

## Assessing the Environmental Impact of Land Reclamation in Ogbunabali, Port Harcourt

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### Abstract

Land reclamation is a widely practiced process that aims to enhance land usability for various purposes, including urban development and infrastructure projects. However, the environmental consequences of such activities are often complex and multifaceted. This study focuses on assessing the environmental impact of land reclamation in Ogbunabali, an indigenous community situated within the city of Port Harcourt, Nigeria. Employing a comprehensive approach, including stakeholder engagement, field investigation, data collection, and analytical methods, the study establishes a baseline understanding of the study area. Exploring the project proponent, specific activities, and the ramifications of land reclamation, the study evaluates changes in ecosystems, soil quality, water resources, and biodiversity. Furthermore, the research investigates potential disruptions to human activities, such as livelihoods and local practices, while also assessing effects on existing infrastructure and socio-economic aspects. In response to the identified negative impacts, the study proposes practical and sustainable mitigation measures. Recommendations are tailored for policymakers, urban planners, and stakeholders, advocating for the adoption of responsible land reclamation practices to minimize adverse effects.

**Keywords:** Environmental impacts, Land reclamation, Physical Environment, Human Activities, Infrastructure and Socioeconomics

### Introduction

Land reclamation, the transformative process of converting unused or underutilized areas into valuable assets for human activities, has gained prominence in response to urbanization and developmental needs. While it offers the promise of expanding urban spaces and fostering economic growth, a critical examination of its environmental repercussions becomes imperative. This study centres on the assessment of the environmental impact of land reclamation in Ogbunabali, situated within the dynamic city of Port Harcourt, Nigeria.

Port Harcourt, the capital city of Rivers State, serves as a symbol of Nigeria's socio-economic development, attracting a substantial influx of people from diverse regions. Initially a modest fishing settlement with a population of 5,000 in 1913, the city has evolved into a metropolis with over a million residents, driven by its central role in the nation's oil and gas industries and as a hub for multinational international oil companies (Oyegun, 1999). As the largest city in the Niger Delta region and the fifth-largest in Nigeria, Port Harcourt embodies the challenges and opportunities associated with rapid urbanization.

The city's burgeoning population and its status as an industrial and economic powerhouse have strained its finite resources, particularly the crucial land required for housing, industries, and various developmental purposes. The demand for expanded land space has fuelled extensive reclamation activities, notably in coastal areas such as Borokiri, Marine Base,

Eagle Island, and prominently, Ogbunabali. These efforts aim to address the urgent need for additional land to support urban growth.

Land reclamation, characterized as the artificial creation of new land through draining marshy areas or filling existing water bodies, has become a hallmark of Port Harcourt's expansion strategy (The Uptide, 2022). In alignment with its commitment to advancing the development of Port Harcourt City, the Rivers State Government has initiated a significant reclamation project along the Ogbunabali waterfront. The objective is to generate additional land to fuel the city's growth and meet the demands of its burgeoning population.

However, the intricate relationship between urban development and environmental integrity necessitates a nuanced understanding of the potential adverse impacts of such initiatives. Recognizing that human activities often have repercussions on the environment, there is an imperative for a comprehensive Environmental Impact Assessment (EIA) of specific development activities. Such assessments not only unveil ecological consequences but also lay the foundation for recommending mitigative measures to alleviate potential environmental challenges.

In light of the ongoing Ogbunabali waterfront reclamation project, this study delves into the environmental impact of these activities.

### **Problem Statement**

The rapid urbanization and economic growth in Port Harcourt, particularly the extensive land reclamation initiatives in Ogbunabali, pose a pressing challenge that demands thorough scrutiny. While land reclamation is pivotal for accommodating the burgeoning population and sustaining development, the potential environmental ramifications necessitate a critical examination. The accelerated pace of urban expansion, driven by the city's strategic role in the oil and gas industries, has resulted in heightened pressure on limited resources, particularly land.

The ongoing reclamation activities in Ogbunabali, a locality within Port Harcourt, have been spurred by the imperative to create additional land space for housing, industries, and other developmental purposes. However, this proactive approach to land utilization raises concerns about its ecological consequences. The balance between urban development aspirations and environmental preservation requires careful consideration, especially in a region as ecologically sensitive as the Niger Delta.

The primary problem lies in understanding the extent and nature of the environmental impact of land reclamation activities in Ogbunabali. The accelerated pace of development and the specific focus on reclamation in this region necessitate a comprehensive assessment to discern potential challenges and devise strategies for mitigating adverse effects. The overarching question revolves around how to achieve sustainable urban development in Port Harcourt, especially in Ogbunabali, without compromising the delicate ecological balance and the long-term well-being of the local environment.

