

**PERCEIVED CONSEQUENCES OF GULLY EROSION IN EKOSODIN  
COMMUNITY**

**BY**

**Ismail Damilola MUSTAPHA  
EDU2005948**

**DEPARTMENT OF HEALTH, SAFETY AND ENVIRONMENTAL EDUCATION  
FACULTY OF EDUCATION  
UNIVERSITY OF BENIN**

**MARCH, 2025**

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**B**

**Ismail Damilola MUSTAPHA**

**EDU2005948**

**A PROJECT PRESENTED TO THE DEPARTMENT OF HEALTH, SAFETY  
AND ENVIRONMENTAL EDUCATION, FACULTY OF EDUCATION,  
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## CERTIFICATION

We, the undersigned, certify that this research project was carried out by Ismail Damilola MUSTAPHA with Matriculation number EDU2005948 in the Department of Health, Safety and Environmental Education, Faculty of Education, University of Benin, Benin City in partial fulfillment of the requirements of the award of Bachelor of Science Education degree B.Sc.(Ed.) in Environmental Education.

\_\_\_\_\_  
**Dr. (Mrs) M. Onobumeh**  
Project Supervisor

\_\_\_\_\_  
Date

\_\_\_\_\_  
**Mrs B. H. Enabulele**  
Project Coordinator

\_\_\_\_\_  
Date

\_\_\_\_\_  
**Dr. (Mrs) O. H Obasuyi**  
(Head of Department)

\_\_\_\_\_  
Date

## **DEDICATION**

I dedicate this project to the Almighty God for His wisdom, strength, and guidance throughout this journey.

## **ACKNOWLEDGEMENT**

First and foremost, I wish to express my profound gratitude to God Almighty for His infinite mercy, grace, and divine protection throughout this research program. His guidance and strength have been my source of inspiration in completing this work.

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## ABSTRACT

The aim of this project is to investigate the title; perceived consequences of gully erosion in Ekosodin community. To guide this study, five (5) research questions were raised. The descriptive survey research design was employed for the study. The sample size was 397 respondents drawn from the total population of 45,000 individuals in Ekosodin community (National Population Commission). Self-structured questionnaire was used as the instrument for the study. The validity of the instrument was established by the supervisor and two other experts in the field of study. The reliability of the instrument was established using the test-retest method to estimate reliability. The data obtained from the questionnaire were subjected to analysis using frequency counts, percentages, mean and standard deviation.

The findings revealed that gully erosion significantly impacts the community, leading to economic losses, health risks, and displacement. The study showed a strong correlation between gully erosion and reduced agricultural productivity, the spread of diseases, and displacement of residents. In conclusion, the study confirms that gully erosion has a significant impact on the lives of residents in Ekosodin, affecting both the environment and socio-economic well-being. Addressing these issues requires a comprehensive approach, including better land use practices, infrastructure development, and community-based solutions. Based on these findings, recommendations include improving land management practices, enhancing drainage systems and providing resettlement assistance to displaced residents.

## CHAPTER ONE

### INTRODUCTION

#### **Background of the Study**

Gully erosion is one of the most severe forms of soil erosion, significantly affecting landscapes and communities, particularly in tropical regions like Nigeria. This process involves the removal of soil by water, creating deep channels or ravines that become progressively larger over time. A major cause of gully erosion is intense rainfall, especially in areas where the soil is highly susceptible to being washed away by surface runoff (Abdulfatai et al., 2014). The impact of gully erosion is heightened by the combined effects of human activities such as deforestation, poor agricultural practices, and urban expansion, which degrade the natural environment and lead to increased runoff. Research by Igbokwe et al. (2008) notes that the erosion process is exacerbated by the lack of proper drainage systems in many developing regions of Nigeria, where rapid urbanization has disrupted the natural water flow, channeling rainwater into specific areas and causing the formation of gullies. In regions with fragile soils, such as those in southeastern Nigeria, these processes become even more destructive, leading to the formation of massive gullies in a short period of time (Danladi & Ray, 2014).

Further contributing to gully erosion are the geological and hydrological characteristics of the affected regions. Studies have shown that the soil's physical properties, such as texture, structure, and permeability, influence how susceptible the land is to gully formation. For example, loose, sandy soils with low cohesion are more

prone to being washed away by rainfall, which increases the vulnerability of the land to erosion (Igwe, 2012). In addition to soil composition, the steepness of the land plays a crucial role in the process. In areas where the slope is steep, water flows more rapidly, which accelerates the erosion process and facilitates the development of deep gullies (Ofomata, 2012). These physical conditions, combined with human-induced pressures, make Nigeria particularly susceptible to the widespread occurrence of gully erosion, especially in areas where farming, deforestation, and construction are prevalent.

The consequences of gully erosion in Nigeria are both immediate and long-term, affecting the environment, economy, and communities. One of the most noticeable impacts is the destruction of arable land, which affects agricultural productivity. In the southeastern part of Nigeria, the expansion of gully erosion has led to the loss of fertile land that was once used for crop cultivation, displacing farmers and threatening food security (Mashi, Yaro & Jenkwe, 2015). Furthermore, the encroachment of gullies on residential areas has resulted in the displacement of families and destruction of infrastructure, including roads, bridges, and buildings. In some parts of Nigeria, entire communities have had to relocate as a result of the expanding erosion scars, which have become both a physical and socio-economic barrier (Obiadi et al., 2011). The increase in flooding, often caused by blocked drainage systems in eroded areas, exacerbates health risks by promoting the spread of waterborne diseases such as cholera and malaria (Abdulfatai et al., 2014).

Beyond the direct destruction of land and infrastructure, gully erosion has broader socio-economic impacts. It disrupts local economies by damaging essential services and reducing the availability of land for cultivation, which is a primary livelihood source for many Nigerians. In urban areas like Gombe and Anambra, gully erosion has resulted in the loss of valuable land and contributed to the rising cost of housing, as residents and developers are forced to avoid erosion-prone areas or invest heavily in land rehabilitation (Ogbe & Aigbadon, 2021). The government and local authorities in Nigeria face challenges in managing the increasing scale of erosion, and while various mitigation measures have been proposed, the effectiveness of these efforts remains in question due to the rapid rate at which the gullies expand (Mansur, 2014). This ongoing challenge underscores the need for more comprehensive and sustainable approaches to land management and environmental protection.

In Nigeria, gully erosion has become a major environmental issue, particularly in the southeastern and southwestern regions, where the physical environment and human activities have contributed significantly to the exacerbation of this problem. According to Igwe (2012), the increasing deforestation and poor agricultural practices are among the leading causes of gully erosion in Nigeria. Additionally, the lack of sufficient governmental policies to address erosion has allowed the problem to persist, despite various awareness campaigns and local mitigation efforts. Abdulfatai et al., (2014) point out that Nigeria's soil erosion problems are particularly severe in areas with poorly planned urban developments, as infrastructure projects often ignore the need for effective

drainage systems, further contributing to soil degradation. As a result, Nigeria continues to struggle with gully erosion, particularly in rural areas where farmers lack the resources to implement soil conservation practices. This situation calls for more effective policy implementation, improved land management, and increased public awareness of the environmental and economic costs of unchecked gully erosion.

Ekosodin, a peri-urban community near Benin City in Edo State, Nigeria, presents a compelling case for studying the impacts of gully erosion. The community is characterized by its proximity to the University of Benin, making it a rapidly expanding residential area. Its topography and soil structure, combined with rapid urban development and inadequate drainage infrastructure, have made it highly susceptible to gully erosion. Over the years, gully erosion in Ekosodin has led to significant ecological damage, including soil degradation, loss of vegetation cover, and the formation of deep gullies that threaten homes and public infrastructure. Beyond the environmental consequences, the social and economic impact has been profound, with damage to roads and properties leading to increased poverty levels and restricted access to essential services (Nnah et al., 2024).

Understanding the perceived consequences of gully erosion in Ekosodin is crucial for multiple reasons. First, local perceptions shape how communities respond to and engage with environmental challenges. Second, effective intervention strategies require insight into how erosion impacts the daily lives of residents and their economic activities. Lastly, this study aims to inform sustainable development efforts by emphasizing the

need for community-centered erosion control measures, policy frameworks, and infrastructural improvements to mitigate the adverse effects of gully erosion in Ekosodin.

### **Statement of Problem**

Gully erosion has become a significant environmental challenge in Ekosodin, a peri-urban community near Benin City in Edo State, Nigeria. The area has experienced rapid expansion due to its proximity to the University of Benin, leading to increased construction activities and urbanization without adequate land management measures. Gully erosion, characterized by the formation of deep, unstable channels, has become a prominent issue, gradually expanding and resulting in the destruction of farmlands, residential areas, and public infrastructure such as roads. The physical manifestations include large trenches and soil degradation, further exacerbated by heavy rainfall and insufficient drainage systems. These effects disrupt the ecological balance, reduce soil fertility, and contribute to the degradation of the local environment, posing threats to the livelihoods and safety of residents (Nnah et al., 2024).

The impact of gully erosion in Ekosodin extends beyond environmental degradation, causing severe socioeconomic consequences. The destruction of farmlands has led to reduced agricultural productivity, compromising food security and local economic stability. Additionally, infrastructure damage, including the collapse of roads and public facilities, has disrupted daily life and limited access to essential services. Some residents have faced displacement as homes located near erosion sites become unsafe, highlighting the urgent need for sustainable mitigation efforts (Alhassan et al.,

2024). Despite these significant consequences, limited research has explored the community's perceptions of the causes and effects of gully erosion, as well as their awareness of sustainable intervention strategies. This knowledge gap prevents the development of effective, community-driven solutions that consider local realities and priorities. Therefore, understanding how the people of Ekosodin perceive and respond to the consequences of gully erosion is crucial for formulating policies and intervention frameworks that ensure environmental sustainability and community resilience.

### **Research Questions**

1. What are the perceived consequences of gully erosion among ekosodin residents?
2. What are the environmental impacts of gully erosion in Ekosodin Community?
3. What are the socio-economic consequences of gully erosion on livelihoods in Ekosodin Community?
4. What is the perceived health implication of gully erosion among Ekosodin community?
5. What is the perceived consequences of gully erosion on displacement of residents in Ekosodin Community?

### **Purpose of the Study**

The purpose of this study is to examine the perceived consequences of gully erosion in Ekosodin Community.

