for decades. Historical records indicate that gully formation in Nanka began as early as the 1920s, and has since expanded both in depth and breadth, consuming homes, farmlands, and roads. Several factors contribute to the severity of gully erosion in Nanka, including its topography, which features numerous hills and valleys, the presence of friable sandy soils, and intense seasonal rainfall. Human activities such as deforestation, improper agricultural practices, and poor drainage planning have also played significant roles in exacerbating the situation.

The effect of gully erosion on the livelihoods of the Nanka community cannot be overstated. Livelihoods in Nanka are primarily agrarian, with most households depending on farming, fishing, and petty trading. As gullies expand, they not only render vast tracts of agricultural land unusable but also disrupt local economies, displace families, and lead to loss of ancestral homes and cultural heritage (Ezezika, 2010). The destruction of road networks and infrastructure further isolates the community, limiting access to markets, schools, and healthcare facilities. In some instances, entire families have been forced to migrate, resulting in social dislocation and increased urban pressure in nearby towns and cities. Thus, gully erosion directly threatens the economic stability and social cohesion of Nanka. Efforts to control gully erosion includes structural measures such as construction of check dams, as well as vegetative measures like tree planting. Recent calls have therefore emphasized the need for integrated, community-driven approaches that combine engineering solutions with environmental conservation and sustainable land use practices (Nwankwor, 2015).

Existing literature tends to focus on technical aspects such as erosion control engineering, with limited attention given to the human dimension—particularly the socio-economic impacts on affected communities (Okereke et al., 2012).

Therefore, this study seeks to provide insights into the magnitude of the problem, its socio-economic consequences, and the coping mechanisms which can be adopted by the people. By situating Nanka's experience within broader national, continental, and global contexts, the study aims to deepen understanding of gully erosion as an issue that intertwines environmental degradation with human welfare. Ultimately, it is hoped that the findings will inform more holistic policies and interventions that not only curb gully expansion but also enhance the resilience and well-being of vulnerable communities such as Nanka.

Gully erosion is a critical environmental challenge that continues to threaten ecosystems, infrastructure, and human livelihoods across the world. In Nigeria, and especially in the southeastern region, gully erosion has become a recurrent and worsening phenomenon due to a combination of natural susceptibility

and human-induced factors such as deforestation, poor land use practices, and unplanned urban development

In Anambra State, the situation is especially dire, with communities such as Nanka experiencing some of the most catastrophic impacts of gully erosion. The Nanka gully complex has expanded over decades, consuming vast expanses of farmland, homes, and roadways, and thereby endangering the socio-economic foundations of the community. The livelihoods of the residents, predominantly based on agriculture, petty trading, and artisanal activities, have been severely disrupted. This has led to heightened food insecurity, loss of income, migration, and social disintegration. While physical measures to control the gullies have occasionally been implemented, there has been limited research into how these environmental changes have transformed the livelihood patterns, coping strategies, and resilience of the affected populations**.**

Given this context, the research problem underpinning this study is the pressing need to examine and understand the effect of gully erosion on the livelihoods of the Nanka community. This includes identifying the extent of livelihood losses, assessing the socio-economic vulnerabilities created by the erosion, and exploring the coping mechanisms and adaptive strategies employed by the community. By focusing on these dimensions, this study aims to contribute to the growing body of knowledge that links environmental degradation to human development, and to offer practical recommendations that can inform more integrated and sustainable responses to the gully erosion crisis in Nanka and similar setting

The objectives of this study are to assess the impact of gully erosion on the livelihood of Nanka community in Orumba North Local Government, examine the effects of the gully erosion on the livelihood of Nanka community and its environs and identify the strategies adopted to mitigate the effect of gully erosion in the study area**.**

2.0 MATERIALS AND METHODS

2.1 Area of Study

The study area lies within latitudes 60, 00'N and 60, 18'N and longitudes 60, 45'E covering an area of about 1709 km2 within the Anambra Basin. The study area is a significant part of Anambra River Basin stratigraphy and is basically, a result of the Paleohydrogy of the region (Durham *et al*, 2008). The main geologic units of the study area are the Nanka Sand (Ecocene), overlain by Ogwashi-Asaba, formation (Oligocene) and underlain by Imo Shale (Paleocene). (Okoro *et al*, 2010).