### **Aim and Objectives**

The aim of the study is to assess the environmental impact of land reclamation in Ogbunabali, Port Harcourt. The specific objectives of the study are as follows:

- i. Investigate the Physical Characteristics of the Study Area
- ii. Describe the Project Proponents and Activities
- iii. Investigate Impacts on the Physical Environment, Human Activities, Infrastructure, and Socioeconomics
- iv. Mitigate the Identified Negative Impacts of the Project

## 2.0 Study Area

Port Harcourt is located approximately 66 km<sup>2</sup> from the Atlantic Ocean, situated between the latitudes of 4° 5'11" and 5° 15'45" North of the equator, as well as longitudes of 6° 22'25" and 8° 05'12" East of the Greenwich meridian (Ajie & Dienya, 2014). The city is bordered to the North by Obio/Akpor Local Government Area, to the East by Oyigbo and Eleme Local Government Areas, to the West by Emohua Local Government Area, and to the South by Degema and Okirika Local Government Areas. The specific study area where the project is sited is Ogbunabali which is at the middle southern part of the city (See Fig 1 for visualization).

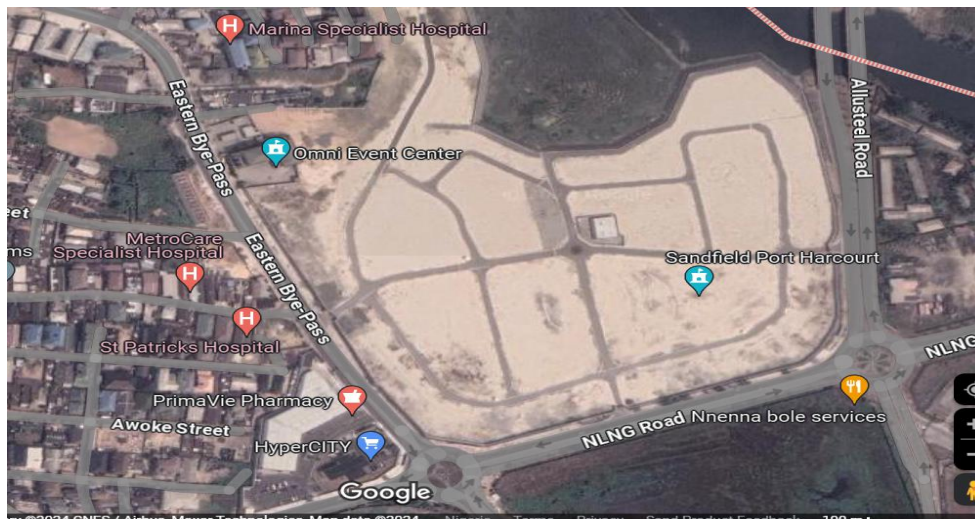


Fig. 1: Study Area  
Source: Map Data, 2024

## Literature Review

### 1.1 Concept of the Urban Environment

The environment is defined as the totality of the ecosystem comprising man, animals, plants, microorganisms, and life support systems such as air, water, and soil (Ajie & Dienya, 2014). The American Geological Institute further characterizes the environment as "the sum total of all external conditions which may act upon an organism or community to influence its development or existence."

The term "urban environment" refers to the physical, social, economic, and cultural aspects of the human-made environment within a city or urban area. It encompasses the infrastructure, buildings, public spaces, transportation systems, and other elements that make up the urban area. In an urban setting, the environment encompasses the air people breathe, the water they consume, the food they eat, the land on which they live and cultivate, and the shelter providing protection, production, and services. Additionally, it includes pollutants and waste materials that may adversely affect human life and health. The urban environment is shaped by the interaction between human activities and the surrounding physical space.

Despite the anticipated benefits of developmental projects, there is a need to scrutinize potential negative consequences to maintain sustainable development. Sustainable development is defined as a situation where positive indicators of human life quality and economic growth align with positive bio-physical indicators, ensuring that development does not exert negative changes in the bio-physical environment.

## 1.2 Environmental Impact Assessment

Environmental Impact Assessment (EIA) is a systematic process that evaluates the potential environmental impacts, both positive and negative, of a proposed project or development. This assessment considers the interconnected socio-economic, cultural, and human-health aspects related to the project.

According to the United Nations Environment Programme (UNEP), EIA serves as a crucial tool to identify and analyze the environmental, social, and economic implications of a project before decisions are made. It facilitates the prediction of environmental impacts during the early stages of project planning, enabling the exploration of ways to mitigate adverse effects, align projects with local environmental conditions, and present assessment findings and alternatives to decision-makers. The utilization of EIA can yield environmental and economic benefits, including reduced project implementation and design costs, avoidance of treatment/clean-up expenses, and adherence to laws and regulations.