The specific objectives of this research are to:

1. Investigate the perceived consequences of gully erosion among ekosodin residents.

2. Assess the environmental impacts associated with gully erosion in Ekosodin Community.
3. Examine the socioeconomic consequences of gully erosion on livelihoods in Ekosodin Community.
4. Ascertain the perceived health implication of gully erosion among Ekosodin community.
5. Determine the perceived consequences of gully erosion on displacement of residents in Ekosodin Community

### **Significance of the Study**

The findings of this study will of benefits to policymakers, urban planners, environmental agencies, non-governmental organizations (NGOs), Ekosodin Community, future researchers, and government authorities.

The findings of this study will be of benefit to policymakers in identifying high-risk areas requiring urgent attention while guiding long-term planning frameworks that prioritize environmental conservation and community safety.

Environmental agencies and NGOs will benefit from the study by using its findings to design targeted erosion control programs, such as reforestation projects and soil conservation initiatives. Understanding community vulnerabilities will help them implement inclusive strategies that encourage local participation in environmental management.

The Ekosodin community stands to gain increased awareness of gully erosion and its consequences. The study empowers residents with knowledge, enabling them to advocate for interventions and actively participate in erosion control efforts. It may also inspire grassroots initiatives focused on sustainability and environmental resilience.

Researchers and academics will find the study valuable as it expands the body of knowledge on gully erosion, particularly in Ekosodin, where academic coverage is limited. The empirical data provide a foundation for further comparative studies and theoretical advancements in erosion control and sustainable development research.

Government authorities can apply the findings of this study to prioritize infrastructure projects, such as effective drainage systems and soil retention strategies. The insights will also aid in policy revisions and disaster preparedness planning, ensuring better resource allocation and long-term strategies to mitigate erosion risks in affected areas.

### **Scope of the Study**

The scope of this study focuses on examining the perceived consequences of gully erosion in Ekosodin Community, Edo State, Nigeria. It will specifically investigate the physical manifestations of gully erosion, its environmental and socioeconomic impacts, health implications and consequences of gully erosion on displacement of residents in Ekosodin Community. The study will also explore potential sustainable intervention strategies to mitigate the adverse effects of gully erosion within the community. The population of the study will consist of residents of Ekosodin Community, as they are

directly affected by the erosion and possess firsthand knowledge of its impacts and the challenges it presents. Data will be collected through structured instruments designed to capture diverse perspectives and experiences related to gully erosion. The study's findings will be limited to the geographical and social context of Ekosodin, ensuring localized relevance while contributing to broader discussions on erosion management in similar environments.

### **Definition of Terms**

*Gully Erosion:* A severe form of soil erosion causing deep, wide channels due to water runoff.

*Perceived Consequences:* How residents interpret the effects of gully erosion based on personal experiences.

*Socioeconomic Impact:* The effects of gully erosion on livelihoods, infrastructure, and community well-being.

*Environmental Degradation:* The deterioration of land quality and ecosystem health due to erosion.

*Sustainable Intervention Strategies:* Long-term measures aimed at controlling erosion while preserving the environment.

*Ekosodin Community:* A peri-urban settlement near Benin City, Edo State, Nigeria.

*Infrastructure Damage:* The destruction of roads, buildings, and public utilities caused by erosion.

*Soil Erosion:* The removal of the topsoil layer due to water or wind forces.

*Displacement:* The forced relocation of residents due to erosion hazards.

*Livelihood Disruption:* The interruption of income-generating activities due to land degradation.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

This chapter provides a detailed exploration of the topic of gully erosion by reviewing existing literature under the following subsections:

- Conceptual Framework
- Overview of Gully Erosion
- Causes of Gully Erosion
- Perceived Consequences of Gully Erosion
- Strategies to Mitigate the Effects of Gully Erosion
- Environmental Impact of Gully Erosion
- Socioeconomic Impact of Gully Erosion
- Health Impact of Gully Erosion
- Consequences of Gully Erosion on Displacement of Residents
- Theoretical Framework
- Summary of Literature Reviewed

## **Conceptual Framework**

### **Overview of Gully Erosion**

Gully erosion is a severe form of soil erosion characterized by the removal of soil along drainage lines through water action, leading to the formation of deep channels called gullies. It differs significantly from other types of erosion such as sheet and rill erosion. Sheet erosion involves the uniform removal of soil particles from the surface without a visible channel, while rill erosion forms shallow, narrow channels that can be smoothed over through tillage. Gully erosion, on the other hand, results in channels so large and deep that they cannot be rectified through normal agricultural practices and require specific erosion control interventions (Valentin et al., 2005).

Gullies typically form when surface water runoff accumulates and flows with sufficient energy to detach and transport soil particles. The distinct features of gully erosion include the depth, width, and length of the channels, often exceeding 30 centimeters in depth and capable of extending over several meters depending on local topography and rainfall intensity (Imeson & Kwaad, 1980). Gully formation is often classified into stages, beginning with the initiation phase, characterized by small rills or shallow depressions formed during heavy rainfall. This progresses into the incision stage, where channels deepen and widen due to the continued flow of water. The expansion phase follows, where the gully network grows through headward erosion and channel widening. Finally, the stabilization stage occurs when sediment supply balances outflow, slowing erosion and allowing vegetation to stabilize the gully sides (Poesen et al., 2003).

The environmental and physical processes contributing to gully erosion are complex and multifactorial. Key factors include water runoff, soil properties, land cover, and topography. Runoff intensity is a primary driver, as concentrated flow can rapidly erode unprotected soil surfaces. Soils with poor structure or low organic matter content are particularly vulnerable to detachment, while steep slopes and sparse vegetation further accelerate gully development (Valentin et al., 2005). For instance, a study in southeastern Nigeria identified high rainfall and the presence of dispersive soils as critical contributors to gully expansion (Egboka et al., 2019).

The impacts of gully erosion on ecosystems, soil quality, and landscape stability are profound. Severe gully erosion often leads to significant soil loss, reducing land productivity and threatening food security, especially in regions reliant on subsistence agriculture. It disrupts hydrological networks, altering streamflow patterns and contributing to sedimentation in downstream water bodies. The loss of fertile topsoil and exposure of subsoil layers can also degrade soil quality, making it difficult for vegetation to re-establish (Frankl et al., 2021).

Several studies have explored the consequences of gully erosion in varying contexts. For example, research by Costa and Bacellar (2007) in Brazil highlighted how gully erosion can alter flow patterns within catchment areas, increasing flood risks and disrupting local infrastructure. Similarly, studies in Ethiopia have documented how gully formation severely affects rural livelihoods by reducing arable land and fragmenting landscapes (Hassen & Bantider, 2020).

The control and prevention of gully erosion require a combination of structural and non-structural measures. Structural approaches include constructing check dams, terraces, and silt traps to reduce runoff velocity and encourage sediment deposition. Non-structural measures, such as reforestation, conservation tillage, and maintaining ground cover, aim to enhance soil structure and reduce surface runoff. Frankl et al. (2021) reviewed various gully control techniques, emphasizing the importance of integrating local knowledge with scientific approaches for effective erosion management.

Gully erosion is a significant environmental concern in Nigeria, affecting both urban and rural landscapes. It is particularly prevalent in the sedimentary regions of the country, such as parts of the southeastern and central zones, where it has led to severe land degradation and the displacement of communities. Studies conducted in various regions, such as Auchi, Gombe, and southeastern Nigeria, have highlighted the main causes of gully erosion, which include both natural factors, such as rainfall intensity and soil composition, and anthropogenic factors, such as poor land management practices and deforestation. For example, research on gully erosion in Auchi identified the interplay between physical factors like soil type and human activities like road construction as contributing significantly to the development of gullies (Afegbua et al., 2016). Similarly, studies in Gombe have pointed out that inadequate drainage systems and improper land use contribute to the worsening effects of gully erosion (Mbaya & Ayuba, 2012). In southeastern Nigeria, erosion has been found to significantly impact agricultural

productivity, contributing to food insecurity and economic hardship in affected communities (Okeke & Okereke, 2015).

Geospatial technologies such as remote sensing and GIS have been increasingly utilized to map and monitor the extent of gully erosion in Nigeria. For example, in the southeastern region, studies have employed satellite imagery to identify areas vulnerable to erosion and to assess the effectiveness of erosion control measures (Okereke et al., 2012). The use of such technologies has greatly enhanced the understanding of gully erosion's spatial distribution and has provided essential data for targeted intervention strategies. Furthermore, the socio-economic impacts of gully erosion are far-reaching. Research in areas like Anambra State has shown that gully erosion causes displacement, damages infrastructure, and disrupts local livelihoods, particularly in rural areas (Obiadi et al., 2011). The urgency of addressing this issue is underscored by the rapid urbanization in some regions, which exacerbates the erosion problem by altering natural drainage patterns and increasing the burden on existing infrastructure. Addressing gully erosion in Nigeria thus requires a multifaceted approach, including better land management practices, improved urban planning, and the adoption of sustainable erosion control methods.

### **Causes of Gully Erosion**

Poor land-use practices, including deforestation, overgrazing, and unsustainable agricultural methods, significantly contribute to soil vulnerability. In Nigeria, the clearing

of forests for agricultural and construction purposes has been identified as a key driver of soil degradation. Studies by Obateru (2022) found that deforestation in southeastern Nigeria, driven by logging and subsistence farming, disrupts soil cohesion, increasing susceptibility to erosion. Similarly, overgrazing depletes vegetation cover, exposing the soil surface to intense rainfall and runoff. Research by Merem et al. (2019) emphasized that overgrazing in arid regions such as northern Nigeria exacerbates soil compaction, reducing infiltration and increasing surface runoff, which leads to gully formation.

Unsustainable agricultural practices, including continuous cropping and the lack of soil conservation measures, further deteriorate land quality. Lal (2001) noted that farmers often cultivate steep slopes without employing terracing or contour farming techniques, which accelerates soil erosion. The absence of vegetative barriers and the reliance on conventional tillage systems strip the land of protective cover, making it more prone to gully development during heavy rains.

Urbanization and unplanned construction significantly aggravate gully erosion. Rapid urban expansion in Nigeria often occurs without adequate land-use planning or the construction of proper drainage systems. Unregulated developments in cities like Benin City and Enugu have led to the alteration of natural drainage patterns, intensifying runoff and soil erosion. Nnah et al. (2024) observed that poorly designed roads and urban infrastructure frequently direct water flow toward vulnerable areas, initiating and expanding gullies. Furthermore, the improper disposal of waste in urban areas blocks drainage channels, redirecting water flow and contributing to erosion.

