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Examining How the Excavation, Deepening and Opening of MBITA Causeway by Kenya Shipyards Limited has Promoted Socio-Economic Development in Lake Victoria Region, Kenya

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DECLARATION

This research proposal is my original work and to the best of my knowledge it has not been presented for a degree in any other University or any other award.

Signature..... Date.....

GETEMBE EVANS MOMANYI

PHD/DS/00116/022

SUPERVISORS

We confirm that the work reported in this project was carried out by the candidate under our supervision.

DR. CALVINCE BARRACK

Signature..... Date.....

DR. MICHAEL OWISO

Signature..... Date.....

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DEDICATION

This paper is dedicated to the resilient communities of the Lake Victoria region, whose livelihoods and heritage are deeply intertwined with the lake's ecosystem. Their unwavering commitment to sustainable practices and environmental conservation serves as an inspiration for this study. Additionally, this work is dedicated to Kenya Shipyards Limited and all stakeholders who have contributed to the restoration of Lake Victoria's ecological and socioeconomic vitality.

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ABSTRACT

The excavation, deepening, and opening of the Mbita Causeway by Kenya Shipyards Limited marks a transformative intervention in Lake Victoria's ecosystem and socio-economic landscape. Historically, the causeway's obstruction of natural water flow led to environmental degradation, including water hyacinth proliferation, reduced aquatic biodiversity, and diminished socio-economic activities such as fishing and tourism. This study investigates the project's contributions to environmental conservation, socio-economic revitalization, and the challenges that remain. Employing a mixed-methods approach, the study collected quantitative data through surveys and qualitative insights from interviews and focus group discussions with 412 participants, including fisherfolk, tourism operators, government officials, and community members. Quantitative data were analyzed using descriptive statistics, while thematic analysis was employed for qualitative data. Key findings reveal that the restoration of natural water flow has improved water quality, significantly reduced water hyacinth, and created a conducive environment for aquatic biodiversity to thrive. The enhanced breeding grounds for fish have revitalized fishing activities, boosting local incomes and creating employment opportunities. Additionally, the elimination of weed obstacles has facilitated tourism activities, including boat riding and wildlife observation, contributing to economic growth. The collaboration between government agencies, such as NEMA, KMA, and KCGS, has been instrumental in leveraging the blue economy's potential through infrastructure development, including new ports and piers. However, the study highlights ongoing challenges, particularly pollution from incoming rivers and industrial discharges, which threaten the lake's ecological stability. Addressing these challenges requires robust pollution control measures and sustained multi-agency collaboration. This research underscores the critical role of infrastructure projects in fostering environmental conservation and socio-economic development while emphasizing the need for sustainable management practices. By providing actionable insights for policymakers, environmental agencies, and stakeholders, this study contributes to the broader discourse on balancing development and environmental preservation in lake ecosystems. It advocates for an integrated approach to managing Lake Victoria's resources, ensuring that the benefits of the Mbita Causeway project are preserved and expanded for future generations.

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CHAPTER ONE
INTRODUCTION

A. Background to the Study

Water transport plays a crucial role in the socio-economic development of regions with large water bodies, providing an efficient and cost-effective means of transport for goods and people. Lake Victoria, the largest freshwater lake in Africa, holds immense socio-economic significance for the East African Community (EAC), serving as a vital resource for transportation, fishing, tourism, and livelihoods for millions of people (Abila, 2020). Spanning Kenya, Uganda, and Tanzania, the lake supports regional trade, provides critical ecosystem services, and underpins the cultural heritage of surrounding communities. However, infrastructural and navigational challenges, coupled with ecological issues such as pollution, habitat degradation, and invasive species like the water hyacinth, have significantly hindered the lake's potential (Smith & Jones, 2020).

Kenya Shipyards Limited (KSL), a state-owned corporation, has emerged as a pivotal player in enhancing Kenya's maritime infrastructure. One of its flagship projects has been the excavation, deepening, and opening of the Mbita Causeway. Initially constructed in the 1980s to connect Rusinga Island to the mainland, the causeway disrupted water flow between Lake Victoria's Winam Gulf and the main lake. This led to ecological disruptions, including water stagnation, pollutant accumulation, and the proliferation of invasive species, which in turn adversely affected fishing, tourism, and trade (Awange & Ong'ang'a, 2006; Kenya Shipyards Limited, 2023).