While legislative practices may vary globally, the core stages of an EIA typically involve the following:

**Screening:** Identifying which projects necessitate a comprehensive or partial impact assessment study.

**Scoping:** Identifying relevant potential impacts for assessment, considering legislative requirements, international conventions, expert input, and public involvement. This stage also involves identifying alternative solutions, incorporating safeguards in project design, and determining terms of reference for the impact assessment.

**Assessment and Evaluation:** Predicting and identifying likely environmental impacts, including the detailed exploration of alternatives.

**Reporting:** Preparing the Environmental Impact Statement (EIS) or EIA report, which includes an environmental management plan (EMP) and a non-technical summary for the general audience.

**Review:** Evaluating the Environmental Impact Statement (EIS) based on the terms of reference and public participation.

**Decision-Making:** Determining whether to approve the project, the conditions of approval, or whether to proceed with alternative designs or sites.

**Monitoring, Compliance, Enforcement, and Environmental Auditing:** Monitoring the occurrence of predicted impacts and effectiveness of mitigation measures outlined in the EMP. Ensuring the proponent's compliance with the EMP, addressing unpredicted impacts or failed mitigation measures promptly.

In a whole, EIA serves as a vital process in informed decision-making for sustainable development, balancing project goals with environmental considerations and public welfare.

### **1.3 The Regulatory and Legal Framework for Environmental Assessment (EIA)**

Various regulatory and legal frameworks govern Environmental Impact Assessment (EIA) in Nigeria. Key legislation includes:

#### **Federal Environmental Protection Agency (FEPA) Degree No. 58 of 1988**

Grants FEPA statutory powers to protect, restore, and preserve ecosystems.  
Enforces water and air quality standards and issues EIA permits for major industrial projects.

#### **Nigerian Urban and Regional Planning Law (Decree 38 of 1992)**

Ensures proper development control for liveable, safe, and healthy human settlements.  
Requires EIA reports for specific developments, including residential land, factories, and places of worship, major recreational developments, institutional buildings, and commercial or industrial buildings.

#### **Environmental Impact Assessment (EIA) Decree No. 86 of 1992**

Empowers FEPA to prepare guidelines for EIA reports.  
Mandates EIA for specific activities, especially in the petroleum industry.

#### **Rivers State Environmental Protection Edict No. 2 of 1994**

Empowers the State Ministry of Environment to demand EIA reports from developers.  
Regulates developments to protect biodiversity, environmental resources, and natural resources (Ajie & Dienya, 2014).

### **2.2 Land Reclamation**

Land reclamation is the process of converting underutilized or unproductive areas into usable land for various purposes. It encompasses creating new land from the sea. Land reclamation has historical roots, with examples ranging from ancient civilizations to contemporary urban development projects. According to Blasco, Chapman, Campana, and Hampel (2016), the inception of significant land reclamations traces back to the 1970s, notably with the extension of the Port of Rotterdam in the Netherlands. This marked the commencement of the contemporary era of land reclamation, rapidly proliferating worldwide. In 1975, Singapore's government initiated the construction of Changi Airport on the eastern tip of the country, utilizing over 40 million cubic meters of sand reclaimed from the seabed. Prominent instances of coastal land reclamation include Hong Kong, Singapore, the Netherlands (OSPAR, 2008a,b; Hilton and Manning, 1995), and extensive stretches of mainland China's coastline (An, Li, Guan, Zhou, Wang et al., 2007).

### **3.0 Methods and Materials**

There are four primary methodologies employed for identifying, measuring, interpreting, and communicating the impacts associated with any project, namely the checklist, matrix, overlay, and baseline methods. The checklist method involves compiling a comprehensive list of environmental effect and impact indicators. However, due to the inherent limitation of knowledge not being exhaustive, this method proves challenging for most projects and is deemed unsuitable for the current endeavour.

Similarly, the matrix method is not suitable for this project, as the final decisions projected through quantitative or qualitative techniques in controversial assessments can potentially be

manipulated by the researcher. The checklist of environmental conditions used in identifying cause-and-effect relationships is subjective to researcher submissions.

Conversely, the overlay method is applicable for projects covering large areas, such as metropolitan regions, river basin areas, or states, rendering it unsuitable for the relatively small scale of this project. In contrast, the baseline method utilizes easily monitored and assessed anthropogenic elements in the environment for impact identification and assessment. This method has been chosen to evaluate the impact that the proposed project will have on its immediate environment.

Consequently, environmental baseline data for this project were gathered through field sample collection, photographs, and interviews.