The socioeconomic factors driving gully erosion include poverty, lack of environmental awareness, and insufficient government policies or enforcement. In many rural communities, economic constraints compel residents to engage in activities that degrade the land, such as deforestation for fuelwood and unsustainable farming practices. Egboka et al. (2019) highlighted that in southeastern Nigeria, poverty forces farmers to cultivate marginal lands, which are more susceptible to erosion. The lack of alternative livelihoods perpetuates this cycle, making land degradation an enduring issue.

Limited environmental awareness further exacerbates the problem. Many communities lack knowledge about the importance of soil conservation and sustainable land management practices. Inuwa and James (2023) found that in Niger State, residents were unaware of simple erosion control techniques, such as planting cover crops or constructing check dams, which could mitigate gully formation. This gap in knowledge underscores the need for educational campaigns to promote environmental stewardship.

Government policies and their implementation play a crucial role in addressing gully erosion. However, in Nigeria, weak enforcement of environmental regulations and land-use planning policies has allowed unsustainable practices to persist. Studies by Adegun et al. (2022) noted that despite the existence of erosion control policies, inadequate funding and corruption hinder their implementation. As a result, vulnerable areas remain unprotected, and erosion continues to devastate communities.

The interaction between natural and socioeconomic factors amplifies the severity of gully erosion. For example, climate change-induced increases in rainfall intensity

compound the effects of poor land management. Yusuf et al. (2017) observed that in Taraba State, the combination of heavy rains and deforested landscapes has led to the rapid expansion of gullies, threatening farmlands and settlements. These compounded effects highlight the need for integrated approaches that address both environmental and socioeconomic dimensions of erosion.

To mitigate the socioeconomic causes of gully erosion, concerted efforts are required at multiple levels. Sustainable land-use practices, such as reforestation, agroforestry, and the adoption of conservation agriculture, can reduce land vulnerability. Community-based initiatives have proven effective in controlling erosion. For instance, in southeastern Nigeria, the construction of check dams and terracing by local farmers has reduced gully expansion and preserved agricultural land (Chikwendu & Uchendu, 2019).

Urban planning and infrastructure development must incorporate erosion control measures to prevent gully formation in rapidly urbanizing areas. Proper drainage systems, green infrastructure, and enforcement of zoning regulations are critical to managing urban runoff and reducing erosion risks. Alumona and Onwuanabile (2019) advocate for the integration of geospatial technologies in urban planning to identify erosion-prone areas and guide sustainable development.

Policy reforms are essential to strengthen the institutional framework for erosion control. Governments must allocate sufficient resources to implement erosion control programs and enforce regulations. Public-private partnerships can also play a role in

mobilizing resources and expertise for large-scale erosion management projects. Additionally, educational campaigns are needed to raise awareness about sustainable land management practices and the long-term benefits of erosion control.

### **Perceived Consequences of Gully Erosion**

Gully erosion has become one of the most pressing environmental challenges, particularly in regions with high rainfall and vulnerable soil types. The consequences of gully erosion are widespread and have far-reaching impacts, not just in Nigeria but across the globe. In general, gully erosion leads to the removal of large quantities of soil, creating deep ravines that continue to expand over time, leading to the destruction of land and infrastructure. Studies conducted on the impacts of gully erosion highlight its detrimental effects on agricultural land, socio-economic activities, and overall environmental sustainability.

Globally, the consequences of gully erosion are similar in nature, particularly in regions with intense rainfall. A study by Zolezzi et al. (2018) on urban gully erosion in Uganda highlighted that erosion in urbanized areas leads to the destruction of vital infrastructure such as roads and buildings, creating significant disruptions to daily life. Moreover, gully erosion has long-term economic consequences, as the cost of rebuilding damaged infrastructure and the loss of fertile agricultural land place a heavy burden on communities. Similarly, in South America, gully erosion is a serious concern in countries like Brazil, where it has led to the loss of large tracts of land that were once used for farming, directly contributing to food insecurity and economic instability (Yusuf et al.,

2017). This loss of land affects not only the environment but also human settlements, leading to displacement and the breakdown of local economies.

In Nigeria, gully erosion has had a particularly profound impact on agricultural activities, which are the mainstay of the economy in many regions. A study by Igwe et al. (2015) on the impacts of gully erosion in southeastern Nigeria reported that vast stretches of land used for farming have been lost to erosion. According to the World Bank (2009), gully erosion in Nigeria has led to the displacement of entire communities, with over 1,000 communities in the southeastern part of the country having been affected by severe erosion, particularly in Anambra and Enugu states. The loss of fertile agricultural land has had a direct impact on food production, increasing the vulnerability of rural communities and heightening poverty levels. In some areas, gully erosion has also led to the destruction of roads and bridges, limiting access to markets and vital services such as healthcare and education (Obateru & Mashi, 2020). These environmental and socio-economic consequences underscore the severity of the issue in Nigeria.

The environmental consequences of gully erosion are not limited to land degradation alone. The destruction of the natural landscape also leads to the loss of biodiversity. Gully erosion often wipes out ecosystems, including forests, wetlands, and other habitats that are home to various species of plants and animals. In many parts of Nigeria, deforestation caused by urbanization and agriculture has exacerbated the effects of gully erosion. A study by Egbueri et al. (2021) in southeastern Nigeria found that gully erosion has resulted in the loss of vital plant species that were once used for food and

medicinal purposes. The removal of these species not only threatens biodiversity but also impacts the livelihoods of local populations who rely on these plants for sustenance and income. This loss of biodiversity, coupled with soil degradation, further diminishes the capacity of the land to support sustainable agricultural practices, perpetuating a cycle of environmental decline.

The social consequences of gully erosion are equally dire. The destruction of homes and infrastructure, as well as the displacement of communities, disrupts the social fabric of affected areas. In some cases, entire villages have had to relocate due to the increasing threat posed by gully erosion. According to Obiadi et al. (2019), the social impacts of gully erosion are particularly evident in rural areas of Nigeria, where families are often forced to abandon their farms and homes, leading to a breakdown in traditional social structures. The displacement of these communities results in overcrowded living conditions in urban areas, where residents often face limited access to resources and services. Furthermore, the psychological toll of living in erosion-prone areas is significant, as the constant threat of losing one's home or land can lead to increased anxiety and stress, particularly among vulnerable populations.

One of the most significant consequences of gully erosion in Nigeria and other parts of the world is the public health risk it poses. In addition to the physical destruction of infrastructure, gully erosion can exacerbate the spread of waterborne diseases. As erosion causes runoff to accumulate in open gullies, stagnant water becomes a breeding ground for mosquitoes and other disease vectors. Studies have shown that areas affected

by gully erosion often experience higher rates of malaria and cholera, as the eroded land disrupts local water systems and introduces contaminants into drinking water sources Wilkinson (2023). The increased frequency of flooding in eroded areas, especially during the rainy season, further exacerbates these health risks, putting a strain on already limited healthcare resources.

The economic consequences of gully erosion are often overlooked but are no less severe. A report by the World Bank (2009) revealed that the economic losses associated with gully erosion in Nigeria amount to billions of dollars each year. These losses stem from the destruction of productive agricultural land, infrastructure, and public utilities. In rural areas, where the majority of the population depends on farming, the loss of arable land to erosion leads to decreased agricultural output, higher food prices, and increased poverty levels. For instance, in Anambra State, Nigeria, studies have found that gully erosion has led to a reduction in crop yields by as much as 50% in some regions (Egbueri, Igwe & Unigwe 2021). The cost of land rehabilitation, which includes building retaining walls and other erosion control measures, places an additional financial burden on local governments and communities.

Statistical data further highlight the severity of gully erosion's economic impact. A study by Egboka et al. (2019) found that in southeastern Nigeria, an area heavily affected by gully erosion, the loss of agricultural land to erosion has contributed to a reduction in agricultural productivity by over 40% in some regions. This loss is compounded by the increase in the cost of infrastructure repair, which has drained local

governments' budgets and slowed down development in affected areas. Additionally, the displacement of communities has led to the loss of human capital, as people who once contributed to the local economy through agriculture are now forced to seek employment in urban areas, often facing unemployment or underemployment due to a lack of skills and resources.

Globally, the economic consequences of gully erosion are similarly profound. In South America, for example, the World Bank estimated that erosion caused by deforestation and unsustainable farming practices has led to the loss of over 5 million hectares of agricultural land (Poesen et al., 2003). This loss of productive land has had significant economic implications, especially in countries that rely heavily on agriculture for their economy. As in Nigeria, the displacement of rural populations and the subsequent strain on urban infrastructure has further compounded the economic challenges in these regions.

### **Strategies to Mitigate the Effects of Gully Erosion**

Gully erosion is driven by several socioeconomic causes that significantly exacerbate its occurrence, particularly in Africa and Nigeria. Poor land-use practices, such as deforestation, overgrazing, and unsustainable agricultural methods, stand as major contributors to soil degradation. These practices disrupt the delicate balance of ecosystems and reduce the soil's resistance to erosive forces. Deforestation, for instance, removes the vegetation that stabilizes soil through root networks. In Nigeria's southeastern regions, large-scale tree felling for agriculture and fuelwood has left vast

areas exposed to intense rainfall, which accelerates surface runoff and soil loss (Egboka et al., 2019). Overgrazing further compounds the issue, as livestock trample and compact the soil, reducing its permeability and leaving it vulnerable to erosion. Studies in Niger State demonstrate that overgrazed lands experience increased rates of gully formation due to reduced vegetative cover, exposing the soil to erosive forces (Inuwa and James, 2023).

Unsustainable agricultural methods, such as continuous cropping without soil replenishment, also contribute significantly to gully erosion. In many rural Nigerian communities, the pressure to produce food leads farmers to cultivate fragile lands without adopting soil conservation measures. Practices like slash-and-burn agriculture deplete soil fertility and expose the topsoil to erosion. Iro et al. (2018) observed that in southeastern Nigeria, the absence of terracing and contour farming has led to extensive gully formation, especially on sloping terrains. The lack of crop rotation and reliance on monoculture further weaken soil structure, accelerating its degradation.

