

Gis-Based Assessment of Socio-Economic Impacts of Swamp Reclamation in Abonnema, Rivers State, Southern Nigeria

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Abstract

Abonnema in Rivers State is a significant town with a riverine domain in the Kalabari Kingdom in Akuku-Toru Local Government Area, Rivers State, Nigeria is surrounded by water. The town, founded in 1882 and with a population of 74468, is located in the southwest of the State. Because of its overcrowding and the demand for new housing, Abonnema became interested in land reclamation. The aim of this study was to determine the benefits and drawbacks of marsh reclamation on livelihood and infrastructure delivery in Abonnema. The Rivers State Ministry of Works and perspective aided in the provision of data, through field observations, questionnaire surveys, land-sat imagery, and sky-view lifetime drone pictures for this project. To assess the percentage of land cover in the research area, supervised classification of image processing was used. Land reclamation activities have resulted in the destruction and displacement of organisms and species, although most people have benefited from them, according to the findings. The development of infrastructure and access to employment possibilities, the expansion of land capacity, and the improvement of inhabitants' living standards are just a few of the benefits. As a result, the study recommends that the Rivers State Government continue to reclaim more land, particularly in other islands in the state, so that these islands can benefit from infrastructural development, as well as enacting more laws and strategies to regulate reclamation activities across the state. Environmental awareness and perception of the environment should be a component of educational organizations' responsibilities.

Keyword; Swamp reclamation, Abonnema, Wetlands, Hydrology, Socio-economics

1. Introduction

Abonnema, which was created in 1882 and was formerly known as Nyemoni (which means "covet your own" in the Kalabari dialect of the Ijaw language), is a significant town in the Kalabari Kingdom. An expedition of eleven autonomous chieftaincy houses from the Kalabari city-state discovered its area (Elem Kalabari). During the colonial period, Abonnema



developed into a thriving major Nigerian seaport. It was home to a large number of European businesses. The Royal Niger Company was one of these companies. Abonnema is the administrative center of Rivers State's Akuku-Toru Local Government Area, which is primarily surrounded by wetlands.

Wetland ecosystems are crucial for fish, and their loss or degradation will have a direct impact on sustainable fisheries [3]. The water swells up to standing level whenever a supply of freshwater meets a floodplain with no sharp outflow. Although it is difficult for humans to live in Niger, this is known as a swamp and is a fertile habitat. The largest mangroves in Africa are found in the Delta, but uncontrolled anthropogenic activity have diminished their abundance. The conversion of big mangrove stands to small mangrove stands has some ecological consequences for species populations. Small populations, for example, are affected by stochastic occurrences such as flooding, landslides, sea-level rise, high temperatures, and humidity.

Random deforestation for firewood production, canalization, and de-silting of rivers, as well as artisan refineries, have resulted in the full eradication of mangrove stands in some sites due to human-mediated operations. The cumulative effect of these acts could lead to local extinction and a loss of mangrove genetic variety. Fish, crabs, and other species that live in the mangroves of the Niger Delta have suffered as a result of the destruction of mangroves over time. Mangrove forests provide a variety of services, including lumber, medicines, fish, and shellfish, among others. Fish and shellfish catches, particularly crabs and shrimp, are dependent on ecosystem health, which includes appropriate seawater flushing, thick and productive tree stands, and ecological links with neighbouring ecosystems such as sea grass meadows. As a result, managing mangrove forests to improve fisheries provisioning also entails improving ecosystem health, with advantages for other services like coastal protection and carbon sequestration. Individual tree interactions that are positive boost the possibility of synergy in timber production and other services (Huxham et al., 2010). Due to the strong demand for land, the locals have engaged in marsh reclamation using traditional sand filling methods such as swamp mud, as well as swamp buggies. The introduction of large machinery into the swamp has detrimental consequences for the coast, including the extinction of many soil-dwelling and benthic creatures. Despite the fact that land reclamation can be defined as the process of obtaining land from marshes, coasts, or sea-land, reclamation activities kill organisms and species' habitat.