## 4.0 Results and Discussions

### 4.1 Physical characteristics of the Project site

#### 4.1.1: Location

The Ogbunabali reclamation project is positioned along the eastern bypass road/NLNG road, with geographic coordinates taken from a site point at  $40^{\circ}47'51.32''N$  and  $7^{\circ}01'16.95''E$ . Bounded by the Ogbunabali creek to the north, the Eastern bypass road to the west, NLNG road to the south, and NLNG–Nkpogu link road to the east, the total sand-filled area is estimated at  $145,372.70m^2$  using GIS. Refer to Figure 2 for an illustration of the reclaimed area outlined in red.



Fig. 2: Imagery of project site and environs  
 Source: Google Earth, 2022

#### 4.1.2 Vegetation

The project site falls within the saltwater swamp vegetation zone. While the natural vegetation originally included mangrove trees and other plant species, anthropogenic actions have led to the removal of the natural vegetation. Presently, the area stands bare without any form of vegetation.

#### 4.1.3 Climate

Port Harcourt experiences a tropical monsoon climate (Köppen: Am) characterized by lengthy and heavy rainy seasons and brief dry seasons. The months of December to February constitute the dry season, with the harmattan influence being less pronounced. The city's heaviest precipitation occurs in September, with an average rainfall of 367 mm, while December is the driest month, with an average rainfall of 20 mm. The temperatures in the city

remain relatively constant throughout the year, typically ranging between 25°C and 28°C (Wikipedia, 2022).

#### 4.1.4 Hydrology, Terrain and Landform

Port Harcourt exhibits a monotonously flat landform, interspersed with creeks and rivers flowing into the Bonny River in the south and Imo River in the west. The project site is flanked by the Ogbunabali creek to the north and is in proximity to the Amadi Creek in the east, serving as natural storm water drainage channels for the city. Refer to Fig. 3 for an illustration of one of the creeks close to the project site.

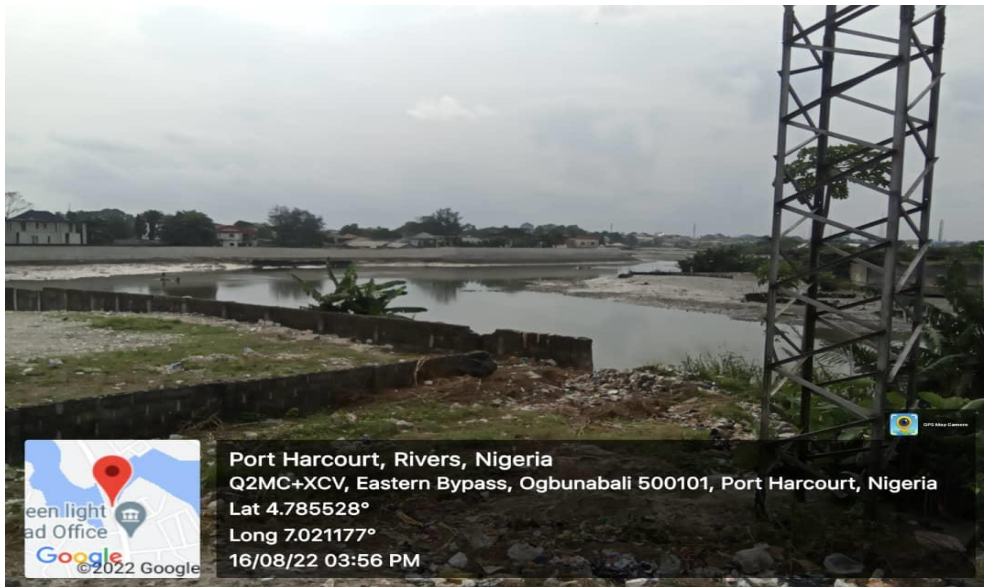


Fig. 3: A view of one of the creeks close to the project site  
Source: Researcher's Fieldwork

#### 4.1.5 Accessibility

The project site is primarily accessible via the Eastern Bypass road and NLNG road, both experiencing heavy traffic as they connect the Abuloma/Amadi axis to the Ogbuanabli, Old GRA, and Marine Base axis of the city. This ensures accessibility from various parts of the city. Fig 4 provides a view of one of the access roads leading to the site.



Fig. 4: A view of the access road leading to the project site  
Source: Researcher's Fieldwork

#### 4.1.6 Adjoining developments

The project site is situated within a built-up community, impacting nearby developments. Immediate vicinity developments include the NLNG office, residential neighborhoods, and commercial establishments. Fig 5 and 6 showcase some of these developments in proximity to the project site.