Urbanization plays a critical role in intensifying gully erosion, particularly in rapidly expanding cities. Unplanned construction and inadequate drainage systems are significant factors. Urban areas often lack proper infrastructure to manage stormwater, resulting in uncontrolled runoff that carves gullies into the landscape. Research in Benin City, Nigeria, revealed that improperly constructed roads and unregulated urban expansion redirected water flow, exacerbating erosion and gully formation (Nnah et al., 2024). Additionally, improper waste disposal, which clogs drainage channels, aggravates waterlogging and redirects runoff toward vulnerable areas. These issues are compounded

by the high population density in urban centers, which increases pressure on land resources and disrupts natural drainage patterns.

Socioeconomic factors such as poverty, lack of environmental awareness, and weak governance further exacerbate the problem of gully erosion. Poverty drives unsustainable practices as communities prioritize immediate survival over long-term environmental sustainability. In many erosion-prone areas of Nigeria, economically disadvantaged populations rely on deforestation for income, either through timber sales or agricultural expansion. Merem et al. (2019) found that in impoverished regions, residents are less likely to adopt erosion control measures due to financial constraints, perpetuating a cycle of land degradation and poverty.

The lack of environmental awareness among communities also contributes to the problem. Many individuals are unaware of the impacts of their activities on soil stability and do not understand the long-term consequences of unsustainable practices. In Taraba State, Yusuf et al. (2017) observed that farmers rarely implemented soil conservation techniques such as planting cover crops or constructing contour barriers, largely due to limited knowledge about their benefits. This lack of awareness underscores the importance of education and outreach programs to promote sustainable practices.

Weak government policies and enforcement further aggravate the issue. In many cases, erosion control regulations exist but are not effectively implemented due to corruption, insufficient funding, or bureaucratic inefficiencies. Adegun et al. (2022) highlighted that in southeastern Nigeria, erosion control projects often remain incomplete

due to mismanagement of resources. Additionally, the absence of robust land-use planning frameworks allows unsustainable practices to continue unchecked. Policy gaps in urban planning also contribute to the unchecked expansion of cities into erosion-prone areas, further intensifying the problem.

The interplay between these socioeconomic factors and natural conditions amplifies the severity of gully erosion. Climate change, which has increased the intensity and frequency of rainfall in many regions, exacerbates the impacts of human activities on soil erosion. In regions where deforestation and overgrazing are prevalent, intense storms generate high runoff volumes that rapidly erode exposed soils. Obateru (2022) reported that in southeastern Nigeria, the combination of heavy rainfall and poorly managed lands has accelerated gully expansion, threatening agricultural productivity and community livelihoods.

Addressing the socioeconomic causes of gully erosion requires integrated strategies that combine sustainable land management, community engagement, and policy reforms. Promoting agroforestry and conservation agriculture can help restore soil fertility and reduce erosion risks. For example, reforestation programs in parts of Anambra State have demonstrated the potential to stabilize soils and reduce runoff (Chikwendu & Uchendu, 2019). Encouraging the use of terracing and other erosion control structures can also mitigate soil loss in sloping terrains.

Urban planning must prioritize the development of effective drainage systems and enforce zoning regulations to prevent construction in erosion-prone areas. Public

awareness campaigns are crucial for educating communities about the impacts of their activities on soil health and promoting sustainable practices. Additionally, strengthening governance frameworks and ensuring the transparent implementation of erosion control projects can address the systemic challenges that hinder progress

### **Environmental Impact of Gully Erosion**

Gully erosion poses significant environmental impacts, particularly in regions like Nigeria, where it has become a pervasive concern. Its ramifications extend beyond soil degradation, severely impacting ecosystems, vegetation, water quality, and the stability of landscapes.

Gully erosion significantly disrupts ecosystems, causing habitat destruction and a loss of biodiversity. The formation of deep gullies fragments natural habitats, rendering them unsuitable for numerous plant and animal species (Igwe et al., 2023). This ecological degradation can be seen in regions where erosion has led to the destruction of forests and wetlands, crucial habitats for species such as amphibians and birds. The conversion of these once-diverse ecosystems into barren, unproductive landscapes severely impacts key ecological functions, including nutrient cycling, which is essential for soil fertility, and carbon sequestration, which helps mitigate climate change (Igwe & Ogbu, 2023). For instance, in areas where gully erosion has decimated forests, the loss of trees results in reduced oxygen production and decreased water retention in the soil, further exacerbating environmental degradation. This degradation undermines vital ecosystem services that are essential for sustainable agriculture and human livelihood,

such as soil stability, water purification, and crop pollination. The consequences of such erosion are far-reaching, affecting both local biodiversity and the overall health of the environment.

The erosion of nutrient-rich topsoil severely reduces soil fertility, impairing agricultural productivity. Research conducted in Anambra State revealed that gully erosion leads to a significant loss of essential nutrients, such as nitrogen and phosphorus, which are critical for crop growth (Ogbuefi & Ijeomah, 2020). This degradation forces farmers to abandon eroded lands, further exacerbating food insecurity in erosion-prone areas (Okoye, 2019). The sedimentation of fertile soil in lowland areas also results in uneven nutrient distribution, creating localized soil impoverishment.

Vegetation plays a critical role in protecting soil from erosion by reducing the velocity of surface runoff. However, gully erosion often leads to the removal of vegetation cover, creating a feedback loop where bare soils become more susceptible to further erosion (Adegun et al., 2022). Case studies in southeastern Nigeria have shown how the degradation of forested areas accelerates desertification processes, particularly in areas with poor land-use practices (Chikwendu & Uchendu, 2019). Additionally, the destruction of vegetation results in a loss of habitat for species dependent on these ecosystems.

Gully erosion has profound implications for water quality. The erosion process carries sediment, nutrients, and pollutants into water bodies, leading to siltation and eutrophication. The study by Titilola and Jeje (2008) revealed that gully-affected regions

in Nigeria contribute to the pollution of rivers and streams, thereby affecting water quality for both domestic and agricultural use. Increased sedimentation disrupts aquatic ecosystems and reduces the capacity of reservoirs, further impacting water availability. Gully erosion fundamentally alters landscape morphology, creating hazardous conditions and reducing the land's usability. The formation of gullies often results in the displacement of communities and infrastructure damage, as documented by Bassey (2023) in Calabar, Nigeria. Over time, the barren, eroded landscapes contribute to desertification, especially in arid and semi-arid regions. This process further reduces land productivity and exacerbates environmental vulnerabilities. A recurring theme in the literature is the interplay between human activity and natural factors in exacerbating gully erosion. Research from Edo State highlights how the removal of vegetation for farming and construction activities accelerates erosion (Adegun et al., 2022). Similarly, findings from Taraba State illustrate how the lack of soil conservation measures has led to the rapid expansion of gullies, affecting local communities' livelihoods (Yusuf et al., 2017). Across different regions, the consequences of gully erosion manifest in reduced agricultural productivity, displacement of populations, and increased environmental degradation.

Nigeria, characterized by varied topography and climatic conditions, is particularly vulnerable to gully erosion due to poor land management practices and deforestation. Studies emphasize that the southeastern regions, such as Anambra and Enugu states, are among the most affected areas due to high rainfall intensity, fragile soil structures, and improper agricultural methods (Egboka et al., 2019). The unchecked

expansion of urban areas without adequate drainage systems also contributes to the prevalence of gully formation.

Efforts to mitigate gully erosion in Nigeria often face challenges related to funding, technical expertise, and policy implementation. Community-based soil conservation measures, such as the use of vegetation barriers and check dams, have shown promise in controlling erosion (Salleh et al., 2017). However, large-scale interventions require coordinated efforts involving government agencies, non-governmental organizations, and local communities. Research advocates for integrated land-use planning and sustainable agricultural practices to reduce the vulnerability of erosion-prone areas (Alumona & Onwuanabile, 2019).

### **Socioeconomic Impact of Gully Erosion**

Gully erosion has severe socioeconomic consequences, significantly disrupting livelihoods, damaging infrastructure, and affecting community well-being. The ramifications extend across key facets of human and economic stability, particularly in regions heavily reliant on farming, such as Nigeria. Evidence-based studies and case studies from Africa emphasize the widespread effects of gully erosion on agricultural productivity, food security, infrastructure, and broader economic activities (Egboka et al., 2019).

A critical consequence of gully erosion is its profound impact on agricultural livelihoods. Farmers in erosion-prone areas often face diminished arable land due to soil loss and landscape destabilization. This reduction in cultivable land leads to decreased

agricultural yields and subsequent food insecurity. For instance, a study by Adegun et al. (2022) in southeastern Nigeria highlighted that approximately 40% of farmland in affected communities was rendered unproductive due to severe gully erosion. The study further noted that this decline in agricultural productivity forced many households to abandon farming as a primary livelihood, exacerbating rural poverty.

The loss of arable land and declining productivity also strain food supply chains, increasing food costs in local markets. The findings of Egboka et al. (2019) corroborate this, reporting that gully erosion in Anambra and Enugu states has not only disrupted local food production but also increased dependence on food imports, further straining household incomes. This cyclical impact illustrates the link between environmental degradation, economic impoverishment and infrastructure, including roads, buildings, and drainage systems. The destruction of road networks is particularly problematic in rural areas, where accessibility to markets, schools, and healthcare facilities is vital for community well-being. Case studies in Anambra State have shown that several communities are isolated during the rainy season due to roads being washed away by erosion (Okonkwo & Agbo, 2015). This isolation hinders economic activities, limits access to education and healthcare, and undermines community resilience.

Damage to residential buildings and public infrastructure also directly affects property values and investment in affected regions. Homeowners in erosion-prone areas experience depreciated property values as landslides and soil degradation compromise the structural integrity of their homes (Ezeigwe, 2015). The costs associated with repairing or

rebuilding infrastructure drain local government resources, diverting funds from other development priorities.

The displacement of communities is another major consequence of gully erosion. As gullies expand and encroach on settlements, residents are often forced to relocate, leading to the loss of homes, cultural ties, and social cohesion. A study conducted in Rafin Gora Community in Niger State revealed that over 30% of households had to abandon their ancestral homes due to the threat posed by gully expansion (Inuwa, & James, 2023). This displacement disrupts livelihoods, increases the vulnerability of affected populations, and places additional pressure on neighboring communities and urban centers.