Recognizing these challenges, KSL's interventions aim to restore natural water flow, improve water transport efficiency, and mitigate environmental degradation. These efforts are aligned with Kenya's Vision 2030 and the blue economy agenda, which emphasize sustainable utilization of water resources for economic growth and environmental conservation. This paper examines the impact of KSL's initiatives on socio-economic development in the Lake Victoria region, focusing on how improved water transport has enhanced trade, accessibility, and livelihoods while addressing environmental concerns.

Lake Victoria is a vital socio-economic resource for the East African region, providing livelihoods for millions through fishing, trade, and tourism. However, decades of environmental and infrastructural challenges have limited its potential. The Mbita Causeway, constructed in the 1980s, served as a major infrastructural development connecting Rusinga Island to the mainland in Kenya. While it facilitated road transport, it inadvertently disrupted natural water flow between the Winam Gulf and the main lake. This disruption caused water stagnation, accumulation of pollutants, and the proliferation of the water hyacinth, which severely impacted aquatic biodiversity and the productivity of the lake (Odada et al., 2004; Kenya Shipyards Limited, 2023).

To address these challenges, KSL spearheaded the excavation, deepening, and reopening of the Mbita Causeway. This initiative aimed to restore water circulation, reduce pollutant accumulation, and create favorable conditions for aquatic life. Additionally, the project sought to rejuvenate water transport and stimulate economic activities such as fishing, tourism, and trade. By aligning with Kenya's blue economy agenda, KSL's interventions represent a model for integrating environmental conservation with socio-economic development.

This study evaluates the effectiveness of these initiatives, highlighting their contributions to environmental sustainability and socio-economic transformation while identifying the challenges that remain in ensuring the long-term viability of Lake Victoria as a key resource for the region.

B. Problem Statement

Lake Victoria, the largest freshwater lake in Africa, is an essential resource for the socio-economic development of the East African region. It supports livelihoods through fishing, transportation, trade, and tourism, providing critical ecosystem services to millions of people (Abila, 2020). However, over the years, the lake's potential has been significantly compromised by infrastructural and environmental challenges. The construction of the Mbita Causeway in the 1980s, while facilitating road connectivity between Rusinga Island and the mainland, disrupted the natural water flow between the Winam Gulf and the main lake. This disruption led to water stagnation, accumulation of pollutants, and the spread of invasive species like the water hyacinth, adversely impacting aquatic ecosystems and economic activities such as fishing and tourism (Odada et al., 2004).

To address these issues, Kenya Shipyards Limited (KSL) undertook the excavation, deepening, and reopening of the Mbita Causeway. This project aimed to restore natural water flow, improve navigability, and revitalize economic activities in the Lake Victoria region. Despite these efforts, there remains limited empirical evidence on the extent to which these interventions have contributed to socio-economic development. Understanding the effectiveness of KSL's initiatives is crucial for determining their impact on improving livelihoods, enhancing trade, and fostering sustainable regional development.

This study investigates how the excavation, deepening, and opening of the Mbita Causeway by KSL has promoted socio-economic development in the Lake Victoria region. By examining the outcomes of this project, the research aims to provide insights into the role of infrastructure rehabilitation in addressing ecological challenges and supporting sustainable growth.

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C. General Study Objective:

To examine how the excavation, deepening, and opening of the Mbita Causeway have impacted socio-economic development.

D. Specific Objectives:

- To analyze how improved water flow has enhanced environmental and aquatic health.
- To assess the socio-economic benefits, including fishing, tourism, and job creation.
- To evaluate the collaboration between government agencies and local communities.
- To identify ongoing challenges and propose solutions.

E. Research Questions

- How has the improved water flow affected environmental conservation and aquatic life?
- What socio-economic activities have been revitalized or introduced as a result of this project?
- What are the roles of government agencies and stakeholders in sustaining these benefits?
- What challenges persist in maintaining the lake's ecological and economic health?

F. Significance of the Study

This study is significant as it explores the impact of Kenya Shipyards Limited's (KSL) excavation, deepening, and reopening of the Mbita Causeway on socio-economic development in the Lake Victoria region. By assessing the effectiveness of this intervention, the study contributes to a deeper understanding of how infrastructure rehabilitation can address environmental challenges and stimulate economic growth.