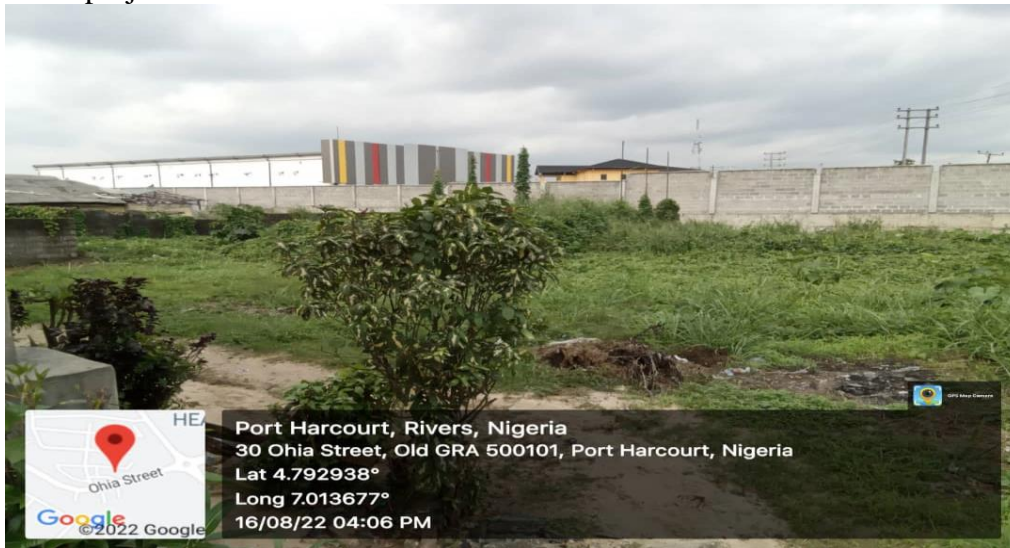


Fig.5: A view of an adjoining area close to parts of the reclaimed site  
Source: Researcher's Fieldwork

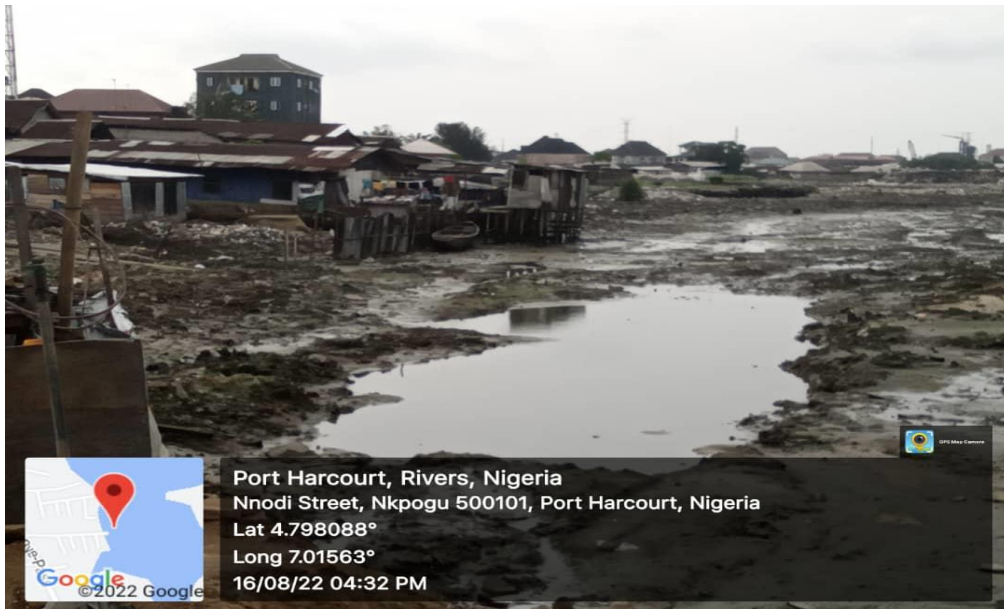


Fig. 6: A view adjoining settlement near the project site  
Source: Researcher's Fieldwork

## 4.2 Project Proponents and their Activities

The Ogunabali waterfront reclamation project is spearheaded by the Rivers State Government as a strategic initiative to enhance the development of Port Harcourt City. The government aims to provide essential infrastructure and services, aligning with its broader mission to create additional land for various development purposes.

The project focuses on the reclamation of land along the Ogunabali creek in Port Harcourt. Key activities involve dredging sediments from the adjacent riverbed, utilizing suction pipes connected to a dredger, and depositing the dredged materials onto the designated reclaimed area.