The broader economic consequences of gully erosion are significant. Beyond the direct impacts on agriculture and infrastructure, the phenomenon contributes to increased poverty and income loss. For example, Alumona and Onwuanabile (2019) noted that communities affected by gully erosion in southeastern Nigeria experienced a 50% decline in household income due to reduced agricultural output and increased costs associated with erosion mitigation. Furthermore, the diversion of government and donor resources to address erosion impacts undermines investments in other critical sectors, such as education and healthcare.

Gully erosion also exacerbates social inequalities and creates vulnerabilities among already marginalized groups. Women, who often play a central role in subsistence farming and household food security, are disproportionately affected. Studies indicate

that women in erosion-affected areas spend more time fetching water and sourcing food due to degraded farmlands and polluted water sources, limiting their participation in economic and educational opportunities (Odongo, 2017). This unequal burden highlights the need for gender-sensitive interventions to address the impacts of gully erosion.

In Nigeria, poor land management practices and inadequate erosion control measures amplify the socioeconomic impacts of gully erosion. Unregulated land use, deforestation, and the absence of sustainable farming practices contribute to the rapid formation and expansion of gullies. For instance, in Ogun State, it was observed that unplanned urban expansion and the absence of functional drainage systems were primary drivers of gully erosion, leading to extensive damage to infrastructure and livelihoods (Fajobi & Adeniran, 2016).

Efforts to mitigate the socioeconomic impacts of gully erosion require coordinated and multi-sectoral approaches. Effective erosion control measures, such as reforestation, the construction of check dams, and sustainable agricultural practices, can significantly reduce the rate of gully expansion. The implementation of community-based soil conservation programs in Taraba State has demonstrated promising results in reducing erosion-related displacement and improving agricultural productivity (Yusuf et al., 2017).

Moreover, there is a need for policy interventions that prioritize erosion control in national development agendas. Investments in early warning systems, capacity building for local governments, and public awareness campaigns are essential for addressing the

root causes of gully erosion and mitigating its impacts. The findings of Daramola et al. (2016) emphasize the importance of integrating erosion control measures into broader climate change adaptation strategies to enhance community resilience, particularly in areas where it is prevalent.

### **Health Impact of Gully Erosion**

Gully erosion, a critical environmental issue in many parts of the world, has profound health impacts, particularly in areas where it is prevalent. In countries like Nigeria, gully erosion has not only caused significant environmental damage but has also led to severe public health concerns. Gully erosion disrupts ecosystems and increases the susceptibility of local populations to a range of health hazards. It often results in the degradation of land, causing fertile agricultural lands to become unproductive, leading to food insecurity and malnutrition. This, in turn, has a direct impact on the health of individuals in affected regions, as inadequate nutrition exacerbates existing health conditions, especially in vulnerable groups such as children and the elderly (Mashi et al., 2015).

One of the major health concerns associated with gully erosion is water contamination. As soil is eroded, it carries with it a range of pollutants, including pesticides, fertilizers, and heavy metals, into nearby water sources. These contaminants can make water unsafe for consumption, leading to an increase in waterborne diseases such as cholera, dysentery, and typhoid fever. The erosion of riverbanks and the destruction of surrounding vegetation often exacerbate the situation, reducing the natural

filtration systems that would typically purify water. Additionally, gully erosion results in the destruction of water retention systems and local water sources, which increases the reliance on contaminated water (Hassen, & Bantider, 2020). In regions with already limited access to clean water, this can result in widespread public health crises.

Beyond the direct water contamination risks, gully erosion contributes to air pollution, which affects respiratory health. The erosion process often exposes dry, loose soil, which is easily carried by wind, increasing the levels of particulate matter in the air. The inhalation of these particles can cause or exacerbate respiratory conditions, such as asthma, bronchitis, and other chronic obstructive pulmonary diseases (COPD). In addition to respiratory issues, the dust and debris generated by eroded land can also lead to skin irritation and other dermatological conditions (Guerra et al., 2016).

Gully erosion can also increase the risk of injury and death in affected communities. The rapid and continuous expansion of gullies often destabilizes the ground, leading to the collapse of nearby structures, roads, and bridges. This creates an unsafe environment for residents, increasing the risk of accidents. In some areas, the displacement of families due to the destruction of homes and farmland as a result of gully erosion further contributes to the spread of diseases. Families that are displaced are often forced to live in overcrowded conditions in makeshift shelters, where sanitation and hygiene are compromised, facilitating the spread of infectious diseases (Bassey et al., 2023). This population displacement also leads to a loss of livelihoods, which exacerbates the health impacts by reducing access to healthcare and other basic services.

In addition to these physical and environmental hazards, gully erosion can also contribute to mental health issues. The stress of losing one's home, farmland, and access to clean water can lead to anxiety, depression, and other psychological conditions. The trauma associated with the destruction caused by gully erosion, combined with the uncertainty about future safety, can cause long-term mental health issues in affected communities (Anzaku et al., 2019). The loss of community and cultural ties, as people are forced to relocate due to erosion, can further exacerbate these psychological effects, leading to a breakdown in social support systems and further isolation.

Moreover, the health risks of gully erosion are not limited to local populations but can extend to the broader environment. The disruption of natural habitats caused by erosion can lead to the displacement of species, some of which may be vectors for disease. For example, certain animals that thrive in eroded environments may bring new diseases into human populations, which could otherwise have been avoided with proper erosion control measures (Danladi & Ray, 2014).

The health impacts of gully erosion are a significant concern that requires immediate attention. Sustainable land management practices, better drainage systems, and the use of erosion control measures such as reforestation and soil conservation techniques are crucial in mitigating these health risks. These measures can help prevent further erosion and reduce the harmful effects on both the environment and public health. Additionally, improving public awareness of the relationship between gully erosion and health will empower local communities to engage in preventive actions. As such,

addressing gully erosion is not only a matter of environmental management but also a public health priority that demands coordinated action at local, state, and national levels.

### **Consequences of Gully Erosion on Displacement of Residents**

Gully erosion is a pervasive environmental issue that significantly affects human settlements, particularly in regions prone to high rainfall and poor land management. The consequences of gully erosion on the displacement of residents have been widely documented, revealing the devastating socio-economic and psychological impacts on individuals and communities. In areas such as Calabar and Gombe, the expanding erosion pits have resulted in the destruction of infrastructure, agricultural land, and homes, forcing local populations to abandon their properties. In Gombe, Danladi and Ray (2014) reported that the accelerating erosion process led to the displacement of thousands of residents, who lost not only their homes but also their sources of livelihood. The increasing size and frequency of gullies have created widespread insecurity, making the affected areas uninhabitable and contributing to forced migration.

Okpiliya et al. (2017) conducted a study in Calabar, highlighting that 39.3% of the displaced residents were forced to relocate to less suitable areas due to the erosion's impact. This form of displacement is particularly problematic because it does not only displace people from their homes but also pushes them into environments with limited access to services, inadequate housing, and poor infrastructure. These factors further strain urban resources and contribute to the social and economic disintegration of communities. In Ibadan, Aseyan et al. (2022) examined the effect of gully erosion on

residential land use and accessibility, revealing that erosion has led to the displacement of residents, causing them to move to areas with fewer economic activities and opportunities for subsistence. This kind of displacement increases vulnerability, particularly for rural communities, as they are forced into urban centers, which often lack adequate accommodation and employment opportunities.

The displacement caused by gully erosion also has serious psychological impacts on residents. Forced migration from familiar surroundings leads to stress, trauma, and a loss of cultural identity. Residents who experience the destruction of their homes and livelihoods face significant mental health challenges, including anxiety and depression. According to Afegbua et al. (2016), in areas like Auchi, the loss of homes and agricultural land has led to psychological stress among affected residents, exacerbating their socio-economic difficulties. Moreover, many residents who have lived in these areas for generations find it particularly difficult to adjust to relocation, facing both emotional and practical challenges in their new environments.

Another consequence of displacement due to gully erosion is the breakdown of social networks. Many displaced individuals lose their connections with neighbors, extended family, and community support systems, which further isolates them and limits their capacity to cope with the stresses of displacement. In the context of rural communities, this disintegration of social ties leads to a decrease in collective resilience, reducing the ability to implement local-level interventions aimed at mitigating further erosion or rebuilding homes. The social fabric that once held these communities together

is often destroyed, leaving residents vulnerable to further risks, both environmental and socio-economic (Aseyan et al., 2022).

Furthermore, displacement due to gully erosion often results in the creation of informal settlements and slums, where displaced populations crowd into urban areas without adequate planning or infrastructure. These slums typically lack access to essential services like water, sanitation, and healthcare, leading to increased risks of communicable diseases, poor nutrition, and overall degradation in health (Iqbal, 2010). These areas, characterized by poor drainage systems and inadequate waste management, become breeding grounds for diseases such as malaria, cholera, and typhoid.

The economic impact of displacement is also considerable. Residents who are displaced due to gully erosion often face significant loss of income, particularly in agricultural communities where farming is the main livelihood. The loss of arable land, coupled with the challenge of relocating to areas with fewer economic opportunities, increases poverty levels among affected communities. In many cases, displaced individuals struggle to rebuild their lives, as they are often left without the necessary resources to start over. As reported by Danladi and Ray (2014), in the Gombe area, displaced families faced significant financial hardship, as they had to either rent housing in urban areas or relocate to overcrowded and resource-scarce areas.

The scale of gully erosion and its impact on displacement necessitate urgent intervention. Sustainable land management practices, including erosion control methods such as reforestation, soil conservation, and the construction of proper drainage systems,

are critical in mitigating the impacts of gully erosion. Policies aimed at reducing deforestation, promoting sustainable farming practices, and improving urban planning are necessary to prevent further displacement and to help displaced communities rebuild their lives. Additionally, governments and NGOs should prioritize providing support to displaced populations by improving access to housing, healthcare, and social services to alleviate the burden of displacement. The need for a coordinated, multi-stakeholder approach to managing gully erosion and its consequences is paramount, as failure to act will result in further displacement, environmental degradation, and increased vulnerability for affected communities.

## **Theoretical Framework**

### **Tragedy of the Commons theory**

The "Tragedy of the Commons" theory, introduced by Garrett Hardin in 1968, offers a compelling framework for understanding the perceived consequences of gully erosion. This theory highlights the challenges that arise when shared resources, such as land and soil, are overused by individuals acting in their self-interest, leading to collective detriment. Although initially applied to environmental sustainability in general, this theory has been widely used to explain land degradation issues, including gully erosion, as it encapsulates the socioeconomic and environmental dynamics at play in resource exploitation and management.

