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GULLY EROSION AND LIVELIHOOD OF PEOPLE IN NIGERIA

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Abstract

Gully erosion which is the most striking erosion type has been recognized as one of the major global environmental problems. While many States in Nigeria are currently under the threats of this phenomenal process, south-eastern part of the country is the most affected. It has numerous causes; and these causes can be both naturally and artificially-induced, but the underlying geology and the severity of accompany surface processes play a key role. This study examines Gully Erosion and Livelihood of People in Nigeria. The study is qualitative in nature as it relied heavily on secondary sources. The study finds that gully erosion is a causative action of nature and man (anthropogenic factors). Man, in most cases remain nonchalant, unconcerned to the consequences of his actions and inactions to the environment. The natural causes of gully erosion are also indirect actions of man which in some cases are even orchestrated for political reasons. The study identified such activities as laterite excavations, bad farming practices, unplanned road construction and urbanization, wood harvesting for fuel and bush burning to clear lands for farming, among others. These activities, coupled with annual flooding from rain water are causing havoc and untold hardship as gullies continue to develop and expand rapidly in the area. Solutions that have been proffered include public awareness campaign, improved farming techniques, cultural method of gully control, enactment of laws against any activities that favour gully growth, and thorough implementation of suggested solutions.

Keywords: Environmental Degradation, Gully erosion, Livelihood, Nigeria and People.

Introduction

Land is one of the major factors of production along with labor and capital and an essential input for housing and food production. Thus, land use is the backbone of agricultural economies and provides substantial economic and social benefits. Land

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use change is necessary and essential for economic development and social progress. More specifically, the land use of developing nations that heavily rely on the agricultural sector for their livelihoods has changed at a high rate and significantly contributed to the high rate and intensity of land degradation worldwide (Abdullahi et al., 2025). Hence, changes in land use and land cover are the main factors affecting the sustainable use of terrestrial ecosystems.

Gully erosion has been recognized as the major cause of land degradation worldwide (Poesen, 2018). According to them, it is fast becoming the most reoccurring disaster in many countries of the world. Gullies are steep sided watercourses, marked by stepped longitudinal profile and commonly an abrupt channel head, subject to intermittent flow of water. Among the land degradation processes, gully erosion is the one that poses more environmental and societal challenges in arid regions. Soil erosion is a geomorphologic process that leads to landscape development and is considered by soil specialists and soil conservation researchers one of the main land degradation processes (Saha et al., 2022), and a relevant issue faced by modern society in many parts of the world. Gully erosion has a significant role in causing land degradation threatening agricultural sustainability. Gully erosion and associated processes wear away most of the nutrient-rich topsoil into streams causing a loss of agricultural productivity and accumulation of sediments in the reservoir (Garosi et al., 2018).

Gullies are landscape features resulting from erosion. Geology (including rock type and faulting and fracturing), steepness, vegetation cover, historical and current land use, and the exposure to rainfall may determine where a gully is formed and how big it becomes. Gully erosion is often combined with other erosion processes in reference to erosion, i.e., the term 'erosion' is generally used as an umbrella term to describe multiple erosion processes. The evidence is strong that gullies, as but one of several erosion processes, through the production of sediment impacts ecological integrity (Larned et al., 2019). However, gully erosion in the African continent as a whole has caused an average annual crop yield decline by 8.2% for Sub-Saharan African and that if higher soil erosion rates continue unabated average possible food production will drop 62% (Pimentel, 2024).

The rate of environmental problems that have occurred in recent decades has assumed unprecedented height, especially in human populated areas such as Nigeria and the multi-facet environmental issues that plague the global community includes global warming, pollution escalated desertification, drought, soil and land degradation, deforestation, food shortage, oil spillage, flora and fauna species extinction, and flooding, which overtime defaced the earths structure, with a dire consequence on urban settlement in both developed and developing countries. Amidst the different environmental hazard that occur in Nigeria. The most prevalent and threatening is erosion, which involves the transportation of soil particles from one geographical space to another by a high flow of

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water at the peak of heavy down pour or after. Although we have three types of erosion namely; splash, rill and gully erosion, they most prevalent type in Nigeria is the gully erosion, and it contributes to the sculpturing of the earth surface. It is against this background that the study review gully erosion and livelihood of people in Nigeria.