The research provides valuable insights for policymakers on how improved water transport can enhance livelihoods by revitalizing key economic sectors such as fishing, trade, and tourism. Lake Victoria, a critical resource for millions of East Africans, plays a significant role in regional economic activities (Abila, 2020). The findings will help justify investments in similar infrastructural projects and guide strategies for sustainable development.

Additionally, the study underscores the environmental benefits of infrastructure restoration. The Mbita Causeway's initial construction disrupted ecological balance, leading to water stagnation, pollution accumulation, and the spread of invasive species like the water hyacinth (Odada et al., 2004). By evaluating the outcomes of KSL's interventions, the study informs strategies for sustainable management of critical ecosystems and guides efforts to balance ecological conservation with economic development.

The study aligns with Kenya's Vision 2030 and the blue economy framework, which emphasize sustainable resource utilization and regional prosperity (Government of Kenya, 2017). The findings highlight how targeted interventions like the Mbita Causeway project contribute to Kenya's development goals, including fostering job creation, enhancing regional trade, and promoting environmental sustainability.

Moreover, the research enriches the academic discourse on sustainable development by examining the interplay between environmental restoration and socio-economic growth. It serves as a reference for future studies, providing a model for assessing the impacts of water transport infrastructure rehabilitation in other regions facing similar challenges.

Finally, the study highlights the importance of multi-stakeholder collaboration and long-term planning in addressing persistent challenges and ensuring lasting benefits for local communities. By improving livelihoods through revitalized fishing, tourism, and other economic activities, the research demonstrates the transformative potential of infrastructure interventions for regional development.

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CHAPTER TWO
LITERATURE REVIEW

A. Environmental Impact of Waterway Restoration

The excavation, deepening, and opening of the Mbita Causeway by Kenya Shipyards Limited (KSL) has been a significant project aimed at improving water transport efficiency in the Lake Victoria region of Kenya. While these activities have clear socio-economic benefits, they also have notable environmental implications. This section examines the environmental impact of such restoration activities, with a focus on the Mbita Causeway, drawing on various studies and literature.

- *Water Quality Improvement:*

The excavation and deepening of waterways like the Mbita Causeway can have a positive impact on water quality. According to Odada et al. (2004), dredging and excavation activities help in removing silt, sedimentation, and debris from the waterways, which can improve the clarity of water and oxygen levels, particularly in congested or shallow areas. For the Mbita Causeway, this has led to better navigation for vessels and enhanced water flow, benefiting the aquatic ecosystem by improving circulation and reducing the growth of harmful algae that thrive in stagnant water.

- *Sediment and Nutrient Dynamics:*

While the excavation and deepening of the Mbita Causeway have improved navigation, they can also disrupt sediment dynamics. Dredging typically releases sediments that may contain pollutants or harmful substances like heavy metals and nutrients (Gittman et al., 2016). If not carefully managed, the release of these pollutants into the water can degrade water quality temporarily and harm aquatic life. However, with proper sediment management strategies, such as sediment capture and controlled disposal, these adverse impacts can be minimized.

- *Habitat Disruption and Biodiversity:*

Waterway restoration efforts, such as deepening and widening of causeways, often lead to habitat disruption. In the case of Lake Victoria, excavation can alter important aquatic habitats, particularly for fish species that rely on shallow or submerged areas for breeding and feeding (Jorgensen et al., 2013). Restoration projects, such as the Mbita Causeway excavation, could affect the habitats of native fish species, such as Nile perch, tilapia, and other endemic fish species. However, if managed responsibly, these impacts can be mitigated through habitat restoration efforts alongside excavation.

- *Coastal Erosion and Shoreline Stability:*

Increased excavation can influence the stability of nearby shorelines. According to the findings by Zaki et al. (2011), dredging activities can increase the rate of erosion along shorelines due to changes in water flow patterns. This can lead to the erosion of valuable agricultural land, as well as damage to local infrastructure. However, with effective shoreline management strategies such as planting vegetation along the edges of the causeway, these risks can be reduced, providing a more stable environment.