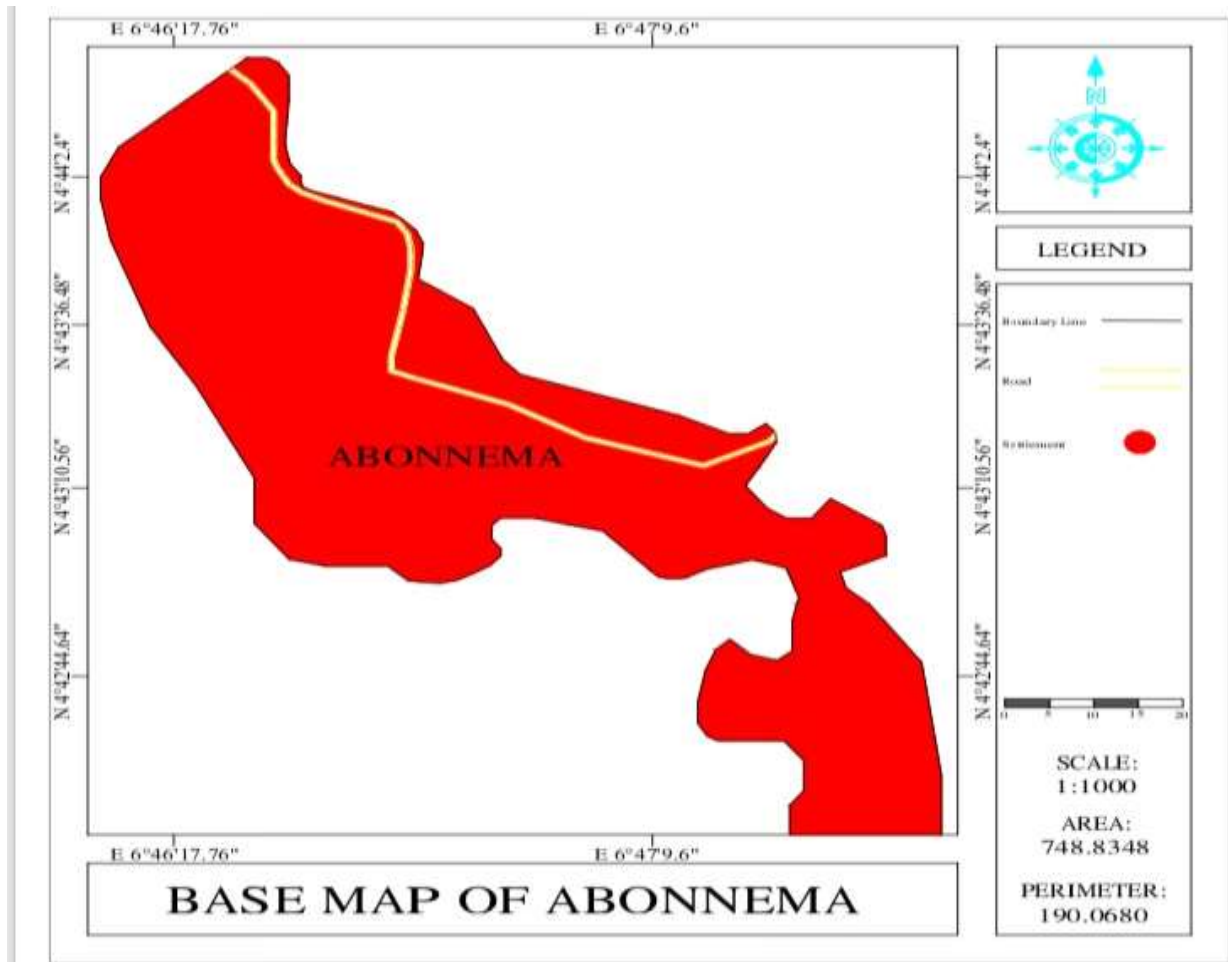


Figure 1: Base Map of Abonnema

2. Literature Review

2.1. Factors of Swamp Reclamation

The process of recovering wetlands due to a lack of habitable land space in a wetland zone and turning it into a beneficial purpose is known as swamp reclamation. In other words, it's a technique for converting a wetland into suitable land for residential, social, commercial, and industrial use. It's quite widespread in Nigeria's southern regions, especially along the coast, where there appears to be lots of land.

People start on swamp reclamation for a variety of reasons. The following are some of the reasons:

Insufficient land: Due to the tiny size of their land, many resort to land reclamation. As a result, they begin on land reclamation in order to increase the current area.

Population pressure: As the world's population grows, there will be a need to reclaim formerly flooded territories.

For residential purposes: People begin on land reclamation to build houses for residential purposes due to a scarcity of land to build on and a high cost of accommodation.

For business purposes: When land is reclaimed, it creates opportunities for trade and other commercial operations. This is a common occurrence in Lagos State.

For industrial purposes: Land reclamation is being done by industrialists in order to locate industries in the new region.