Statement of the Problem

Gully erosion has become one of the worst environmental disasters that many towns and villages in Nigeria have had to contend with over the years. It usually has unpredictable impacts that are often serious and flashy, thus, become most hazardous for human habitation socio-economy. Hundreds of people are directly and negatively-affected every year and have to be re-located to higher grounds from time to time. Large areas of agricultural lands are becoming unsuitable for cultivation as erosion destroys farmlands and lowers agricultural productivity. The infrastructural development coupled with demographic increase, have heightened the problems of gully erosion in the country. People have observed, some small rills, which were crossed with one-footstep, that have now developed into big gullies and those that have their houses at reasonable distances from such rills some years back are now helplessly observing their houses collapsing or with exposed foundations. Federal and State Government have attempted to arrest the problem through numerous contracts awarded for gully erosion projects at some key sites in the state. However, the economic practicalities and engineering control measures has not met people expectation, owing to lack of adequate information on the topography, soil and geology, rainfall characteristics, catchment area and land use pattern of a town experiencing rapid growth. The available literatures on the subject show that this menace is more predominant in the eastern half of the country compared to the northern half. South-eastern part of Nigeria is more affected than its north-eastern counterpart. Soil erosion in the former has been identified as the most threatened environmental hazards in the country (Abdulfatai, et al. 2024).

Objective of the Study

The objective of this study is to review the factors responsible for gully erosion and its impacts on livelihood of people in Nigeria.

Materials and Methods

The researchers gathered a total of 23 materials for this research, but were able to summarize the characteristics of 10 that were deemed more relevant to factors responsible for gully erosion and its impacts on livelihood of people in Nigeria. This research made use of academic articles, conference papers, internet materials, textbooks and publicly available materials on gully erosion and livelihood of people.

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Concept of Gully Erosion

Monkhouse and Small (2018) defined gully erosion as a well-defined water worn channel. They submit that it is a recently extended drainage channel that transmits ephemeral flow, steep side, steeply sloping or vertical head scarf with a width greater than 0.3 m and a depth greater than 0.6 m. It is a V or U-shaped trench in unconsolidated materials with a minor channel in the bottom, but not necessarily linked to a major stream. Similarly, Abdullahi et al (2025) defined gully as a relatively deep, vertical-walled channel recently formed within a valley where no well-defined channel previously existed. Gully erosion is an advanced stage of rill erosion where surface channels have been eroded to the point where they cannot be smoothened over by normal tillage operations. Gullies can be active (actively eroding) or inactive (stabilized). The former, according to Poesen et al. (2023), can occur where the erosion is actively moving up in the landscape by head-cut migration. The causes of gully erosion are poorly understood but the processes and factors involved in its growth and degradation are well-known. The research has shown that gully processes had happened in the past even without human influence or interference. Thus, the phenomenon of gully erosion is either naturally-induced or artificially-induced, or both.

Castillo et al. (2026) posits that a gully is a landform created by running water, mass movement, or commonly a combination of both eroding into soil or other relatively erodible material, typically on a hillside or in river floodplains or terraces. Gully erosion is an advanced stage of rill erosion. Rills are localized washes or channels created when water concentrates into small rivulets in the field. The little streams or rills carry more soil as they pick up speed or grow in size. The abrasive particles they carry scour the sides and bottoms of the channels. Rills are relatively small and can be obliterated by conventional tillage equipment. However, total soil loss, even in a single storm can be great because rill and sheet erosion occur simultaneously. Rills when neglected develop in size and become gullies. Rills can be up to 0.3m deep. If they become any deeper than 0.3m they are referred to as gully erosion. Thus, rill erosion is often described as the intermediate stage between sheet and gully erosion. Sheet erosion is the planar removal of surface soil by the action of either raindrop splash, shallow flows of surface of water, or even by wind.