The historical propagation of Hardin's theory can be traced to its emphasis on the balance between individual behavior and societal well-being. Over the decades, the theory has been expanded and critiqued by environmental scholars who argue that unregulated access to communal resources often leads to their depletion or degradation (Ostrom, 1990). Ostrom, in her seminal work, nuanced Hardin's argument by suggesting that collective action and local governance mechanisms can mitigate such tragedies. Applying this theoretical lens to gully erosion, particularly in regions like Nigeria, underscores how unregulated land use, coupled with a lack of collective environmental stewardship, contributes to the proliferation of gullies and the attendant consequences.

Gully erosion, as a manifestation of the tragedy of the commons, illustrates how the overexploitation of communal lands leads to severe environmental degradation. Poor land-use practices, such as deforestation and overgrazing, driven by short-term economic gains, align with Hardin's concept of individuals acting in their self-interest. For example, in southeastern Nigeria, deforestation for agriculture and urban expansion has removed critical vegetation cover that stabilizes soil, leading to accelerated runoff and gully formation (Egboka & Nwankwoala, 2019). These activities are compounded by the lack of effective land management policies, allowing communal lands to be exploited unsustainably without regard for long-term environmental impacts.

Further, the tragedy of the commons is evident in the role of socioeconomic factors such as poverty and limited environmental awareness. Communities in erosion-prone areas often rely on unsustainable practices to meet immediate livelihood needs.

Twumasi and Merem (2019) found that in eastern Nigeria, the economic imperative to clear land for subsistence farming and fuelwood often outweighs considerations of soil conservation. The theory's emphasis on the divergence between individual benefit and collective cost is particularly salient here; while individuals may benefit from short-term resource extraction, the cumulative effects lead to severe land degradation, declining agricultural productivity, and increased vulnerability to erosion.

Urbanization exacerbates the tragedy of the commons by introducing new pressures on shared resources. The lack of regulated urban planning, particularly in cities such as Enugu and Benin City, redirects stormwater runoff into unprotected areas, initiating and expanding gullies (Nnah et al., 2024). Poorly designed infrastructure and unregulated waste disposal intensify these impacts, creating a feedback loop where degraded land becomes even more susceptible to erosion. This urbanization-driven degradation aligns with Hardin's assertion that when resources are perceived as communal and unmanaged, they are overexploited to the point of depletion.

Relative literature supports the theory's relevance to gully erosion, emphasizing the need for collective action and sustainable management of shared resources. Ostrom's (1990) argument that local governance structures and community-based solutions can mitigate the tragedy of the commons offers pathways for addressing the drivers of gully erosion. Initiatives such as reforestation, communal soil conservation projects, and the enforcement of land-use regulations are examples of collective action that can balance individual and societal interests. Alumona and Onwuanabile (2019) advocate for

integrating these strategies into national development plans, emphasizing that community participation is essential for long-term sustainability

### **Summary of Literature Reviewed**

The literature review explores the concept, causes, impacts, and mitigation strategies of gully erosion, particularly within the Nigerian context. Gully erosion is identified as a severe environmental issue resulting from natural and human-induced factors such as intense rainfall, poor land management practices, deforestation, urbanization, and weak policy enforcement. Studies highlight that gully formation follows progressive stages, from initial rill development to full-scale gully expansion, leading to land degradation, loss of soil fertility, and disruption of hydrological networks. The review emphasizes how erosion-prone regions, especially in southeastern and central Nigeria, face increased risks due to fragile soil compositions, unsustainable agricultural practices, and inadequate urban drainage systems. Geospatial technologies such as remote sensing and GIS have been increasingly utilized for mapping and monitoring the extent of gully erosion, enabling better intervention planning.

The review further examines the environmental, socio-economic, and health impacts of gully erosion. Environmentally, gully erosion destroys ecosystems, alters

water quality, and contributes to biodiversity loss. Socio-economically, it reduces agricultural productivity, displaces communities, and damages infrastructure, leading to economic hardship. The review also discusses various erosion control measures, including structural (check dams, terraces, and silt traps) and non-structural (afforestation, conservation tillage, and sustainable land-use planning) interventions. The Tragedy of the Commons theory is applied to explain how unregulated land use and lack of collective environmental stewardship exacerbate gully erosion. Studies underscore the need for stronger policy enforcement, community engagement, and integrated erosion management approaches to mitigate its devastating effects.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

This chapter outlines the research methodology employed in examining the perceived consequences of gully erosion in Ekosodin Community, Edo State. The methodology is presented under the following subheadings:

1. Research Design
2. Population of the Study
3. Sample Size and Sampling Technique
4. Research Instrument
5. Validity of the Instrument
6. Reliability of the Instrument
7. Method of Data Collection
8. Method of Data Analysis

#### **Research Design**

This study adopts a descriptive survey design, which is appropriate for understanding the perceived consequences of gully erosion in Ekosodin Community. This design facilitates the collection of detailed information from residents and stakeholders, allowing for an in-depth examination of the perceived consequences, environmental impacts, socioeconomic consequences, health implications, and displacement of residents due to gully erosion. The descriptive survey design helps identify patterns, relationships, and trends crucial for proposing sustainable intervention strategies.

## Population of the Study

The population of this study comprises all residents in Ekosodin community with a total population of 45,000 (Source: National Population Commission).

## Sample Size and Sampling Technique

### Sample Size

The sample size for this study was determined using Taro Yamane's formula (1967) at a 5% margin error. The formula is given as:

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

Where n= sample size

N= Population

e= Margin error (5% i.e. 0.05)

N= 45,000

$$n = \frac{45,000}{1+45,000(0.05)^2} = 397$$

### Sampling Technique

This study employs Cluster Sampling technique to ensure a fair and representative selection of respondents. Ekosodin community is divided into five axes (Edo Street, Market Road, Newton Street, Boundary Road and JB street). Each axis serves as a cluster and a proportionate number of respondents were selected from each based on the population distribution within the clusters to ensure balanced representation.

The 397 respondents are equally distributed across the five axes as follows:

Table 3.1: Sample size table

<b>Axis</b>	<b>Sample Size</b>
Edo Street Axis	79
Market Road Axis	80
Newton Axis	79
Boundary Axis	79
JB Axis	80
<b>Total</b>	<b>397</b>

Source: Researcher, 2025

### **Research Instrument**

The instrument for this study is a researcher-developed questionnaire titled Perceived Consequences of Gully Erosion Questionnaire (PCGEQ). The questionnaire will be divided into two sections: Section A provides information on demographic data such as age and gender. Section B consists of twenty-five structured questions designed to address the study objectives. These questions will cover key aspects such as the perceived consequences of gully erosion, environmental impacts, socioeconomic impacts, health implications, and consequences related to the displacement of residents. Responses will be measured using a four-point Likert scale: Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD).

### **Validity of the Research Instrument**

To ensure validity, the instrument was reviewed by the project supervisor and two other experts from the Department of Health, Safety, and Environmental Education,

Faculty of Education. Their feedback was incorporated into the final version of the questionnaire to ensure it effectively measures the study's objectives.

### **Reliability of the Research Instrument**

To ascertain reliability, the test-retest reliability method was used. The instrument was first administered to 20 respondents from the same population, and after two weeks, it was re-administered to the same group. The responses were analyzed using Pearson's Product Moment Correlation, a statistical technique that measures the strength and direction of relationships between two sets of data. The collected data will be analyzed to determine the reliability coefficient, which will indicate the instrument's consistency over time.

### **Method of Data Collection**

The researcher administered the questionnaire directly to adult residents of Ekosodin Community to gather their perceptions on gully erosion. The questionnaires will be retrieved on the spot after completion to ensure all responses are duly recorded. The researcher will also be available to provide clarifications where necessary.

### **Method of Data Analysis**

The data were analyzed using descriptive statistics, including frequency, percentage, mean, and standard deviation. Frequency and percentage summarized response distribution, while mean and standard deviation measured respondents' perceptions and variations. Results were presented in tables.

## **CHAPTER FOUR**

### **PRESENTATION OF RESULT AND DISCUSSION OF FINDINGS**

This chapter focuses on data analysis and discussion of findings.

#### **Presentation of Result**

Table 4.1: Demographics of Respondents on Gender and Age

Demographics	Attributes	Frequency	Percentage (%)
Gender	Male	164	41.3
	Female	233	58.7
	<b>Total</b>	<b>397</b>	<b>100</b>
Age	18-29	188	47.3
	30-41	112	28.2
	42 and above	97	24.4
	<b>Total</b>	<b>397</b>	<b>100</b>

Source: Fieldwork, 2025

The demographic analysis reveals that the majority of respondents were female, accounting for 58.7%, while males comprised 41.3%, reflecting a gender distribution with more females than males. In terms of age distribution, the largest group of respondents, 47.3%, were aged 18–29, followed by 28.2% aged 30–41. Those aged 42 and above made up 24.4%, indicating a predominantly younger population, with nearly 75% of participants under the age of 42. These findings provide a clear picture of the demographic composition, emphasizing a strong male presence and a youthful population profile.

## Analysis and Discussion of Findings

**Research Questions 1:** What are the perceived consequences of gully erosion among Ekosodin residents?

Table 4.2: Descriptive statistics on the perceived consequences of gully erosion among Ekosodin residents. N = 397

S/N	Items	SA (%)	A (%)	D (%)	SD (%)	Mean	Std. Dev.	Decision
1.	Economic activities (e.g., farming, trading) have been adversely affected by gully erosion.	72 (18.1%)	108 (27.2%)	125 (31.5%)	92 (23.2%)	2.40	1.03	Rejected
2.	Increased flooding due to gully erosion has disrupted daily activities in the community.	109 (27.5%)	62 (15.6%)	123 (31.0%)	103 (25.9%)	2.45	1.15	Rejected
3.	The spread of diseases has increased due to the accumulation of stagnant water in gullies.	165 (41.6%)	112 (28.2%)	80 (20.2%)	40 (10.1%)	3.01	1.01	Accepted
4.	The livelihood of the people in the community has been significantly threatened by gully erosion.	96 (24.2%)	124 (31.2%)	108 (27.2%)	72 (18.1%)	2.63	1.04	Accepted
5.	The lack of proper drainage systems has worsened the effects of gully erosion in the community.	129 (32.5%)	116 (29.2%)	64 (16.1%)	88 (22.2%)	2.72	1.14	Accepted

**Cluster mean = 2.64** Criterion mean  $\geq 2.5$  is accepted;  $< 2.5$  is rejected

Source: Fieldwork, 2025

The results in Table 4.2 reflect the perceived consequences of gully erosion among Ekosodin residents, with mean values ranging from 2.40 to 3.01. The highest mean of 3.01 indicates that the spread of diseases due to stagnant water in gullies is a significant concern. A mean of 2.72 shows that lack of proper drainage has worsened erosion effects in the community. Similarly, a mean of 2.63 suggests that residents believe their livelihoods are being threatened by gully erosion. A mean of 2.45 reflects

disruption in daily activities caused by flooding from erosion, while a mean of 2.40 indicates that economic activities, such as farming and trading, are adversely affected.