2.2 Methodology

2.2.1 Sample Size

The sample size for the study was determined using Yamane's (1967) formula for sample size calculation:

The sample size for the study was determined using Yamane's (1967) formula for sample size calculation:

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

where:

n = sample size

N = population size = 33,000

e = margin of error (5%) = 0.05

The values were substituted and arrived at 395. The distribution of the sample across the villages was done based on the estimated population of each village as shown in Table 1.

Table 1: Population and Sample Size Distribution Across Communities

S/N	Village	Estimated Population	Proportion (%)	Sample Size Allocated
1	Agbiligba	4,500	19.4%	77
2	Ifite	6,400	15.6%	62
3	Enugwu	2,700	15.0%	59
4	Etti	3,400	12.2%	48
5	Umudala	4,000	11.7%	46
6	Ubahu	5,000	11.7%	46
7	Amako	7,000	14.4%	57
	Total	**33,000**	**100%**	**395**

Source: Author's Fieldwork,2024

2.2.2 Sampling Technique

A multi-stage sampling technique was adopted. In the first stage, purposive selection of Nanka community based on its erosion vulnerability was adopted. In stage two, stratified sampling to ensure proportional representation of respondents from all seven villages an in stage three was the simple random sampling selection of participants from each village list. The respondent was household head that had lived and experienced erosion in the community.

2.2.3 Sources of Data

Both primary and secondary data were used for the study. Primary data were collected through structured questionnaire administered to the respondents, as well as field observations and informal interviews with community leaders and erosion-affected residents. The secondary data were sourced from scholarly articles, government reports, previous studies on gully erosion in Anambra State, and relevant environmental databases including internet search**.**

3.0 Methods of Data Collection

The main instrument used for data collection was a structured questionnaire, divided into four sections: Section A collected socioeconomic and demographic information of respondents. Section B collected information on the location of gully erosion sites. Section C was on socio-economic, psychological, and environmental effects of gully erosion while section D contain information on mitigation strategies and community responses. The questionnaire items were mostly close-ended, with a few open-ended questions to allow respondents to elaborate on mitigation strategies.

Field observations were also conducted to verify and complement questionnaire responses. Global Positioning System (GPS) was used to take coordinates of the location of the gully sites while a digital camera was used to show and document gully erosion sites.

3.1 Method of Data Analysis

To ensure a robust analysis, descriptive statistics such as frequency counts, percentages, and mean scores were employed. The mean scores were derived from a five-point Likert scale where 5 represented "Strongly Agree," 4 indicated "Agree," 3 stood for "Neutral," 2 denoted "Disagree," and 1 implied "Strongly Disagree." The interpretation of mean scores was based on the following criteria: a mean score of 4.50 to 5.00 indicated "Very Severe," 3.50 to 4.49 was considered "Severe," 2.50 to 3.49 was categorized as "Moderate," 1.50 to 2.49 reflected "Mild," and 1.00 to 1.49 denoted "Negligible. Mean ranking and standard deviation analysis, were used to assess the severity of socio-economic, psychological, and environmental effects as perceived by respondents.