For use in agriculture: Land reclamation sometimes carried out for agricultural purpose.

2.2. Impact of Reclaiming Swamp

Land reclamation affects the water quality in the surrounding areas. Water becomes more acidic as a result of the material utilized, and certain organisms are unable to adapt to this environment. This causes an imbalance in the oxygen-to-carbon dioxide ratio in the water, making it harder for organisms to survive. By constructing over or confining a body of water, reclamation of wetland removes an underwater habitat. The harm induced by a high density of reclamations on small shallow bottom areas is a key form of quantitative damage to the undersea environment, and it is irreversible.

The rise of the water level in the bay, which produces severe flooding and storm surges, is also due to reclaimed land. They have a negative impact on not just individuals' lifestyles, but also on local economic activity, particularly in low-lying communities. There are other benefits of reclaiming lands besides generating a valuable resource where one did not previously exist. Wetland reclamation allows development-obsessed Local Government Areas to avoid demolishing further rural villages and moving tens of thousands of people, as in the case of Abonnema or any other island. Due to the increase in population over time, there are aspirations for more lands and land capacity expansions, which can benefit infrastructural developments and improve road mobility within Abonnema and its surrounding areas.

2.3. The Benefits Swamp Reclamation to Road Construction

Transportation plays an important role in people's daily lives. Because things must be moved about at different moments in time, movement is an essential part of human existence. Transportation systems have evolved over time as a result of this, as have speed and efficiency systems. We can't envision a world without sufficient, effective, and adequate modes of transportation right now. The economy has been shaped by continuous access to transportation infrastructure. Many organizations and industries now require effective and swift transportation networks to ensure that raw materials and products are delivered quickly. Maintaining revenue-generating ventures is also important. The economy depends on having access to trustworthy and efficient transportation networks, which will allow for faster trading to expand among a wider range of stakeholders. Within the employment sector, transportation provides several jobs and career opportunities. Traffic control, pilots, captains, delivery services, and drivers are just a few examples of the jobs available in the transportation business. One of the most important considerations people evaluate when looking for a job or a location for their business is the commute. They frequently discover excellent transportation, which is a crucial factor in determining how wonderful a location is. Improving transportation linkages boosts a community's popularity and future growth. This is why a number of bridges and highways are continually being built. It is critical to cut the

expenses of travel for consumers and businesses while also making transportation more convenient. Transport continues to play an important role in people's socioeconomic lives in both emerging and established nations. The atmosphere is conducive to economic growth when transportation infrastructure is well linked and efficient. Inadequate transportation systems, on the other hand, might stifle economic growth or development by limiting opportunities. Transportation is one of the most important aspects of every company. Moving commodities from locations where they are produced to areas where they are consumed necessitates the establishment of links between businesses and their customers and suppliers. It is a vital activity that supports demand for goods and services while ensuring that customers may have what they need as quickly as they need it.

3. Methodology

For this article, the Rivers State Ministry of Works provided land-sat imageries of Abonnema for the purpose of reviewing and evaluating current infrastructural development and how it has impacted the life and environment in Abonnema, as well as seeing the Degema to Abonnema link bridge built in 1999 and the newly constructed ring road linking Abonnema to her new site. To acquire firsthand information on the socio-economic consequences of marsh reclamation in Abonnema, field observations and surveys were used. To assess the percentage of land cover in the research area, supervised classification of image processing was used.

4. Results and Discussion

The population of Abonnema has grown over time, necessitating the expansion of land capacity, especially since the construction of the Degema-Abonnema link bridge, which allows residents to live in Abonnema and work in other nearby Local Governments in Rivers State. During my interactions with some of the stakeholders in Abonnema, it was deduced that due to the small capacity of land, they experienced a slow rate of inhabitation. Figure 5 shows how Abonnema is surrounded by water and swamp, making boats and canoes the only means in and out until swamp reclamation paved the way for infrastructure development like the bridge shown in figure 5.

Figure 1: According to the supervised image classification, the built-up area covered 373,451sm, followed by the mangrove region, which covered 286,345sm, and the un-built area, which covered 106,526sm, then the swamp area, which covered 50,918sm, and finally the river, which covered 2,852sm. Land reclamation will continue to be a welcomed activity in Abonnema as long as the population of Abonnema residents grows, and the need for more land for infrastructural and agricultural activities remains high. This will result in an increase

in built-up area and a decrease in all other land cover areas.