Gully could also be caused by runoff concentrating at a point on agricultural lands. In this case, water concentrates in depressions caused by localized weakening of the vegetation cover by grazing or bush burning and enlarges until several depressions coalesce and an incipient channel is formed. Erosion is concentrated at the heads of the depressions where near-vertical scarps develop over which supercritical flow occurs. Some soil properties are detached from the scarp which results in deepening of the channel and undermining of the headwall, leading to collapse and retreat of the scarp up slope. Overall, for the purpose of this study, gully erosion is the formation and subsequent

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expansion of erosional channels in the soil as a result of concentrated water flow involving splash, sheet, rill and gully.

Concept of Livelihood

Todaro and Smith (2019) defined livelihoods as earning means to sustain life in the society. People take up different skills to support their lives and their families. It refers to earning an income as well as capability (which can be both, meaning as it enables a livelihood and an end, as it supports exercise and improvement of ability to gain livelihood). "A livelihood system comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base" (De Haan Leo, and Zoomers, 2022). Livelihood does not refer to a single activity as it also includes "complex, contextual, diverse and dynamic strategies developed by the households to meet their needs" (Gaillard, 2019)

Livelihood comprises the capabilities, assets (stores, resources, claims, and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels in the short and long term" (Chambers and Conway, 2021). The primary focus of the sustainable livelihood approach is on the household, specifically the ways in which the household uses its assets to undertake a range of livelihood activities and to ensure its livelihood security, defined as, "adequate and sustainable access to income and other resources to enable households to meet basic needs," (Frankenberger, 2016) food still constitutes a critical basic need and looms large in any conceptualization of household livelihood. In fact, the close relationship between food security and livelihood is a consistent theme (explicit or implied) in definitions of food security, as noted by Maxwell (2021), food security will be achieved when equitable growth ensures that the poor and vulnerable have sustainable livelihoods. A household's livelihood activities, moreover, enable it to manage risks, cope with stresses and shocks, and build or replenish assets, all important determinants of household food security.

At its most basic, a livelihood is a means to a living. Livelihoods are dynamic, relying on emerging opportunities that are embedded within constantly changing social and political contexts. It is difficult – and, many would argue, simplistic – to try to measure complex local household realities by monetary income alone. Livelihoods analysis thus takes a holistic approach, looking at multiple components that contribute to the possible living of a household or individual. A frequently cited definition of a livelihood is "the assets

(natural, physical, human, financial, and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household" (Ellis 2018). Because circumstances and situations change over time, an increasingly common feature of livelihoods studies has been a focus on sustainability.

A livelihood is considered sustainable when "it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base" (Scoones et al., 2022). Ideally, sustainable livelihoods result in maintainable opportunities for the next generation and contribute net benefits to other livelihoods at the local and global levels and over the short and long terms.

Gully Erosion and Livelihood of People in Nigeria

Rotimi (2019) assessed the impact of soil erosion on agricultural land and its productivity in Efon Local Government Area of Ekiti State with the objectives of investigating the cause and effect of soil erosion, the soil conservation practice applied and recommend possible preventive and control measures of soil erosion for agricultural land uses. Both primary and secondary data were used for the study. One hundred and twenty copies of questionnaires were administered on the respondents for the attribute data required. Efon LGA was zoned into four zones for easy administration of the work. The study revealed that soil erosion has caused disruption on the soil, roads, transport and the farmland in the study area. The study recommends that reforestation of farmland should be embarked upon immediately for more food production. Agro forestry should take care of intensive and sustainable land use practices to achieve bumper harvest. Efon Alaaye should have a comprehensive master plan, refuse disposal van, and build sanitary land fill sites for proper hygiene and control to avoid any haphazard development.