- *Carbon Sequestration and Climate Resilience:*

Waterway restoration in the Lake Victoria region could enhance the ability of local ecosystems to sequester carbon. Wetlands surrounding the Mbita Causeway, if properly managed, can serve as significant carbon sinks. As noted by Mitsch et al. (2013), wetland restoration can absorb and store carbon, helping mitigate climate change. Similarly, the excavation of the Mbita Causeway could help in the creation of buffer zones that protect wetland ecosystems and contribute to local carbon storage, enhancing the climate resilience of the area.

- *Socio-Economic Benefits and Ecological Balance:*

The excavation, deepening, and opening of the Mbita Causeway have significant socio-economic benefits, but they must be balanced with environmental sustainability. According to Barbier et al. (2011), improved transportation infrastructure increases trade, facilitates fishing activities, and boosts tourism. These economic benefits, especially for the communities around Lake Victoria, are critical for poverty reduction and local development. However, without proper environmental oversight, the ecological impact of waterway restoration can undermine these gains. Therefore, projects like the Mbita Causeway should integrate environmental management to ensure that the ecosystem's health is not compromised in the pursuit of socio-economic development.

- *Climate Change and Flood Management:*

Waterway restoration has the potential to contribute to flood management, particularly in areas vulnerable to climate change. In the Lake Victoria region, areas surrounding the Mbita Causeway are often subject to flooding due to seasonal rains and rising water levels. According to Temmerman et al. (2013), restoring waterways can help manage floodwaters, prevent shoreline erosion, and protect local communities from the adverse effects of flooding. By improving the water transport infrastructure through the excavation of the Mbita Causeway, the region becomes more resilient to climate-related risks.

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➢ *Long-Term Sustainability of Ecosystems:*

For the Mbita Causeway project, the long-term sustainability of the local ecosystem is essential. Restoration projects that overlook environmental factors can lead to unintended consequences such as loss of biodiversity, water quality degradation, and altered aquatic food chains. As highlighted by Zedler & Kercher (2005), sustainable waterway restoration requires continuous monitoring, community engagement, and adaptive management practices. This ensures that the restoration efforts support both the ecological and socio-economic needs of the region in the long run.

In conclusion, while the excavation, deepening, and opening of the Mbita Causeway offer numerous benefits to the Lake Victoria region, particularly in improving water transport efficiency and stimulating socio-economic development, careful consideration of the environmental impacts is essential. With proper management, these environmental challenges can be mitigated, ensuring that the project remains a model of sustainable development.

B. Role of State-Owned Corporations in Infrastructure Development

State-owned corporations (SOCs) play a pivotal role in the development and management of critical infrastructure, particularly in sectors like transportation, energy, water, and public works. In the context of Kenya, state-owned entities such as Kenya Shipyards Limited (KSL) are central to promoting economic growth, improving public services, and enhancing regional development. The excavation, deepening, and opening of the Mbita Causeway by KSL is a case that illustrates the significant impact of state-owned corporations in infrastructure development and its contribution to the socio-economic transformation of the Lake Victoria region.

➢ *Infrastructure Development and Socio-Economic Growth:*

State-owned corporations like KSL are often tasked with implementing large-scale infrastructure projects that directly impact the socio-economic development of a region. According to Aigbavboa and Thwala (2014), such corporations have the capacity to address infrastructure gaps by providing efficient transportation systems, which are critical for economic activities like trade, tourism, and agriculture. In the case of KSL's work on the Mbita Causeway, improved waterways and navigability facilitate better transportation of goods and people across Lake Victoria, reducing travel time, enhancing trade, and improving access to services (Nkonge, 2015).

➢ *Contribution to Regional Development:*

The activities of state-owned corporations often align with national development goals, especially in developing regions. In their study on infrastructure and regional growth, Tisdell and Sinha (2004) found that state-owned entities are critical for addressing regional disparities in infrastructure. In Kenya's Lake Victoria region, the efforts of KSL to open and deepen the Mbita Causeway have directly impacted the accessibility of remote islands and communities, improving social mobility, access to markets, healthcare, and education (Mugisha, 2018). The causeway also supports local industries like fishing and tourism, which are key economic drivers in the region.

➢ *Enhancing Public-Private Partnerships:*

State-owned corporations in Kenya also contribute to fostering public-private partnerships (PPPs) that encourage further investment in infrastructure projects. The work done by KSL, in collaboration with other governmental and private bodies, creates a platform for leveraging additional resources and expertise. Karanja (2017) highlights that such collaborations are essential for the successful completion of infrastructure projects, as they often combine the advantages of public sector stability with private sector efficiency and innovation. These partnerships increase the capacity of SOCs to deliver complex projects like the Mbita Causeway, benefiting from both public funding and private technical expertise.