4.0 RESULTS

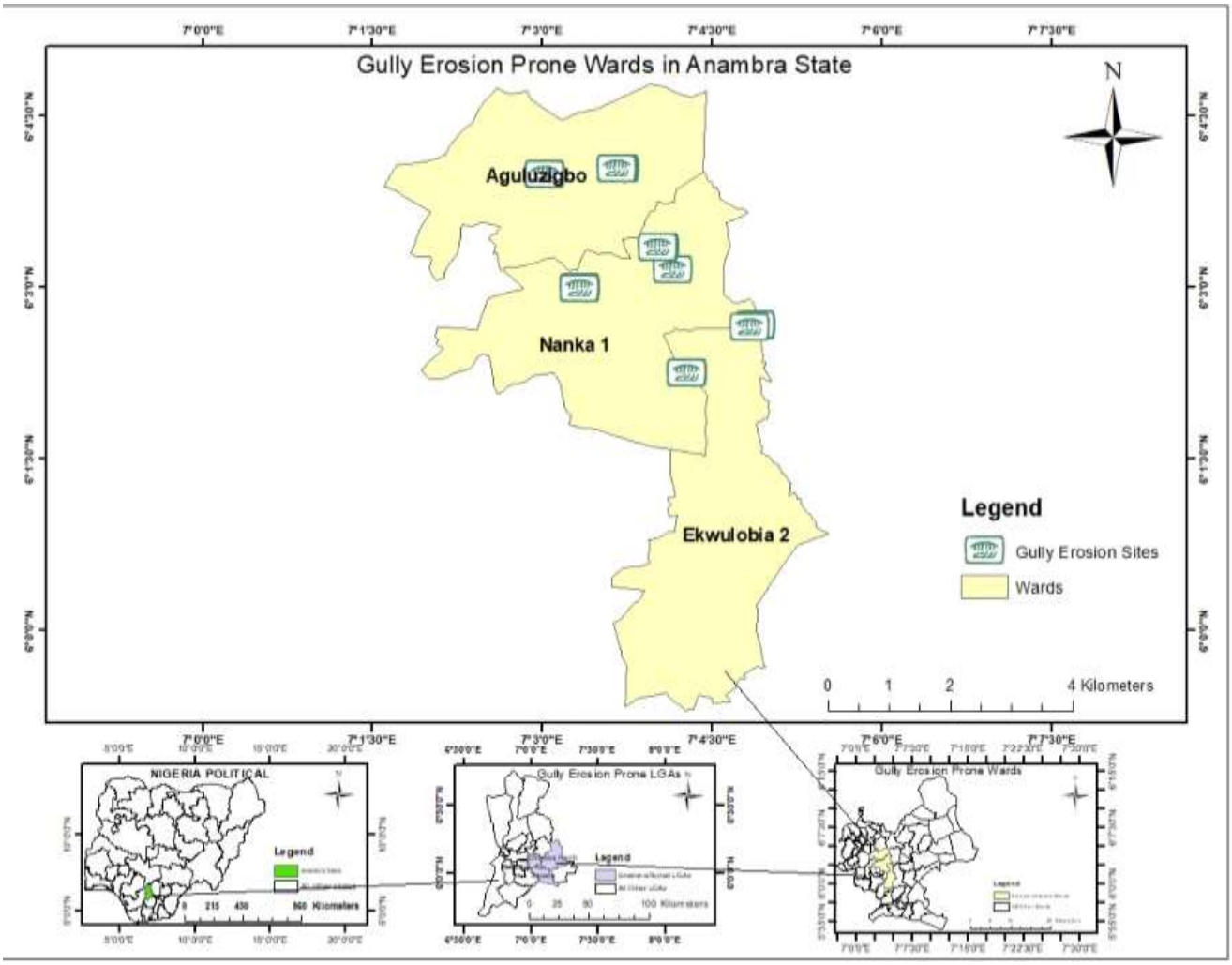

Figure 1: Erosion-Prone Areas in Nanka Community

Table 2: Summary of Identified Gully Erosion Sites in Nanka Communities

Gully Site	Latitude	Longitude	Average Depth (m)	Average Width (m)	Primary Cause
Umudala Gully	6.0392	7.1104	6	11	Sand mining, poor drainage, deforestation
Etti Gully	6.0440	7.1035	5	7	Loss of vegetation, runoff concentration
Enugwu Gully	6.0415	7.1087	4	8	Road drainage failure, building encroachment
Ubahu Gully	6.0478	7.1022	3	7	Footpath runoff erosion
Agbiligba Gully	6.0495	7.1130	8	10	Farmland exposure, slope failure
Akwuoba Gully	6.0365	7.0995	14	9	Spillover from adjacent gullies
Amako Gully	6.0348	7.1060	18	30	Land use change, construction activities

Table 3: Socio-Economic Effects of Gully Erosion in Nanka Community

Socio-Economic Effect	Frequency (n=391)	Percentage (%)	Mean Score	Interpretation
Loss of farmland	324	82	4.56	Very Severe
Damage to residential properties	300	76	4.32	Very Severe
Decline in agricultural productivity	269	68	4.18	Severe
Loss of household income	249	63	4.04	Severe
Displacement from homes	233	59	3.87	Severe
Increased transportation costs	166	42	3.46	Moderate

Table 4: Psychological and Environmental Effects of Gully Erosion in Nanka Community (n=395)