Abbas (2020) assessed the factors controlling gully erosion in Zaria, Kaduna state, Nigeria with the view of ameliorating the consequences of the gully erosion. Satellite imagery Quickbird 2013 1m resolution; 10 years rainfall data; soil samples; and Shuttle Radar Topographic Mission (SRTM) imagery were the data sets used. The study used Geographic Information Science and multi-criteria analysis to analyze the data sets taking into consideration the slope steepness, rainfall, soil texture and land cover of the study area to derive the results. The controlling factors of gully erosion shows that slope (56%) had the highest on gully erosion, followed by rainfall (26%), land cover (12%) and soil with 6% in the study area. The effect of gully erosion in the study area was in the form of loss of lands, houses, economic trees and lives. It was concluded that in some areas, a single factor had an overwhelming effect over others in controlling soil loss among the research sites.

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Sadiq and Ardo (2020) made an evaluation of causes, extent, pattern and effect of gully erosion on some selected arable lands in Yola South LGA, North-eastern part of Nigeria. The study attempts to estimate the causes, extent, pattern and effect of gully erosion on some selected arable lands in Yola South LGA, North-eastern part of Nigeria. Two hundred fifty (250) selected sampled farmers were administered structured questionnaires in each farm location (Mbamba, Bole, Yolde pate and Wuro-chekke) on the causes, effects and control method of gully erosion and the obtained data were analyzed using simple descriptive statistics. Representative soil samples of the gully affected areas were collected and analyzed for soil related erosion properties (structure, texture, OM, porosity and permeability) using standard laboratory procedures. Direct on-field observation, identification and measurement of gully morphological parameters (size, shape, length, depth, width) were obtained and used to calculate extent of the gully (runoff area, gully density and soil loss) respectively.

The result revealed that OM content of the area ranges from 1.52-2.10, porosity 38%-43%, clay loam and sandy loam were dominant. Overgrazing, improper land use and poor management were found to be the major cause of gully formation with medium to large size, U-V shapes with active and extreme damaged on arable lands. Total of 15 gullies were identified in the area with an average total length of 530 m, 14.3 m width, 11. 2m depth having an estimated runoff area of 7782 m2, density of 0.04262 m/ m 2 and estimated soil loss of 2, 5409.8 M3 respectively. Loss of productive land, sediment deposition on fertile land, siltation of dams and reservoirs were among the utmost effects of gully erosion in the area and most farmers saddled to adopt planting of trees and grasses, water ways constructions and sandbags techniques in an effort to curtail the existing menace in the area. To realize healthy and sustainable arable lands for optimum food production in the study area, it is therefore recommended that effective training on the modern techniques of controlling and preventing of gully erosion should be given to the farmers by the extension agents coupled with proper land use and management techniques.

Egbuna, Unachukwu and Alom (2024) focused on the comprehensive assessment and management of gully erosion sites within Anambra State Nigeria. Through a combination of field surveys, remote sensing, and GIS analysis, the extent, severity, and underlying causes of gully erosion were evaluated. Various control measures, including re-vegetation, better agricultural practices, drainage management, management and proper early land response, use were recommended as measures in mitigation of the erosion problem. The findings underscore the critical implications for urban planning, highlighting the need for integrated land use planning and sustainable development strategies to address the erosion problem effectively.

Nnah, Esechie and Ikwueze (2024) investigated the impact of urbanization on gully erosion processes in Benin City, Edo State, Nigeria. Through a combination of field

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surveys, remote sensing analysis, and statistical modeling, the study examined the relationships between urbanization factors and gully erosion dynamics within the urban landscape. Key findings reveal that proximity to gully sites, land use patterns, slope characteristics, and built-up density are important determinants of gully erosion severity in urban areas. The analysis demonstrates positive relationships between distance to gully sites and built-up density, as well as between distance to gully sites and slope gradient, highlighting the influence of human activities and topographic factors on erosion processes. These findings stress the urgent need for integrated approaches to urban planning and land management that prioritize erosion control measures, sustainable land use practices, and community engagement. By addressing the underlying drivers of gully erosion and implementing proactive strategies, policymakers and stakeholders can work towards creating resilient and environmentally sustainable urban environments in Benin City and beyond. This study contributes valuable insights to the understanding of urbanization impacts on land degradation and provides a basis for informed decision-making and action towards sustainable urban development.