➢ *Capacity Building and Skill Development:*

State-owned corporations like KSL play an essential role in building local capacity and developing a skilled workforce, particularly in specialized areas such as shipbuilding, engineering, and marine infrastructure. By involving local communities in the planning and execution of large projects, KSL has contributed to skills development in the Lake Victoria region. According to Nyoni and Kamuzora (2017), state-owned corporations provide job opportunities and vocational training, which helps uplift the local workforce and reduces unemployment rates, thus directly contributing to the socio-economic development of the area.

➢ *Socio-Economic Impacts of Improved Water Transport Infrastructure:*

The excavation, deepening, and opening of waterways significantly impact local economies by boosting maritime trade, tourism, and agriculture. Studies by Oyebanji (2019) show that efficient water transport infrastructure fosters economic activities in port and coastal regions by facilitating the easy movement of goods. In the case of the Mbita Causeway, the deepening and opening of the waterway enhance navigation for larger vessels, reducing transport costs for goods such as fish and agricultural products. This contributes to higher income generation, particularly for local farmers and fishers who rely on the transport system to access markets.

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➢ *Government's Role in Infrastructure Development through State-Owned Corporations:*

State-owned corporations are integral to achieving national development objectives in infrastructure. The Kenyan government, through KSL, has positioned itself as a key player in infrastructure development in the Lake Victoria region. According to the Kenya Vision 2030, improving transport infrastructure is crucial for unlocking the potential of the country's economic hubs. KSL's efforts in enhancing the Mbita Causeway align with this broader vision, improving connectivity and promoting the region as a focal point for both domestic and international trade.

➢ *Challenges Faced by State-Owned Corporations:*

While state-owned corporations play an important role in infrastructure development, they face numerous challenges, including limited financial resources, political interference, and bureaucratic delays. These challenges can impede the efficiency and effectiveness of infrastructure projects. However, despite these obstacles, state-owned entities like KSL continue to make significant strides in improving regional infrastructure. According to the World Bank (2016), addressing these challenges through reforms, increased transparency, and effective management practices is crucial for improving the performance of state-owned corporations and ensuring successful infrastructure projects.

State-owned corporations like Kenya Shipyards Limited play a significant role in the development of critical infrastructure in Kenya, particularly in regions such as Lake Victoria. The excavation, deepening, and opening of the Mbita Causeway is a prime example of how such projects can promote socio-economic development by improving transportation, trade, regional connectivity, and access to essential services. Despite challenges, the contribution of KSL to infrastructure development showcases the vital role of state-owned corporations in fostering economic growth and improving the quality of life in local communities.

C. Socio-Economic Benefits of Lake Restoration Projects Globally and Regionally

Waterway and lake restoration projects provide significant socio-economic benefits to both local and regional communities. Globally, numerous restoration efforts have demonstrated the positive effects on economic growth, resource sustainability, and improved living conditions. In the context of Lake Victoria, projects like the excavation, deepening, and opening of Mbita Causeway by Kenya Shipyards Limited (KSL) aim to harness these benefits.

➢ *Economic Growth and Infrastructure Development:*

Globally, restoration projects in lakes and waterways have led to enhanced local infrastructure, which supports economic development. For example, the restoration of the Thames River in London has revitalized surrounding areas, boosting property values and creating employment opportunities in tourism and local businesses (Environment Agency, 2008). Similarly, KSL's restoration of the Mbita Causeway has improved transportation channels, facilitating movement of goods and people, which can directly contribute to the economic growth of the Lake Victoria region. Efficient transportation in this region promotes trade and tourism, which in turn creates jobs and boosts local economies.

➢ *Fisheries and Livelihoods:*

A key socio-economic benefit of lake restoration is the revival of the fishing industry. Lake restoration can help enhance fish stocks by improving water quality and reestablishing habitats for aquatic species. In places like Lake Erie in North America, restoration efforts have led to improved water quality and a subsequent rebound in fish populations, benefiting local fishers (Ohio EPA, 2010). Similarly, in the Lake Victoria region, the Mbita Causeway project could enhance the fisheries sector by improving water navigation and promoting sustainable fishing practices.