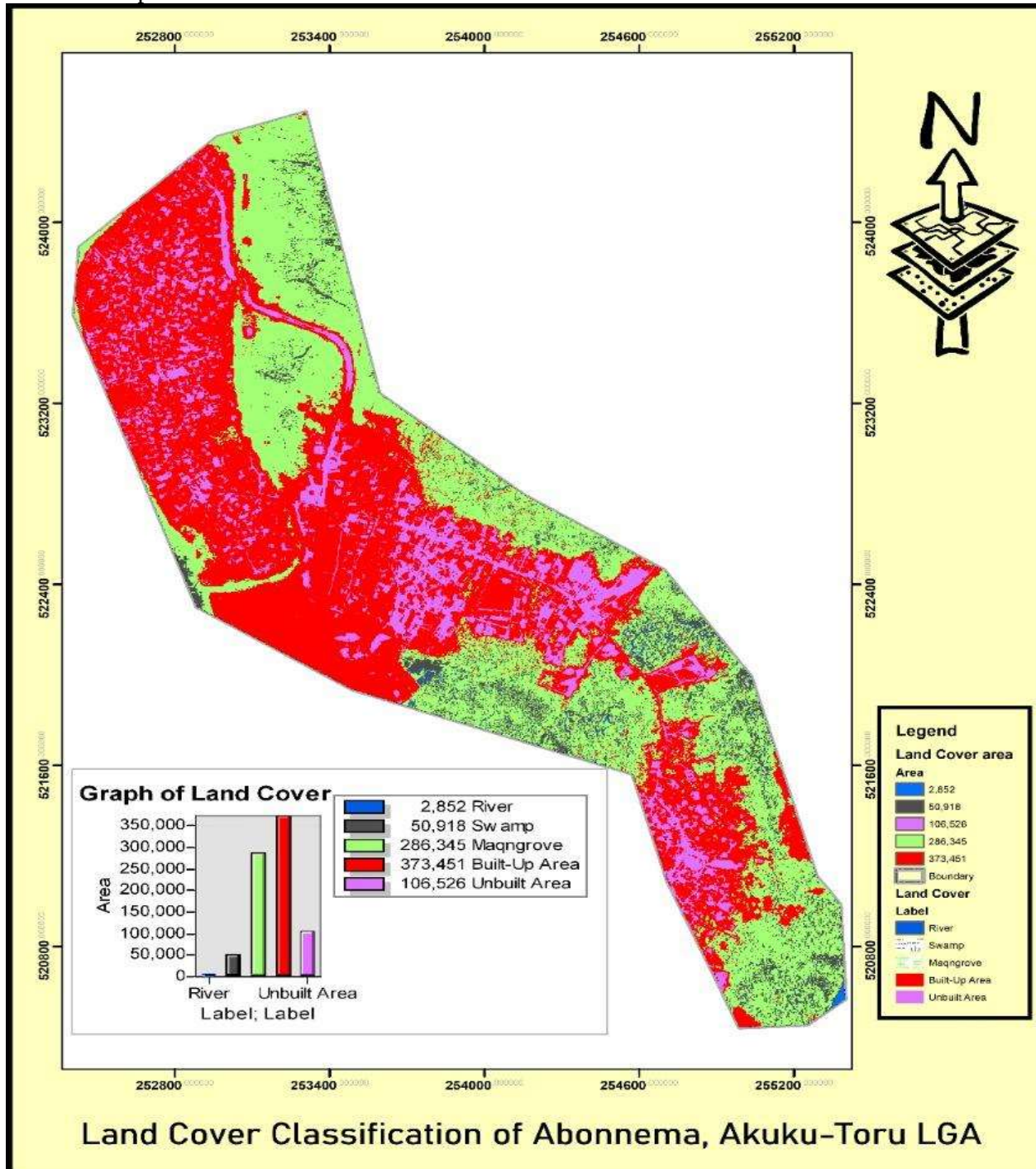


Figure 1: Land Cover Classification of Abonnema

Figure 1 shows the land use classification of the study area. The built-Up area dominated the area with an estimated area of 373,451km², mangrove (286,345 km²), unbuilt (106,526 km²)

and the least river (2,852 km²). This means the study area is increasingly being reclaimed for urbanization purpose.