Conclusion

This study found some significant conclusions based on the review above. Firstly, the majority of the people are affected by the gully erosion; mostly, their houses and farmland are more affected. Secondly, the study found out that people are applying biological control measures and sandbagging to minimize the impact of the gully erosion while government is using stones wall engineering control measures. Although, both the control measures have failed because the Biological control measures attract harmful insects to the environment while sandbagging demands money. In contrast, engineering control failed due to unqualified engineers and substandard construction materials. Therefore, it was concluded that, gully erosion devastating effects to physical structures and socio-economic activities and the impact of gully erosion is visible on residential houses, bridges, road network and culverts.

In addition, settlement patterns, the nature of housing and infrastructural development contribute to the development of gullies in Nigeria. Settlements are not planned, houses are built indiscriminately without consideration to natural flood paths and drainage system. Infrastructures such as roads are built without proper environmental studies and tend to facilitate the gulling processes. The dense population in Nigeria is also a factor. As population increases, the need to provide housing and other facilities increases also. Where this is not properly managed as is the case in the region, construction of new houses, roads etc will only exacerbate the situation. For example Anambra State has probably the highest population density in the whole of south eastern part of Nigeria. With gully erosion destroying much of the land surface, there will be high population

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pressure in housing, water supply road construction power supply among others. This results in massive pressure on the available land. The desperate and unplanned move to satisfy the need for more and more housing only creates favorable condition for gully development. Based on the findings of this study, the following recommendations were presented:

Recommendations

The most effective control practices good for soil erosion control are provision of contour bunds, terracing, crop rotation and strip cropping. For contour bunds, it involves ploughing, planting, cultivating and furrowing along the natural contour lines of sloping land. The practice creates obstacles that greatly reduce the velocity of downhill flow, which would otherwise be rapid on a smooth slope. Crop rotation reduces the impact of rain drops, breaking up the soil particles and reduces the erosion rates, it is a practice whereby a given soil belt is planted with different crops in each year of a cycle of rotation that includes legumes to increase nitrogen content of the soil, a grass crop to improve tilth (ease of cultivation) and a clean-cultivated crop such as corn. There is the need for public awareness campaign, improved farming techniques, cultural method of gully control, enactment of laws against any activities that favour gully growth, and thorough implementation of suggested solutions.

References

Abdullahi, Y. A., Adamu, T. A., & Muhammad, A. (2025). Nature of Gully Erosion on Livelihood in Nasarawa South, Nasarawa State, Nigeria. *International Journal of African Reseaarch and Sustainability Studies, 10 (2):* 3027-2599.

Abbas I. I. (2020). Factors that Influence the Gully Erosion Situation in Zaria, Kaduna State, Nigeria. *Journal of Research in Forestry, Wildlife & Environment*, 12(4): 24-36.

Abdulfatai, I. A., Okunlola, W. G., Akande, L. O., & Ibrahim, K. O. (2024). Review of Gully Erosion in Nigeria: Causes, Impacts and Possible Solutions. *Journal of Geosciences and Geomatics*, 2(3): 125-129.

Castillo, C., & Gómez, J. A. (2026). A century of gully erosion research: Urgency, complexity and study approaches. *Earth-Science Reviews, 160*, 300–319.

Chambers, R., & Conway, G. R. (2021). Sustainable rural livelihoods: Practical concepts for the 21st century *(IDS Discussion Paper No. 296). Institute of Development Studies.*

De Haan, L., & Zoomers, A. (2022). Exploring the frontier of livelihoods research. *Development and Change, 36*(1), 27–47.