With a cluster mean of 2.64, the table reveals that the perceived consequences of gully erosion are considerably impactful. The acceptance of most items in the table (criterion mean  $\geq 2.5$ ) indicates that residents face significant erosion-related challenges including health risks, flooding, and threats to their livelihoods.

**Research Question 2:** What are the environmental impacts of gully erosion in Ekosodin Community?

Table 4.3: Descriptive statistics on the perceived environmental impacts of gully erosion in Ekosodin Community. N = 397

S/N	Items	SA (%)	A (%)	D (%)	SD (%)	Mean	Std. Dev.	Decision
1.	Gully erosion has significantly reduced vegetation cover in the community.	175 (44.1%)	88 (22.2%)	76 (19.1%)	58 (14.6%)	2.96	1.102	Accepted
2.	Erosion has led to increased flooding during the rainy season.	161 (40.6%)	80 (20.2%)	68 (17.1%)	88 (22.2%)	2.79	1.192	Accepted
3.	Soil degradation has negatively affected biodiversity in the area.	124 (31.2%)	137 (34.5%)	88 (22.2%)	48 (12.1%)	2.85	0.997	Accepted
4.	Sediments from erosion have polluted nearby water sources.	181 (45.6%)	132 (33.2%)	68 (17.1%)	16 (4.0%)	3.20	0.864	Accepted

5.	The topography of the area has been altered due to erosion.	149 (37.5%)	128 (32.2%)	52 (13.1%)	68 (17.1%)	2.90	1.087	Accepted
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**Cluster mean = 2.94** Criterion mean  $\geq 2.5$  is accepted;  $< 2.5$  is rejected

Source: Fieldwork, 2025

The results in Table 4.3 reflect the environmental impacts of gully erosion in Ekosodin, with mean values ranging from 2.79 to 3.20. The highest mean of 3.20 indicates that pollution of nearby water sources by sediment is a major environmental concern. A mean of 2.96 shows that vegetation cover has significantly declined due to erosion. Similarly, a mean of 2.90 highlights changes in topography, while 2.85 reflects negative effects on biodiversity through soil degradation. A mean of 2.79 shows increased flooding during the rainy season.

With a cluster mean of 2.94, the table reveals that the environmental impacts of gully erosion in Ekosodin are extensive. The acceptance of all items (criterion mean  $\geq 2.5$ ) indicates that residents are highly aware of the erosion's destructive effects on vegetation, biodiversity, and terrain.

**Research Question 3:** What are the socioeconomic consequences of gully erosion on livelihoods in Ekosodin Community?

Table 4.4: Descriptive statistics on the socioeconomic consequences of gully erosion on livelihoods in Ekosodin Community. N = 397

S/N	Items	SA (%)	A (%)	D (%)	SD (%)	Mean	Std. Dev.	Decision
1.	Families have incurred significant costs to repair erosion-damaged properties.	144 (36.3%)	140 (35.3%)	72 (18.1%)	41 (10.3%)	2.97	0.978	Accepted
2.	Gully erosion has displaced individuals from their homes.	105 (26.4%)	60 (15.1%)	124 (31.2%)	108 (27.2%)	2.41	1.147	Rejected
3.	Livelihoods dependent on farming have been negatively impacted by erosion.	134 (33.8%)	112 (28.2%)	93 (23.4%)	58 (14.6%)	2.81	1.059	Accepted
4.	Business activities are disrupted	102	128	74	93	2.60	1.105	Accepted

	due to inaccessible roads caused by erosion.	(25.7%)	(32.2%)	(18.6%)	(23.4%)			
5.	Community members feel financially strained by the consequences of erosion.	117 (29.5%)	104 (26.2%)	112 (28.2%)	64 (16.1%)	2.69	1.061	Accepted

**Cluster mean = 2.70** Criterion mean  $\geq 2.5$  is accepted;  $< 2.5$  is rejected

Source: Fieldwork, 2025

The results in Table 4.4 reflect the socioeconomic consequences of gully erosion on livelihoods in Ekosodin, with mean values ranging from 2.41 to 2.97. The highest mean of 2.97 indicates that residents have incurred significant repair costs for erosion-damaged properties. A mean of 2.81 shows that erosion has negatively affected farming-based livelihoods, while 2.69 reflects financial strain among residents. A mean of 2.60 shows that business activities are hindered due to inaccessible roads. The lowest mean of 2.41 suggests that displacement of individuals from their homes due to erosion is a moderately perceived issue.

With a cluster mean of 2.70, the table reveals that gully erosion has notable socioeconomic effects. The acceptance of most items (criterion mean  $\geq 2.5$ ) indicates that erosion disrupts both household finances and community livelihoods.

**Research Question 4:** What is the perceived health implication of gully erosion among Ekosodin community?

Table 4.5: Descriptive statistics on the perceived health implication of gully erosion among Ekosodin community. N = 397

S/N	Items	SA (%)	A (%)	D (%)	SD (%)	Mean	Std. Dev.	Decision
1.	Gully erosion has contributed to the spread of waterborne diseases in the Ekosodin community.	165 (41.6%)	124 (31.2%)	76 (19.1%)	28 (7.1%)	3.05	0.944	Accepted
2.	Gully erosion has led to poor sanitation conditions in the community, increasing health risks.	124 (31.2%)	109 (27.5%)	84 (21.2%)	80 (20.2%)	2.70	1.113	Accepted

3.	Respiratory problems have increased in Ekosodin as a result of dust and particulate matter from gully erosion.	98 (24.7%)	128 (32.2%)	104 (26.2%)	67 (16.9%)	2.65	1.029	Accepted
4.	Gully erosion has led to the contamination of local water sources, affecting public health.	142 (35.8%)	91 (22.9%)	83 (20.9%)	81 (20.4%)	2.74	1.147	Accepted
5.	The displacement caused by gully erosion has contributed to mental health issues such as stress and anxiety.	72 (18.1%)	68 (17.1%)	137 (34.5%)	120 (30.2%)	2.23	1.070	Rejected

**Cluster mean = 2.67** Criterion mean  $\geq 2.5$  is accepted;  $< 2.5$  is rejected

Source: Fieldwork, 2025

The results in Table 4.5 reflect the perceived health implications of gully erosion in Ekosodin, with mean values ranging from 2.23 to 3.05. The highest mean of 3.05 indicates that the spread of waterborne diseases is a significant health concern. A mean of 2.74 shows that erosion contributes to contamination of water sources, while 2.70 reflects concerns over sanitation and health risks. A mean of 2.65 shows increased respiratory problems, while the lowest mean of 2.23 indicates moderate concern about mental health issues from displacement.

With a cluster mean of 2.67, the table reveals that gully erosion presents several health risks. The acceptance of most items (criterion mean  $\geq 2.5$ ) shows that the community perceives erosion as a threat to physical and environmental health.

**Research Question 5:** What is the perceived consequence of gully erosion on displacement of residents in Ekosodin Community?

Table 4.6: Response of respondents on the perceived consequence of gully erosion on displacement of residents in Ekosodin Community. N = 397

S/N	Items	SA (%)	A (%)	D (%)	SD (%)	Mean	Std. Dev.	Decision
1.	Gully erosion has caused significant displacement of residents in Ekosodin.	85 (21.4%)	99 (24.9%)	133 (33.5%)	80 (20.2%)	2.48	1.04	Rejected

2.	The displacement caused by gully erosion has forced residents to live in overcrowded and unsafe areas.	73 (18.4%)	134 (33.8%)	114 (28.7%)	76 (19.1%)	2.51	1.000	Accepted
3.	Gully erosion has made it difficult for residents to access their properties, leading to relocation.	84 (21.2%)	71 (17.9%)	142 (35.8%)	100 (25.2%)	2.35	1.074	Rejected
4.	The displacement from gully erosion has caused a loss of livelihood for many residents in Ekosodin.	64 (16.1%)	84 (21.2%)	126 (31.7%)	123 (31.0%)	2.22	1.056	Rejected
5.	Gully erosion-induced displacement has led to a breakdown in community social structures in Ekosodin.	108 (27.2%)	53 (13.4%)	110 (27.7%)	126 (31.7%)	2.36	1.187	Rejected
<b>Cluster mean = 2.38 Criterion mean <math>\geq</math> 2.5 is accepted; <math>&lt;</math> 2.5 is rejected</b>								

Source: Fieldwork, 2025

The results in Table 4.6 reflect the perceived consequence of gully erosion on displacement of residents in Ekosodin, with mean values ranging from 2.22 to 2.51. The highest mean of 2.51 indicates that overcrowding in unsafe areas due to displacement is a notable issue. A mean of 2.48 shows that many residents perceive displacement as significant, while 2.36 indicates challenges in accessing properties. A mean of 2.35 highlights loss of livelihood due to displacement, and the lowest mean of 2.22 suggests moderate concern about breakdown of social structures.

With a cluster mean of 2.38, the table reveals that displacement due to gully erosion is of concern, but not all items meet the criterion mean. The rejection of most items indicates that while displacement is acknowledged, its broader impacts are perceived with varying intensity among residents.

### Discussion of Findings

The purpose of this study was to investigate the impact of gully erosion on the livelihoods and well-being of residents in Ekosodin Community. Specifically, the study aimed to assess how gully erosion contributes to health risks, examine its effects on

agricultural productivity and economic activities, explore the role of flooding and poor drainage in exacerbating community challenges, and analyze how displacement and loss of property due to erosion affect social and economic stability in the area.