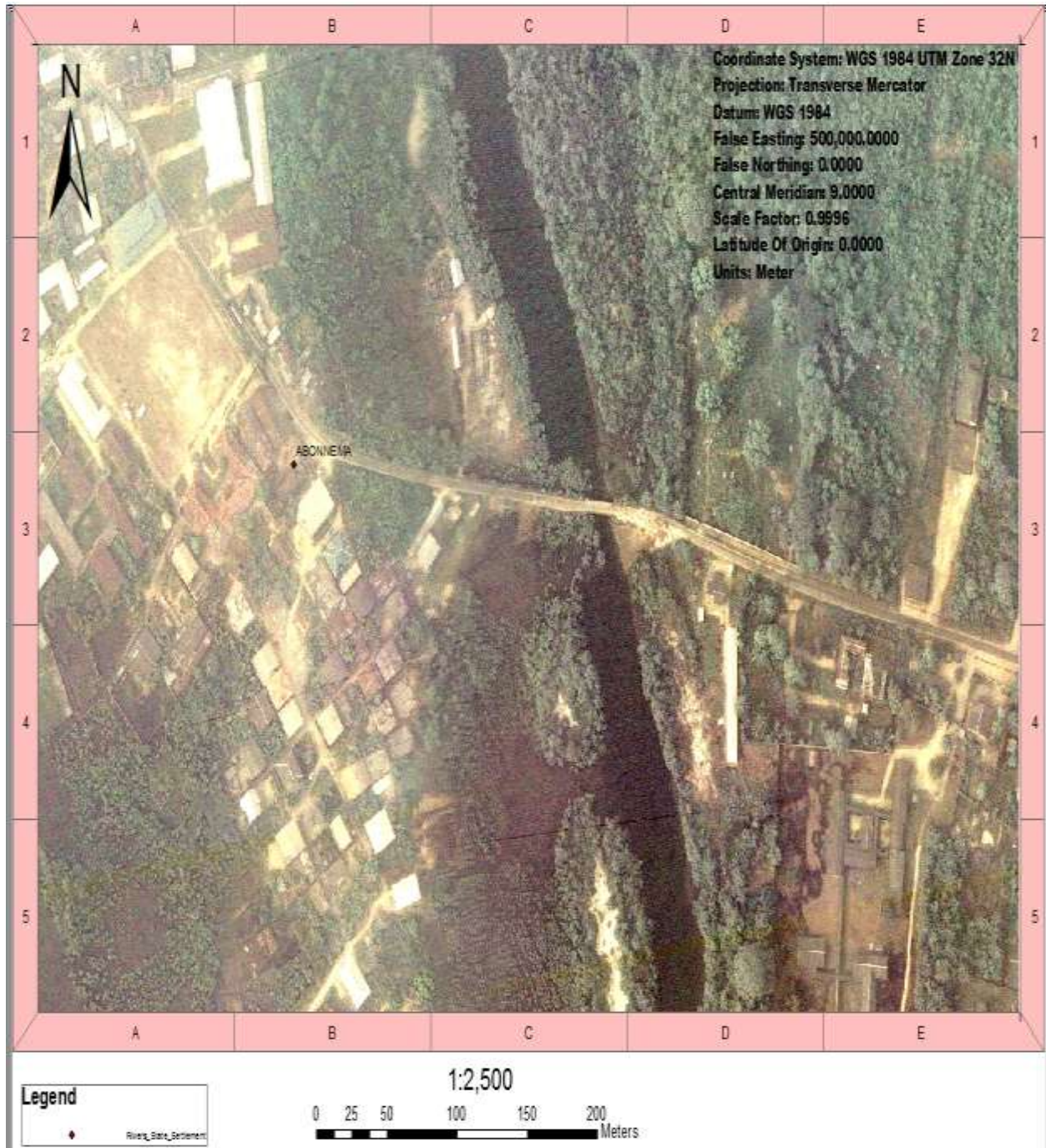


Figure 2: Land-sat Imagery of Abonnema showing the link road to Ogoiri

Figure 2 showed the land-sat imagery of the link road to Ogoiri. The aerial view depicts a linear and clustered settlement pattern with diverse human activities.