Egbuna, O.K., Unachukwu, S.S., and Alom, A.C. (2024). Gully Erosion Assessment and Management in Anambra State Nigeria. *International Research and Engineering Journals (IREJ)*, 7(12): 48-55.

Ellis, F. (2018). Rural livelihoods and diversity in developing countries. *Oxford University Press.*

Frankenberger, T. R. (2016). Indicators and data collection methods for assessing household food security. In S. Maxwell & T. R. Frankenberger (Eds.), *Household food security: Concepts, indicators, measurements* (73–134). UNICEF and IFAD.

Garosi, Y., Sheklabadi, M.,a Pourghasemi, H. R., Besalatpour, A. A., Conoscenti, C., Van Oost, K. (2018). Comparison of differences in resolution and sources of controlling factors for gully erosion susceptibility mapping. *Geoderma,* 330, 65–78.

EDITOR-IN-CHIEF
Prof. S. T. Addo [GHANA]

Gaillard, J. C. (2019). Disaster studies inside out. *Disasters, 43*(1): 7–17.

Larned ST, Moores J, Gadd J, Baillie B, Schallenberg M 2019. Evidence for the effects of land use on freshwater ecosystems in New Zealand. *New Zealand Journal of Marine and Freshwater Research*. 1-41.

Maxwell, S., (2021). *Household food security:* Concepts, indicators, measurements. *United Nations Children's Fund (UNICEF) and International Fund for Agricultural Development (IFAD).*

Monkhouse, F. J., and Small, J. (2018) A Dictionary of the Natural Environment, London: *Arnold*.

Nnah, Esechie, and Ikwueze (2024). Impact of Urbanization on Gully Erosion In Benin City, Edo State Using Remote Sensing and GIS. *International Journal of Innovative Environmental Studies Research,* 12(2): 33-44.

Poesen, J. (2018). Soil erosion in the Anthropocene: Research needs. *Earth Surface Processes and Landforms, 43*(1), 64–84.

Pimentel, D., Harvey, C., Resosudarmo, P., Sinclair, K., Kurz, D., McNair, M., Crist, S., Shpritz, L., Fitton, L., Saffouri, R., & Blair, R. (2024). Environmental and economic costs of soil erosion and conservation benefits. *Science,* 267 *(5201):* 1117–1123.

Poesen, J., Nachtergaele, J., Verstraeten, G., & Valentin, C. (2023). *Gully erosion and environmental change: Importance and research needs*. *Catena, 50*(2–4): 91–133.

Rotimi, A. E. (2019). The impact of soil erosion on agricultural land and productivity in Efon Alaaye, Ekiti State. *International Journal of Agricultural Policy and Research, 7*(2): 32–40.

Sadiq, A.A., and Ardo, A.S. (2020). An evaluation of causes, extent, pattern and effect of gully erosion on some selected arable lands in Yola South Lga, North-eastern part of Nigeria. *African Journal of Environment and Natural Science Research*, 3(3): 37-56.

Saha, A., Pal, S.C., Chowdhuri, I., Islam, A.R.M.T., Roy, P. and Chakrabortty, R. (2022). Land degradation risk dynamics assessment in red and lateritic zones of eastern plateau, India: A combine approach of K-fold CV, data mining and field validation. *Ecological Informatics,* 69:101653.

Scoones, I., Stirling, A., Abrol, D., Atela, J., Charli-Joseph, L., Eakin, H., Ely, A., Olsson, P., Pereira, L., Priya, R., van Zwanenberg, P., & Yang, L. (2022). A sustainable livelihoods framework for the 21st century. *World Development, 155*, 105898.

Todaro, M. P., & Smith, S. C. (2019). Economic development (13th ed). Pearson.

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Prof. S. T. Addo [GHANA]