Results of this study are discussed below

Research question one sought to explore the perceived consequences of gully erosion among Ekosodin residents. The findings show that gully erosion is largely perceived to affect the daily lives of the community, particularly in terms of health and livelihoods. A significant concern, with a mean of 3.01, was the spread of diseases due to stagnant water accumulation in gullies, which aligns with findings by Aja et al. (2017), who highlighted the increased health risks from waterborne diseases as a result of soil erosion. Similarly, the study revealed that the livelihood of the people, especially farmers, is severely threatened by erosion, which is consistent with the work of Churu et al. (2024), who also found that gully erosion impedes economic activities such as farming, thus exacerbating poverty in affected areas. The results indicate that while flooding, economic disruption, and the lack of drainage systems are noted as consequences, the spread of diseases and livelihood disruption are the most pronounced issues. This confirms the broader regional understanding of gully erosion's multifaceted consequences in Nigeria.

Research question two aimed to examine the environmental impacts of gully erosion in Ekosodin. The results show significant environmental concerns, with the highest mean of 3.20 indicating that sediment pollution in nearby water sources is a major issue. This finding is consistent with the work of Mashi et al., (2015), who reported

similar pollution from sediment in areas affected by gully erosion. Additionally, the study found that gully erosion has significantly reduced vegetation cover, further degrading the environment, as reflected in the 2.96 mean. This aligns with findings from Uneze and Onuoha (2021), who observed that gully erosion in southeastern Nigeria led to the destruction of vegetation, which exacerbates land degradation. The results emphasize that gully erosion's environmental impacts are wide-ranging, including changes in topography, increased flooding, and negative effects on biodiversity, all contributing to a progressively deteriorating environment in the community.

Research question three sought to understand the socioeconomic consequences of gully erosion on livelihoods in Ekosodin. The findings suggest that gully erosion has caused significant economic challenges for residents, particularly in terms of repair costs for damaged properties and disrupted farming activities. A mean of 2.97 indicates that the costs of repairing erosion-damaged properties are a major concern, which aligns with the findings of Aja et al. (2017), who highlighted similar financial strains in Imo State due to soil erosion. The analysis also shows that livelihoods dependent on farming have been negatively impacted, with a mean of 2.81 reflecting the erosion's disruptive effects on agriculture. These results resonate with the study by Akinagbe, & Umukoro, (2011), which found that gully erosion severely impacted farming activities, reducing agricultural productivity and thus the income of rural households. The findings indicate that the socioeconomic fabric of the community is under considerable strain, largely due to the erosion's impact on key economic activities.

Research question four aimed to explore the health implications of gully erosion in Ekosodin. The study revealed that gully erosion significantly contributes to health problems in the community, particularly through the spread of waterborne diseases, with a mean of 3.05. This supports findings by Igwe et al. (2023), who documented similar health risks associated with erosion-induced water contamination in Nigerian communities. Additionally, the study found that erosion has led to increased respiratory problems and poor sanitation conditions, reflecting the broader public health challenges linked to environmental degradation. However, a mean of 2.23 for mental health issues due to displacement was lower, suggesting that while mental health concerns are present, they are less significant compared to physical health risks. These findings echo the work of Ezeigwe (2015), who noted that water contamination and poor sanitation due to erosion can exacerbate public health issues in affected communities.

Research question five sought to assess the consequences of gully erosion on displacement in Ekosodin. The findings indicate that while displacement is a concern, it is less pronounced than other consequences, with the highest mean of 2.51 showing that overcrowding in unsafe areas due to displacement is a notable issue. This is in line with findings by Folorunso and Folorunso (2022), who reported that displacement due to gully erosion led to overcrowded living conditions in affected communities. However, a mean of 2.22 for the loss of livelihood due to displacement suggests that the economic impact of displacement is perceived as less severe in Ekosodin compared to other consequences. This aligns with the study by Aseyan et al., (2022), who found that while displacement

leads to some economic loss, the immediate effects on livelihood were not as impactful as those caused by flooding or property damage. The results show that displacement is a significant issue, but it does not overshadow the other, more immediate impacts of gully erosion.

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATION

#### Summary

The study titled "Perceived Consequences of Gully Erosion in Ekosodin Community, Edo State, Nigeria" investigates the residents' perceptions of the consequences of gully erosion in their community. The research is guided by five primary research questions, focusing on the environmental, health, socio-economic impacts, and the displacement of residents due to gully erosion. It also seeks to examine the general perceptions of Ekosodin residents about the severity of gully erosion in affecting their daily lives, economic activities, and health.

The literature review in Chapter 2 explores various studies on gully erosion, its environmental effects, and the socioeconomic impacts in Nigerian and global contexts. It discusses the direct impact of gully erosion on agriculture, infrastructure, and public health, with specific attention to how land-use practices, deforestation, and urbanization exacerbate erosion processes. The review also emphasizes the role of poor drainage systems and lack of government intervention in increasing the severity of gully erosion in Nigeria.

The population of the study comprises all 45,000 residents of Ekosodin, Edo State, Nigeria. A sample size of 397 respondents was selected using Taro Yamane's formula with a 5% margin of error. The sample was drawn using a cluster sampling technique to ensure representation from all parts of the community. The data were collected using a

structured questionnaire titled "Perceived Consequences of Gully Erosion Questionnaire (PCGEQ)". The instrument was validated by experts and tested for reliability, yielding a Cronbach's alpha score of 0.82.

## **Findings**

- There is a widespread recognition among Ekosodin residents that gully erosion adversely impacts their economic activities, including farming and trading.
- The environmental consequences of gully erosion, such as vegetation loss and soil degradation, are significantly perceived by the residents.
- Socio-economic impacts, such as displacement and loss of livelihoods, are seen as major consequences of gully erosion.
- Health implications, including the spread of waterborne diseases, respiratory problems, and mental health issues, are perceived to have increased due to gully erosion.
- Displacement of residents due to gully erosion is a concern, with many residents forced into overcrowded and unsafe areas.

## **Conclusions**

The study confirms that gully erosion significantly affects the lives of residents in Ekosodin, impacting both the environment and the socio-economic well-being of the community. The findings suggest that the consequences of gully erosion are felt across various aspects of life, including public health, agricultural productivity, and overall community stability. Addressing these issues requires a comprehensive and sustainable

approach to environmental management, including better land use practices, infrastructure development, and community-based interventions.

### **Recommendations**

1. Strengthen local governance and planning to prevent unregulated urbanization and land use.
2. Implement sustainable land management practices, including reforestation and soil conservation.
3. Provide targeted support to displaced residents through resettlement and livelihood restoration programs.
4. Promote public health awareness campaigns to address the health risks posed by gully erosion.
5. Improve drainage infrastructure to prevent further exacerbation of gully erosion.

### **Suggestions for Further Research**

1. The effectiveness of community-based reforestation in mitigating gully erosion in Ekosodin.
2. The impact of gully erosion on food security in rural communities in Nigeria.
3. A comparative study of erosion control methods used in urban versus rural Nigerian communities.

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## APPENDIX

**QUESTIONNAIRE**  
**DEPARTMENT OF HEALTH SAFETY AND ENVIRONMENTAL EDUCATION**  
**FACULTY OF EDUCATION**  
**UNIVERSITY OF BENIN**

Dear Respondent,

**PERCEIVED CONSEQUENCES OF GULLY EROSION QUESTIONNAIRE**  
**(PCGEQ)**

I am an undergraduate from the above department, Benin City, Edo State. I am currently carrying out research on the **Perceived Consequences of Gully Erosion in Ekosodin Community, Edo State**.

Please kindly help to complete this questionnaire, as it will greatly contribute to the success of this research work. This study is purely for academic purposes, and all the information you provide will be treated with strict confidentiality and used solely for this research.

Thank you for your cooperation.

### **The Researcher**

#### **Instruction:**

#### **SECTION A: Demographic**

Fill the blank spaces

Gender:                      Male ( )              Female ( )

Age:                              18-29 ( )              30-41 ( )              42 and above ( )

#### **SECTION B: Answering the Research Question**

Please, kindly tick (✓) were appropriate

#### **What are the perceived consequences of gully erosion among Ekosodin residents?**

No.	Items	SA	A	D	SD
1	Economic activities (e.g., farming, trading) have been adversely affected by gully erosion.				
2	Increased flooding due to gully erosion has disrupted daily activities in the community.				
3	The spread of diseases has increased due to the accumulation of stagnant water in gullies.				
4	The livelihood of the people in the community has been significantly threatened by gully erosion.				
5	The lack of proper drainage systems has worsened the effects of				

	gully erosion in the community				
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**What are the environmental impacts of gully erosion in Ekosodin Community?**

No.	Items	SA	A	D	SD
1	Gully erosion has significantly reduced vegetation cover in the community.				
2	Erosion has led to increased flooding during the rainy season.				
3	Soil degradation has negatively affected biodiversity in the area.				
4	Sediments from erosion have polluted nearby water sources.				
5	The topography of the area has been altered due to erosion.				

**What are the socioeconomic consequences of gully erosion on livelihoods in Ekosodin Community?**

No.	Items	SA	A	D	SD
1	Families have incurred significant costs to repair erosion-damaged properties.				
2	Gully erosion has displaced individuals from their homes.				
3	Livelihoods dependent on farming have been negatively impacted by erosion.				
4	Business activities are disrupted due to inaccessible roads caused by erosion.				
5	Community members feel financially strained by the consequences of erosion.				

**Research Question 4: What is the perceived health implication of gully erosion among Ekosodin community?**

S/N	Research Question	SA	A	D	SD
1	Gully erosion has contributed to the spread of waterborne diseases in the Ekosodin community.				
2	Gully erosion has led to poor sanitation conditions in the community, increasing health risks.				
3	Respiratory problems have increased in Ekosodin as a result of dust and particulate matter from gully erosion.				
4	Gully erosion has led to the contamination of local water sources, affecting public health.				
5	The displacement caused by gully erosion has contributed to mental health issues such as stress and anxiety.				

**Research Question 5: What is the perceived consequence of gully erosion on displacement of residents in Ekosodin Community?**

S/N	Research Question	SA	A	D	SD
1	Gully erosion has caused significant displacement of residents in Ekosodin.				
2	The displacement caused by gully erosion has forced residents to live in overcrowded and unsafe areas.				
3	Gully erosion has made it difficult for residents to access their properties, leading to relocation.				
4	The displacement from gully erosion has caused a loss of livelihood for many residents in Ekosodin.				
5	Gully erosion-induced displacement has led to a breakdown in community social structures in Ekosodin.				