➢ *Tourism and Recreation:*

Restoration of water bodies often boosts tourism by enhancing the natural beauty of the area and providing recreational opportunities. The restoration of wetlands around the Great Lakes in the U.S. has contributed to the growth of ecotourism, attracting visitors who engage in bird watching, fishing, and other recreational activities (Lake Michigan Federation, 2012). With the opening and deepening of Mbita Causeway, the surrounding areas in the Lake Victoria region could similarly benefit from increased tourism, attracting domestic and international tourists for activities such as fishing, boat tours, and cultural exploration.

➢ *Job Creation and Capacity Building:*

Lake restoration projects, particularly in developing countries, often result in the creation of numerous job opportunities, from manual labor during the restoration process to positions in tourism, fisheries, and environmental management. In the case of the Mbita Causeway project, the restoration and deepening processes could create direct employment opportunities for local workers, as well as indirect jobs in sectors like transport and hospitality.

D. Challenges of Pollution and Sustainable Waterway Management

Waterway restoration, especially in lakes like Lake Victoria, faces challenges related to pollution and the management of waterway resources in a sustainable manner. These challenges can undermine the effectiveness of restoration efforts and hinder long-term socio-economic benefits.

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- *Water Pollution:*

Lake Victoria has faced significant pollution issues due to agricultural runoff, industrial waste, and untreated sewage, which contribute to nutrient loading, water eutrophication, and reduced biodiversity. According to Okello (2017), this pollution affects both the ecological health of the lake and the livelihoods of local communities that depend on its resources. Despite efforts to restore areas like Mbita Causeway, ongoing pollution remains a challenge to achieving sustained improvements in water quality.

- *Invasive Species:*

Invasive species, such as the Nile perch, have caused severe disruptions to the natural ecosystem of Lake Victoria. The Nile perch has altered the fish population dynamics and resulted in the decline of native fish species (Witte et al., 1992). The Mbita Causeway restoration must incorporate strategies for managing invasive species to ensure that the restoration effort does not inadvertently exacerbate these ecological issues, which could affect the livelihoods of local communities dependent on native species for fishing.

- *Overfishing and Unsustainable Practices:*

Overfishing is a major concern in the Lake Victoria region, with unsustainable fishing practices negatively impacting fish stocks. According to Onyango (2019), the high demand for fish has led to practices such as illegal fishing, use of destructive nets, and fishing during restricted seasons. These activities compromise the restoration efforts aimed at rejuvenating fish populations in the region. Ensuring that restoration projects like the Mbita Causeway are paired with effective fisheries management strategies is critical to maintaining long-term socio-economic benefits.

- *Climate Change and Water Level Variability:*

Climate change has led to increased rainfall variability and more extreme weather events in the Lake Victoria region. This has affected water levels, which in turn impact navigation and the overall functionality of the Mbita Causeway. The deepening and opening of the causeway must account for these climate-related factors, ensuring that it can withstand fluctuations in water levels and support long-term resilience against floods and droughts (Kigotho, 2020).

E. Knowledge Gaps Specific to Lake Victoria and Mbita Causeway

Although much has been studied regarding waterway restoration and socio-economic development in general, there are specific knowledge gaps related to the excavation, deepening, and opening of the Mbita Causeway by KSL. Addressing these gaps is crucial for understanding the full impact of the project on both the environment and the local economy.

- *Long-Term Socio-Economic Impacts:*

While there is literature on the short-term benefits of lake restoration projects, there is a lack of long-term studies on how projects like Mbita Causeway influence socio-economic development in the Lake Victoria region. Research on the long-term effects of improved transportation infrastructure on trade, tourism, and local livelihoods is limited. Longitudinal studies are needed to assess the sustained impact of the causeway on the economic activities of surrounding communities.

- *Ecological Effects of Restoration on Fisheries:*

Although there is general knowledge on how waterway restoration can improve fish habitats, there is limited data on the specific effects of the Mbita Causeway restoration on fish populations in Lake Victoria. More research is needed to examine the relationship between the restored causeway, water quality, and fishery productivity. This would include studies on fish migration patterns, breeding cycles, and the restoration of native fish species.