The comprehensive set of reclamation activities and associated tasks include:



- i. Moving of Machinery and Personnel to the Project Site:
  - ii. Transporting necessary equipment and personnel to the designated project site to commence the reclamation process.
  - iii. Preconstruction and Strengthening of Bond Walls:
  - iv. Conducting preconstruction activities, including fortifying bond walls to facilitate the proper settling of sediments during the reclamation process.
  - v. Dredging of Sand for Reclamation from Adjacent Riverbeds:
  - vi. Implementing the dredging process to extract sand from the adjoining riverbeds for the purpose of land reclamation.
  - vii. Setting Up a Temporary Office Structure:
  - viii. Establishing a temporary office structure at the project site to facilitate efficient project management and coordination.
  - ix. Perimeter Fencing of the Reclaimed Area:
  - x. Installing perimeter fencing around the reclaimed area to delineate the project site and ensure security.
  - xi. Developing the Site to the Allocated Land Use:
  - xii. Undertaking site development activities to align with the predetermined land use, ensuring that the reclaimed land serves its intended purpose effectively.
- The combination of these activities reflects the multifaceted approach employed by the project proponents to achieve successful land reclamation, contributing to the overall development objectives of the Rivers State Government in Port Harcourt City.



Fig 7: A view of the sand filled area  
Source: Researcher's Fieldwork

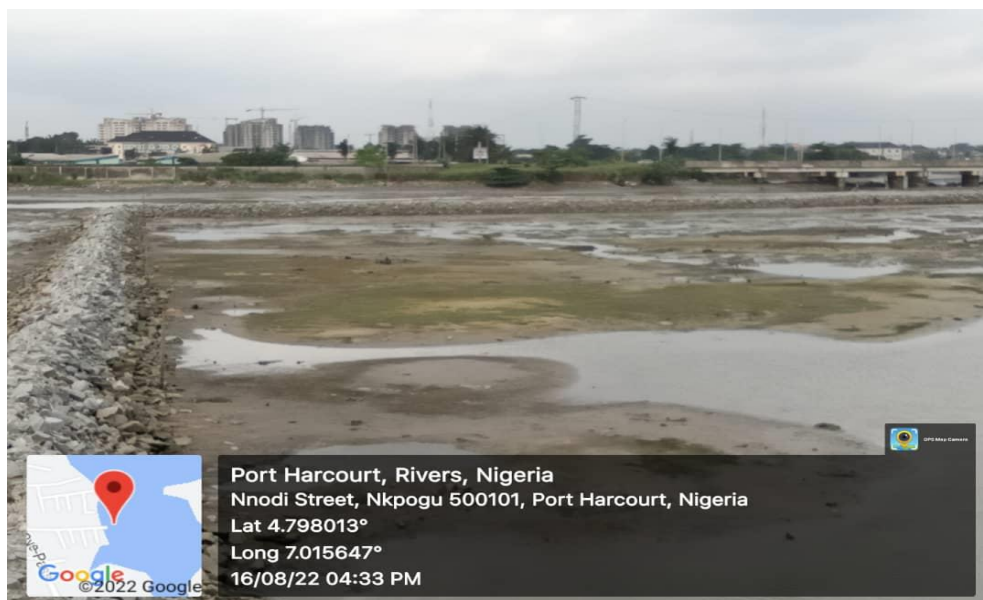


Fig 8: A view of the bond wall area to be reclaimed  
Source: Researcher's Fieldwork.

### 4.3 Impacts on the Physical Environment, Human Activities, Infrastructure, and Socioeconomics

#### 4.3.1 Impacts on the Physical Environment

##### Ecological Disruption

The dredging activities, involving the removal of approximately 50,000 cubic meters of sediments, has led to short-term disruption of local ecosystems, impacting biodiversity and habitat integrity.

##### Changes in Hydrology

The alteration of water flow patterns due to the reclamation process has resulted in a temporary 20% decrease in water circulation within the Ogbunabali creek, influencing aquatic ecosystems and water quality.

##### Loss of Vegetation Cover

Removal of an estimated 14.5 hectares of natural vegetation during the reclamation process has resulted in a visible loss of green cover and flood basin, affecting the aesthetic and environmental quality of the area.

#### 4.3.2 Impacts on Human Activities

##### Disruption of Livelihoods

Local communities relying on the Ogbunabali waterfront for fishing or other activities have experienced permanent disruptions, leading to an estimated 50% reduction in income for affected households during the construction phase. Since the ecosystem for fishing is totally removed, they had to resort to other forms of sustenance. A key informant explained

*'Some of us have to travel far to where we still have this vegetation to get fish for the family but it is not business as usual when you can come out of your house, walk down and cast a net for a catch'*

Another explained... *'we had to get into buying and selling to keep the family going. It is not easy for us to cross over to Amadi creek since we do not own boat'*

##### Changes in Access and Mobility

Temporary alterations in access routes and mobility patterns resulted in a 25% increase in travel time for residents and businesses in the vicinity during the construction period.