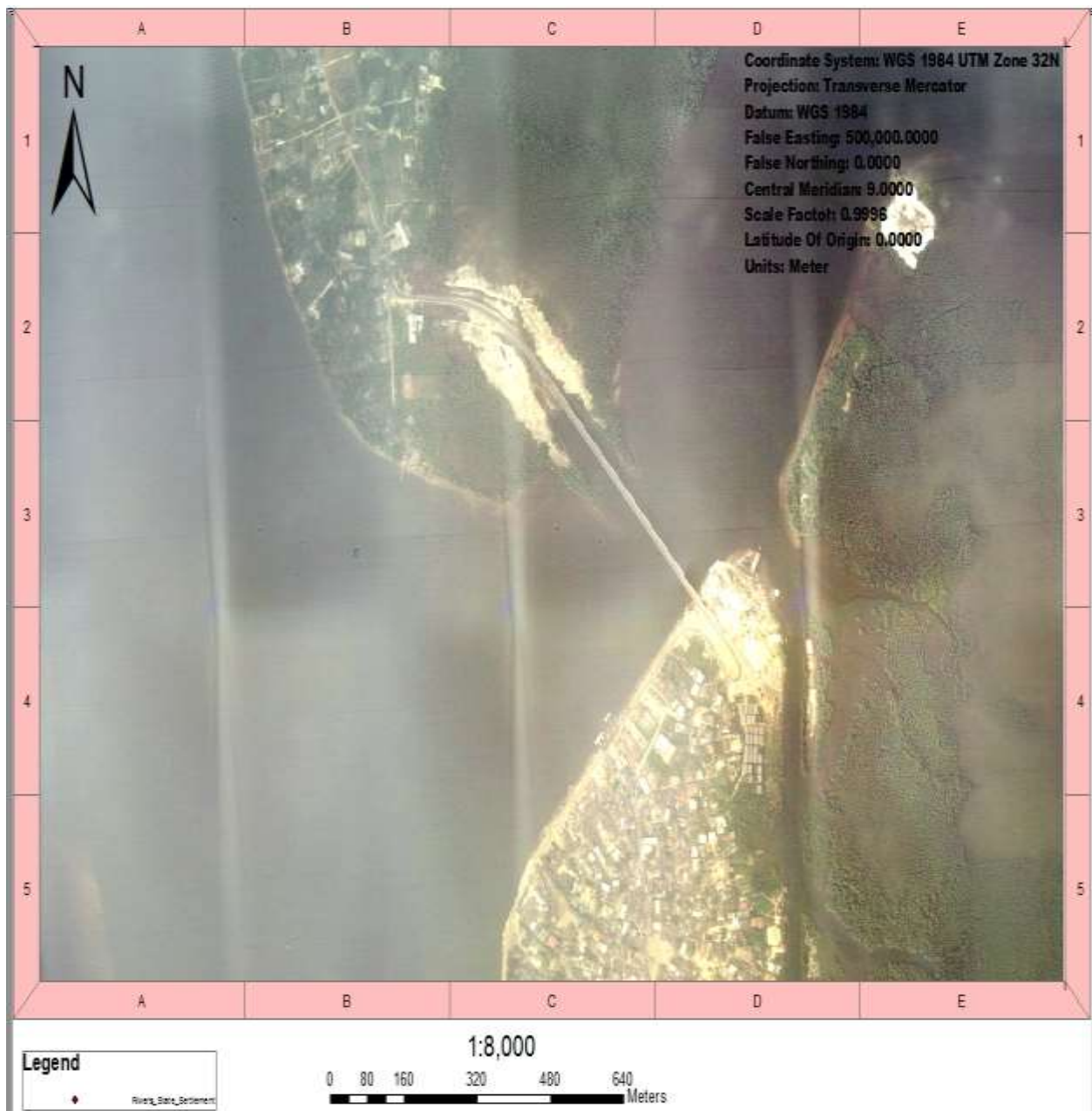


Figure 3: Land-sat imagery of Abonnema and Degema

Figure 3 showed the Land-sat imagery of Abonnema and Degema. These two regions have a common boundary separated by a bridge with several human activities.



Figure 4: Land-sat imagery of Abonnema

Figure 4 shows the study area an Island with clustered settlement pattern owing to the scarcity of land for development thereby necessitating land reclamation activities.



Figure 5: Abonnema drone view

Figure 5 showed the drone view of the study area. An Island separated by river, with a bridge connecting it and Degema.



Figure 6; Abonnema Ring Road drone view

Source-Rivers State Ministry of Works

Figure 6 depicted one of the socio-economic benefits of swamp reclamation in Abonnema, namely the recently created ring-road that connects you directly to the New Site (OgoinPiri) around the back of the Abonnema Cemetery, bypassing the main town.