- *Interactions Between Human and Ecological Systems:*

There is also a lack of research on the interactions between local communities and restored ecosystems. How do local fishing communities adapt to the changes in waterway conditions brought about by the Mbita Causeway? More comprehensive studies are needed to understand the socio-cultural dynamics, including the management of fishing practices, community participation, and the potential for conflicts between conservation efforts and local livelihoods.

- *Climate Change Adaptation Strategies:*

As climate change becomes an increasingly critical issue, there is limited research on how the Mbita Causeway restoration incorporates climate change adaptation strategies. More studies are required to examine how changes in water levels, temperature, and precipitation patterns affect the success of the restoration and the resilience of the causeway in the face of climate challenges.

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CHAPTER THREE
RESEARCH METHODOLOGY

A. Research Design

The study employs a descriptive and exploratory approach to get an in-depth understanding of the socio-economic and environmental impacts of the excavation, deepening, and opening of the Mbita Causeway by Kenya Shipyards Limited (KSL). The descriptive design will enable an in-depth analysis and description of the effects of the project on local communities, environmental conditions, and socio-economic activities in the Lake Victoria region. The exploratory nature of the study is intended to identify new insights and fill existing gaps in the literature regarding the role of KSL in improving waterway infrastructure and its long-term outcomes.

B. Study Area

The study is situated in the Lake Victoria region, specifically focusing on the Mbita Causeway, which is located at the point where Rusinga Island connects to the mainland in Mbita Sub-county, Homa Bay County, Kenya. The causeway has historically obstructed the natural flow of water between the main lake and the adjacent Rusinga Channel, limiting water transport and exacerbating environmental degradation. The region is rich in biodiversity and supports various industries, including fishing, agriculture, and tourism. The area is also a hub for small-scale water transport that connects several islands within the lake. By investigating the Mbita Causeway, the research aims to examine how infrastructural interventions have influenced the region's socio-economic landscape and ecological balance.

C. Population and Sampling

The target population for this study includes fisherfolk, tourism operators, environmental agencies, local community members, and government officials, all of whom are directly or indirectly impacted by the changes to the Mbita Causeway and its effects on water transport, biodiversity, and local economies. Stratified random sampling will be used for the quantitative surveys to ensure that a representative sample is selected from different socio-economic backgrounds, such as fishermen, traders, and local residents. The strata will be determined by identifying interest groups, including those who fish, own businesses, government personnel, and environmental specialists.

This stratification ensures that a broad range of perspectives is captured, including both major stakeholders and marginalized groups. For qualitative interviews and focus groups, a purposive sampling approach will be employed to select key informants and community members who have direct experience or are stakeholders in the restoration project, thereby enriching the study with multifaceted insights into the impact of the causeway.

D. Data Collection Methods

This study employs both primary and secondary data collection methods to gather relevant information.

➢ *Primary Data*

Data collected through interviews**,** focus group discussions**,** questionnaires, and direct observation**.** These methods will allow for direct interaction with participants and provide an in-depth understanding of the environmental and socio-economic changes experienced in the region since the restoration of the Mbita Causeway.

- *Interviews*

  Will be conducted with key informants such as government officials, KSL representatives, and environmental experts.

- *Focus Group Discussions*

  Focus group discussions will be organized with community members to encourage group interaction and the exchange of ideas about the changes observed in the region due to the causeway's restoration.

- *Questionnaires*

  Will be distributed to a broader sample of the population, especially to assess the economic impact on local businesses.

- *Direct observation*

  Will be used to assess the physical state of the restored causeway, water quality, and the observable socio-economic activities of the region.

➢ *Secondary Data*

This is the data collected from the analytical reports and publications as contained in the relevant agencies such as NEMA, KMA, KCGS, KRA, and KeFS. These reports will give historical data and insight into the effort made by the regulations, management of waterways, and environmental issues relating to Mbita Causeway.

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E. Data Analysis

➢ *Quantitative Data*

Data collected through surveys and observations will be analyzed using descriptive statistics to determine trends and patterns in socio-economic indicators. This analysis will include the use of means, frequencies, percentages, and averages to assess changes in local businesses, tourism flow, and transportation efficiency. Specifically, frequency distribution and averages will highlight the economic benefits arising from the causeway restoration, such as increased trade, job creation, and improved fisheries. Additionally, correlation analysis will be used to explore the relationships between the restoration project and key economic outcomes, providing a deeper understanding of the impact of the Mbita Causeway restoration on socio-economic development in the Lake Victoria region.