### **4.3.3 Impacts on Infrastructure**

#### **Infrastructure Development**

Infrastructural facilities are fundamental to the operations of any development. Their presence is a catalyst to all forms of human settlements and developments. The reclamation project itself involves the development of infrastructure, including the construction of bond walls, temporary office structures, and perimeter fencing. This contributes to both short-term and long-term changes in the local infrastructure.

#### **Electricity**

The reclamation project will not increase the demand for electricity in the area. However, when the structures are finally developed on the reclaimed area, this will increase the demand for electricity demand in the project area. Thus, the impact on existing electricity supply will be insignificant.

#### **Road Infrastructure**

The project is sited along an existing road. The developer has maintained a reasonable setback from the road therefore the impact on the road will be minimal.

#### **Potential for Disruptions**

Construction activities pose short-term disruptions to existing infrastructure. The project is sited in an area with significant traffic volume. The proposed reclamation work affects the traffic flow along the road. This has led to traffic hold-ups especially when heavy duty equipment is being transported to the site. Key informants estimated a projected 25% increase in traffic congestion and potential disruptions to utilities in the surrounding areas.

### **4.3.4 Impacts on Socioeconomics**

#### **Employment Opportunities**

Primary occupation of the people such as fishing has been impacted by the reclamation. The dredging activities affected the water quality, the aquatic organisms and the entire fishing area which has ultimately affected the primary occupation of the people. But the project's execution according to key informants has created direct employment opportunities, including an estimated 200 jobs during the construction phase and additional indirect employment through emerging economic activities.

#### **Property Value Fluctuations**

Changes in the physical landscape and improved infrastructure influenced property values in Ogbunabali, Nkpogu and Amadi extensions, potentially leading to a 10% increase in real estate prices for properties in proximity to the newly reclaimed land.

#### **Community Development**

Successful reclamation and subsequent development contribute to community growth, providing opportunities for new businesses, improved services, and an enhanced living environment. From key informants, it was gathered that the land reclamation has resulted in a 20% increase in local businesses and services.

In whole, the Ogbunabali waterfront reclamation project has multifaceted impacts that extend across the physical environment, human activities, infrastructure, and socioeconomics. It is

essential for project stakeholders to closely monitor and manage these impacts, ensuring a balanced and sustainable approach to development in Port Harcourt.

#### **4.4 Sustainable Mitigation Measures**

Table 1 presents a comprehensive overview of the negative impacts associated with the Ogbunabali land reclamation project, along with corresponding mitigation measures and sustainability focuses. Each negative impact is systematically addressed with a specific mitigation measure aimed at minimizing adverse effects, and a sustainability focus aimed at ensuring long-term environmental, social, and economic resilience.

**Ecological Disruption:** The mitigation measure involves implementing an ecological restoration plans, including replanting native vegetation and creating habitats. The sustainability focus emphasizes prioritizing indigenous plant species to enhance ecosystem resilience and biodiversity, ensuring the long-term health of the local environment.

**Changes in Hydrology:** To mitigate changes in water flow patterns, a water management strategy is proposed. The sustainability focus emphasizes integrating green infrastructure solutions for natural storm water management and water quality, promoting sustainable water resource management.

**Loss of Vegetation Cover:** The proposed afforestation program aims to replace lost vegetation, with a sustainability focus on engaging the community in tree planting initiatives. This fosters environmental stewardship and promotes community involvement in habitat restoration efforts.

**Disruption of Livelihoods:** A community support fund is suggested to mitigate disruptions to local livelihoods, with a sustainability focus on investing in skill development and alternative livelihood initiatives. This approach aims to build long-term community resilience and reduce dependency on external support.

**Changes in Access and Mobility:** A traffic management plan with alternative routes is proposed to mitigate disruptions in access and mobility. The sustainability focus emphasizes promoting sustainable transportation options to reduce the community's long-term dependence on private vehicles.

**Infrastructure Development:** The mitigation measure involves implementing a phased construction approach to minimize disruptions, with a sustainability focus on incorporating green building practices and energy-efficient technologies. This ensures that newly developed infrastructure aligns with long-term sustainability goals.

**Potential for Disruptions:** Thorough impact assessments and risk mitigation measures are proposed to address potential disruptions. The sustainability focus involves collaborating with local utilities for efficient infrastructure upgrades, optimizing resource use and minimizing long-term disruptions.

**Employment Opportunities:** Establishing a skills development center for locals is proposed to address potential job disruptions. The sustainability focus emphasizes encouraging the development of sustainable businesses aligned with community needs, fostering long-term employment opportunities and economic growth.

**Property Value Fluctuations:** Transparent communication and community engagement are suggested to address potential fluctuations in property values. The sustainability focus

involves promoting inclusive urban planning, balancing economic development with community identity preservation, and ensuring equitable benefits for all residents.