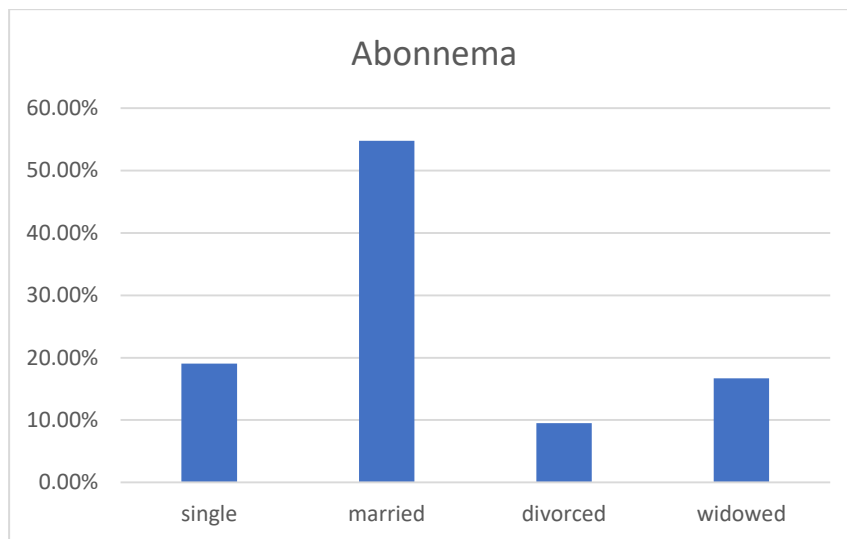


Figure 7 Marital Status of Respondents

Figure 7 showed that in Abonnema, there are a large number of married residents and a small number of single residents.

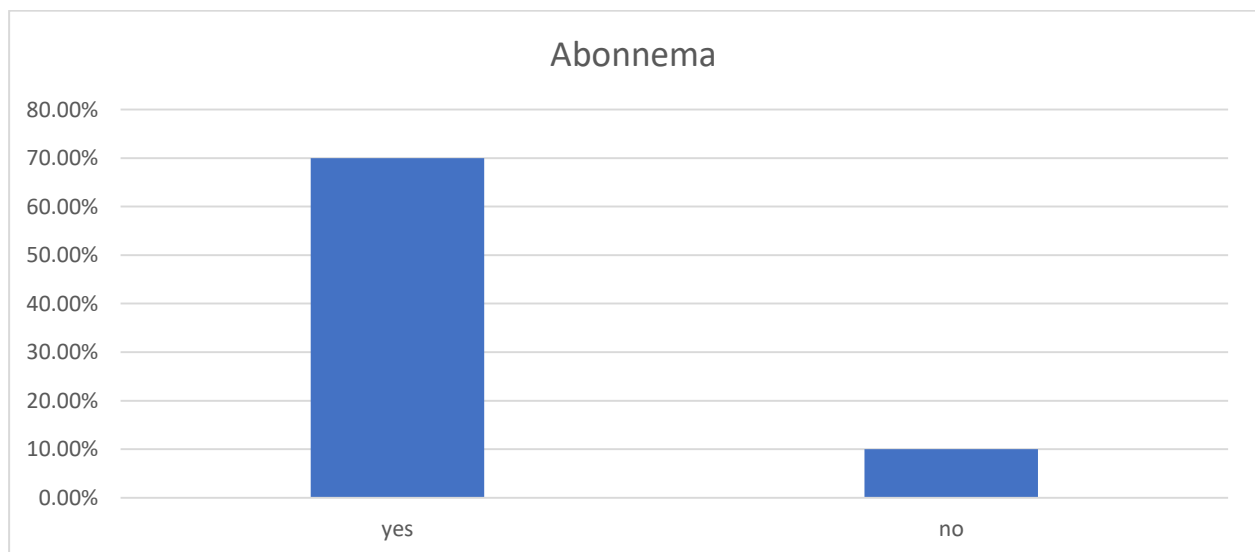


Figure 8 Respondents Comfortable with swamp reclamation

Figure 8 showed that in Abonnema, a large number of locals are happy with swamp reclamation while a small minority are unhappy with reclamation activities.