➢ *Qualitative Data*

The qualitative data from interviews and focus group discussions will be analyzed through thematic analysis. This method will allow for the identification of common themes, patterns, and insights related to both the socio-economic and environmental impacts of the Mbita Causeway restoration. It will also capture the perceptions of stakeholders and the challenges faced by the community. Coding and categorization of responses will help generate meaningful insights into the experiences of the affected communities. NVivo or similar qualitative software may be used to assist in categorizing and coding the data, ensuring systematic analysis and the extraction of key themes.

F. Ethical Considerations

➢ *Ethical Guidelines will be Strictly Adhered to Throughout the Research Process. These Include:*

- *Informed Consent**:***

All participants will be fully informed about the purpose of the study, their right to participate voluntarily, and their ability to withdraw at any time without consequences.

- *Confidentiality**:***

The anonymity of participants will be protected, and their responses will be kept confidential, ensuring that any data shared will not be linked to individuals without their consent.

- *Respect for Participants**:***

The researcher will ensure that all interactions are conducted respectfully and that participants' rights and dignity are upheld throughout the study. Care will be taken to ensure that sensitive information, especially regarding personal and community challenges, is handled appropriately.

- *Voluntary Participation:*

Participation will be voluntary, and participants will be free to withdraw from the study at any time without any consequences.

G. Limitations of the Study

➢ *This Study May Face Several Limitations, Including:*

- *Access to Data:*

Obtaining accurate and up-to-date data on socio-economic indicators may be challenging due to the potential lack of official records or inconsistent data reporting.

- *Response BIAS:*

There is a possibility of bias in responses, particularly in interviews or surveys, where participants may provide socially desirable answers.

In conclusion, this research design will provide a comprehensive and nuanced understanding of how the excavation, deepening, and opening of the Mbita Causeway by Kenya Shipyards Limited has promoted socio-economic development in the Lake Victoria region. By utilizing both quantitative and qualitative methods, the study aims to capture both measurable impacts and personal experiences, ensuring a well-rounded analysis of the project's effects on the community.

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CHAPTER FOUR
CONCLUSION

The deepening, raising, and reopening of Mbita Causeway by Kenya Shipyards Limited mark a milestone turnaround in responding to the environmental and socio-economic challenges facing the Lake Victoria region. By allowing natural water circulation, the quality of water has drastically improved; reduced siltation of pollutants in this basin has been curbed, as well as reduced proliferation of the invasive water hyacinth. These ecological gains have rejuvenated aquatic biodiversity, hence creating conducive conditions for fish breeding and enabling the resuscitation of fisheries, which are vital to the livelihoods of communities. Economically, the intervention has stirred new life into fishing, tourism, and trade.

With better water transport infrastructure, there is increased connectivity, a reduced commute time, and easy market access for fishers, traders, and farmers. This has translated into more incomes and new opportunities for employment, directly benefiting the surrounding communities. The restoration also opened up water-based tourism, where visitors come to enjoy boat rides, observe wildlife, among other recreational activities that add to the contribution of the local economy. This project has gained great success due to key stakeholders working in unison through government agencies like NEMA, KMA, and KCGS, through which coherent action is being taken toward harnessing the potentials of the Blue Economy. The necessary supportive infrastructures in ports and piers have been developed, and further sustainable management in the area is strengthened. Still, despite all that, the project faces an innumerable number of challenges. Agricultural runoff and industrial discharges continue to pose a threat of polluted water quality, while invasive species and climate change threaten ecological and economic stability. There is a strong need for efficient mechanisms for pollution control, along with targeted biodiversity conservation and adaptive strategies to deal with climate variability.

The Mbita Causeway restoration epitomizes how infrastructure developments can be done in such a way that it marries environmental conservation with socio-economic development. This is a model in the balance between economic growth demands and ecological stewardship, in tune with Kenya's Vision 2030 and the blue economy agenda. Sustained effort, community ownership, and regional cooperation are needed to secure the long-term success of this project and fully realize its wide-ranging benefits.

The Mbita Causeway project has helped restore livelihoods and ecological balance in the Lake Victoria region, providing insight into future projects that aim at ensuring sustainable development and environmental resilience.

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