**Community Development:** Establishing a community development fund to support ongoing initiatives is proposed, with a sustainability focus on fostering partnerships for sustainable development between government, private sector, and community organizations. This approach ensures that community development efforts are collaborative, inclusive, and aligned with long-term sustainability goals.

Overall, Table 1 provides a structured and holistic framework for addressing the negative impacts of the Ogbunabali land reclamation project while promoting sustainability and resilience across environmental, social, and economic dimensions.

**Table 1: Sustainable Mitigation Measures**

Negative Impact	Mitigation Measure	Sustainability Focus
Ecological Disruption	Implement ecological restoration plan, including replanting native vegetation and creating habitats	Prioritize indigenous plant species, enhancing ecosystem resilience and biodiversity
Changes in Hydrology	Develop water management strategy to mitigate flow pattern changes	Integrate green infrastructure solutions for natural storm water management and water quality
Loss of Vegetation Cover	Implement afforestation program to replace lost vegetation	Engage community in tree planting initiatives, promoting environmental stewardship
Disruption of Livelihoods	Establish community support fund for affected individuals and businesses	Invest in skill development and alternative livelihood initiatives for long-term community resilience
Changes in Access and Mobility	Develop traffic management plan with alternative routes	Promote sustainable transportation options to reduce long-term dependence on private vehicles
Infrastructure Development	Implement phased construction approach to minimize disruptions	Incorporate green building practices and energy-efficient technologies in new infrastructure
Potential for Disruptions	Conduct thorough impact assessments and implement risk mitigation measures	Collaborate with local utilities for efficient infrastructure upgrades, optimizing resource use
Employment Opportunities	Establish skills development center for locals. Engage locals in the project from the inception to completion of the project, train local to acquire new skill sets	Encourage development of sustainable businesses aligned with community needs
Property Value Fluctuations	Implement transparent communication and community engagement	Promote inclusive urban planning balancing economic development with community identity preservation
Community Development	Establish community development fund to support ongoing initiatives	Foster partnerships for sustainable development between government, private sector, and community

Negative Impact	Mitigation Measure	Sustainability Focus
		organizations

Source: Authors, 2024

### 5.0 Recommendations for the Ogunabali Land Reclamation Project

The following recommendations are tailored for policymakers, urban planners, and stakeholders, advocating for the adoption of responsible land reclamation practices to minimize adverse effects.

- i. **Stakeholder Engagement:** Foster transparent communication and active engagement with all stakeholders, including local communities, government agencies, and environmental organizations, throughout the project lifecycle.
- ii. **Environmental Monitoring:** Implement a robust environmental monitoring program to track the project's impact on local ecosystems, water quality, and air quality. Regular monitoring and data analysis will enable timely interventions to mitigate adverse effects.
- iii. **Adaptive Management:** Adopt an adaptive management approach that allows for flexibility in project implementation based on monitoring data and stakeholder feedback. This approach ensures that the project can respond effectively to changing environmental conditions and community needs.
- iv. **Green Infrastructure:** Incorporate green infrastructure elements, such as vegetated swales and permeable pavements, into the project design to enhance storm water management and reduce runoff pollution. Green infrastructure promotes ecological resilience and improves overall environmental quality.
- v. **Community Benefits:** Ensure that the project delivers tangible benefits to local communities, such as job opportunities, skills training programs, and improved access to public amenities. Community development initiatives should be inclusive, equitable, and responsive to community priorities.
- vi. **Biodiversity Conservation:** Prioritize the conservation of biodiversity hotspots and sensitive habitats within the project area. Implement habitat restoration and conservation measures to protect endangered species and preserve ecological diversity.
- vii. **Resilient Infrastructure:** Design infrastructure components, such as roads, bridges, and buildings, to withstand potential climate-related hazards, such as flooding and extreme weather events. Resilient infrastructure minimizes the risk of damage and disruption during extreme weather events.
- viii. **Sustainable Materials:** Use sustainable construction materials and practices to minimize the project's carbon footprint and environmental impact. Prioritize the use of recycled materials, renewable energy sources, and low-impact construction techniques.

- ix. **Long-Term Maintenance:** Develop a comprehensive maintenance plan to ensure the ongoing integrity and functionality of project infrastructure. Regular maintenance activities, such as vegetation management and erosion control, are essential for preserving the project's long-term benefits.
- x. **Knowledge Sharing:** Facilitate knowledge sharing and capacity building initiatives to empower local communities and government agencies to implement sustainable land reclamation practices. Exchange best practices, lessons learned, and innovative solutions with other stakeholders to promote continuous improvement.

By implementing these recommendations, the Ogbunabali Land Reclamation Project can achieve its development objectives while minimizing environmental degradation, enhancing community resilience, and promoting long-term sustainability.

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