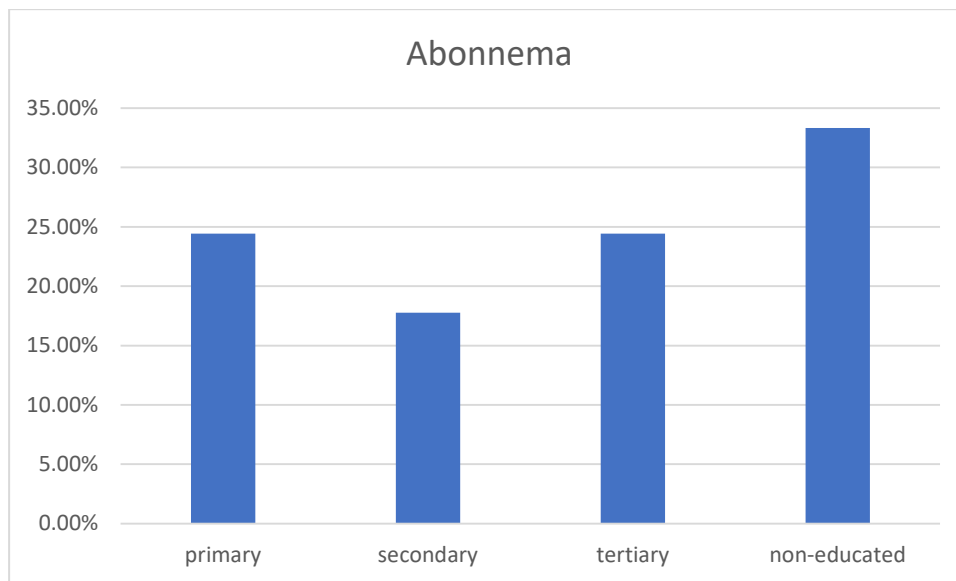


Figure 9 Educational Attainment of Respondent

In Abonnema, Figure 9 showed a large percentage of residents who have not completed any degree of school, as well as a high percentage of respondents who have completed primary, secondary, and university education.

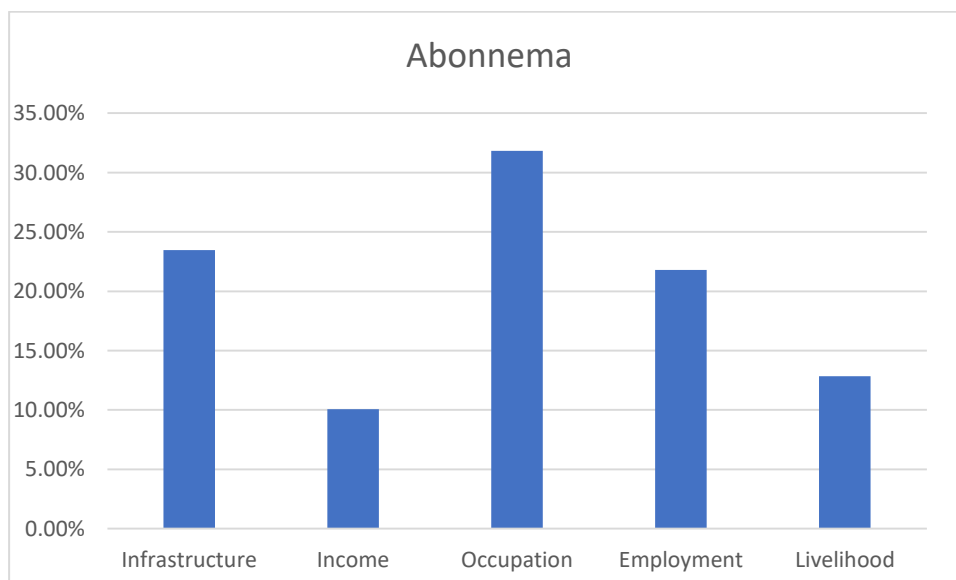


Figure 10: Socio-economic implication of swamp reclamation in Abonnema

Figure 10 showed that a good number of residents are occupation-based with the least as income.



Conclusion

Transportation is critical to urban and rural development because it facilitates the movement of people, animals, and things from one region to another, which is necessary for civilization to advance. Any society's cornerstone is transportation. Infrastructure, which includes elements such as proper road connectivity and modern airports, is essential for economies to grow. Many sectors rely on transportation to grow and prosper. Workers rely on transportation to complete their tasks. Business endeavors benefit from good transportation since it allows employees to move around safely and promptly.

Water was the only form of transportation available in Abonnema prior to marsh reclamation. One of the biggest benefits of swamp reclamation in Abonnema, according to this article, is the construction of the Degema to Abonnema link Bridge, which has helped their livelihood. The freshly constructed ringroad that connects you directly to the New Site (OgoinPiri) through the back of the Abonnema Cemetery, as shown in figure 4, is the second advantage of marsh reclamation in Abonnema. Swamp reclamation in Abonnema has resulted in an increase in land capacity, as well as additional land for infrastructural development such as highways, hotels, schools, and residential buildings, in exchange for providing locals with easier access in and out of town and new work opportunities.

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