Psychological/Environmental Effect	Frequency (n=391)	Percentage (%)	Mean Score	Interpretation
Anxiety and fear of property loss	318	81	4.50	Very Severe
Depression and hopelessness	286	72	4.28	Severe
Loss of vegetation cover	305	77	4.35	Severe
Increased exposure to flooding	277	70	4.20	Severe
Emotional trauma (fear, sadness, anger)	258	65	3.95	Severe
Biodiversity loss (destruction of flora/fauna)	244	62	3.81	Severe

Table 5: Strategies for Mitigating Gully Erosion Effects in Nanka Communities

Mitigation Strategy	Frequency (n=395)	Percentage (%)	Mean Score	Interpretation
Construction of proper drainage systems	346	88	4.63	Very Highly Recommended
Afforestation and reforestation programs	321	81	4.48	Highly Recommended
Use of engineering structures (gabions, retaining walls)	308	78	4.42	Highly Recommended
Public sensitization and awareness campaigns	295	75	4.35	Highly Recommended
Government intervention (policy, funding)	271	69	4.28	Highly Recommended
Community participation and monitoring	260	66	4.20	Highly Recommended

5.0 DISCUSSION OF FINDINGS

This study was carried out to investigate the effects of gully erosion on the livelihood of Nanka community in Anambra State, Nigeria. It specifically identified and mapped the various gully erosion sites, examined the socio-economic, psychological, and environmental effects of gully erosion, and explored mitigation strategies suitable for the community. The findings showed that gully erosion was a widespread environmental disaster across the community, these gully sites posed serious threats to land stability, infrastructure, housing, and agricultural lands. The socio-economic effects were profound, with residents experiencing significant loss of farmland, destruction of properties, decline in agricultural productivity, loss of income sources, and displacement from ancestral homes. Psychological effects such as heightened anxiety, depression, emotional trauma, and fear of impending property loss were prevalent

among residents. Environmentally, there was a noticeable loss of vegetation, soil fertility decline, biodiversity depletion, and an increase in vulnerability to flooding, all of which worsened the already fragile ecosystem of the community.

Furthermore, the study discovered that the residents were aware of various mitigation strategies necessary to curb the menace of gully erosion. The strategies recommended by respondents included the construction of proper drainage systems to control water runoff, afforestation and reforestation initiatives to stabilize soil structure, engineering solutions such as the construction of gabions and retaining walls, active public sensitization to create environmental awareness, and significant government interventions through policy reforms and funding. The results were consistent with previous studies conducted in southeastern Nigeria and supported the Risk and Vulnerability Theory as well as the Adaptive Capacity Theory, both of which explain how communities exposed to environmental hazards respond based on their resilience and adaptive mechanisms. Overall, the study concluded that gully erosion in Nanka poses a complex and multifaceted threat to both the physical environment and human livelihoods, necessitating an integrated, multi-sectoral, and community-driven approach for effective management and long-term sustainability.

5.1 CONCLUSION

This study critically examined the effect of gully erosion on the livelihood of the Nanka community in Anambra State. Through the identification and mapping of major gully sites, it became evident that the community faces a significant environmental threat characterized by widespread land degradation, destruction of properties, and loss of agricultural lands. The socio-economic analysis revealed that gully erosion had severely disrupted farming activities, displaced households, reduced income levels, and increased the vulnerability of residents. Moreover, the psychological impacts including fear, anxiety, and emotional trauma highlighted the invisible yet profound toll that environmental disasters exert on community well-being. Environmentally, the extensive loss of vegetation cover and biodiversity further compromised the resilience of the local ecosystem, making the community even more susceptible to future natural hazards.

The study equally found that while the community had suffered substantial losses, there remained a clear understanding among residents of the strategies needed to mitigate the problem. Recommendations such as proper drainage construction, afforestation, use of engineering structures, and active government intervention were strongly advocated by respondents. These findings reinforced theoretical perspectives like the Risk and Vulnerability Theory and Adaptive Capacity Theory, emphasizing the necessity of strengthening both institutional and community-based adaptive capacities. In conclusion, the study posited that addressing the gully erosion menace in Nanka requires a holistic, integrated approach involving technical, environmental, psychological, and policy-driven interventions to sustainably safeguard the environment and restore the livelihoods of the affected population.

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