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ASSESSING THE IMPACT OF LANDUSE CHANGE ON FLOOD RISK AREAS OF LEKKI AND AJAH OF LAGOS STATE, NIGERIA

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Floods remain a persistent challenge to the environment in Lagos state, especially in highly urbanized areas like Lekki and Ajah, where there have been tremendous changes in land use that have affected natural drainage patterns and land surfaces. Although there are numerous cases of floods in the area, there is not much local evidence on the effects of changing land use on household experiences with flooding. This research evaluates the effects of changes in land use on flood areas in Lekki/Ajah Corridor from 2015 to 2025. The research was guided by two objectives, namely, to explore the changes in land use and land cover using GIS techniques, and the effects of these changes on household experiences of flooding. This study adopted a descriptive and analytical research design. This study's setting included the Lekki/Ajah corridor in Eti-Osa Local Government Area, whose population exceeds 1.5 million due to urbanization in recent times. A total of 400 copies of questionnaire was distributed using stratified random sampling, and 360 questionnaires were valid. Data were collected using Landsat 8 & Sentinel 2 satellite images, questionnaires, and secondary spatial data. Land use and change detection analysis were carried out in ArcGIS and QGIS software. These findings show that there has been considerable expansion in the amount of built-up areas, with a decrease in the vegetative and wetland coverage. Majority of respondents had encountered yearly flooding, extended durations of floods, damages to properties, and occasional evacuation. The study concluded that rapid landuse change especially the expansion in the use of land for various economic activities, such as converting vegetation and wetlands into built-up areas, has increased the occurrence of floods in the study area. The study suggests improved landuse planning, enforcement of laws towards the protection of areas that are environmentally sensitive.

Keywords: *Flooding, Landuse Change, Lekki/Ajah, Urbanisation,*

1.0 Introduction

Flooding has been recognized as among the most significant environmental hazards facing humanity in the twenty-first century. There is an increase in the number and severity of natural disasters due to climate change worldwide, and this causes serious disturbances in the water cycle that affect people's lives and livelihoods (IPCC, 2022). Urban floods are especially catastrophic because not only do they pose the threat of a changing precipitation pattern, but they are also the result of the destruction of the environment through human actions, like converting green space into paved areas. These changes affect the natural water balance by reducing infiltration, accelerating runoff, and overwhelming urban drainage systems (Yang et al., 2021). Therefore, the relationship between changes in landuse and flooding is a concern for both scientists and policy makers globally.

In Africa, the risks arising from changes in land use and floods become particularly evident because of rapid and often unregulated urbanization processes. Across Africa, urbanisation rate is among the fastest in the world; from 43% in 2022 to over 60% by 2050 (United Nations, 2022). However, the problem is that these processes tend to occur in a situation when challenges of poor infrastructure and urban planning remain unaddressed. In particular, the fact that settlements emerge in the zones of flooding and the absence of appropriate draining infrastructure lead to increased exposure to the threat (Mustapha et al., 2021). There are plenty of examples of major African cities facing the dual problem of handling rapidly growing populations and dealing with the risk of floods. Some studies show that the process of flooding in some African coastal cities is being exacerbated not only by climate changes but also by land-cover changes caused by unplanned development (Oladipo & Olaniyan, 2023).

Nigeria is a relevant example of such an experience in Africa because the country has seen several occurrences of floods that pose serious risks to the wellbeing of both rural and urban communities. For instance, the nation-wide floods recorded in 2022 were one of the worst in the recent past, with over 30 states being affected. This resulted in more than 1.4 million people being displaced and over 200,000 houses being destroyed (National Emergency Management Agency [NEMA], 2022). Apart from climatic changes, changes in land use is widely regarded in academic literature as one of the major causes of flood disasters, whereby scholars blame the lack of proper use of natural resources such as wetlands and waterways that play an important role in flood mitigation and management (Ndimele et al., 2024).

It is evident that Lagos State being Nigeria's commercial capital and largest urban settlement, is prone to such hazards as a result of its low-lying nature, heavy precipitation, and high-density population as well as land use (Idowu et al., 2021). In this regard, the Lekki and Ajah axis in Lagos State provides a concrete example of how changes in land use have worsened the issue of floods in the area. It should be noted that Lekki and Ajah used to feature mangrove swamps and wetlands, while being quite sparsely populated. However, in the past two decades, the area has undergone dramatic changes as the consequence of real estate development, road construction, and other processes. In Lekki/Ajah area, most residents are now experiencing increased cases of flooding following rains within a short period, often causing destruction and causing people to be displaced from their houses. Although these experiences are evident, there is little research that correlates the patterns of landuse with the results of flooding in this particular region. Studies conducted on the phenomenon of flooding in Lagos have mostly concentrated on the entire city, leaving out other areas like Lekki and Ajah (Atufu, 2022). As such, the research problem lies in the absence of local based empirical study that links land use changes and flood events in Lekki/Ajah. While it is true that floods are common in Lagos State, the process of policy making and urban development has largely been informed by general studies. The lack of data and analysis that specifically points out local hydrology, policies and initiatives for flood reduction in Lekki/Ajah will make any intervention to be based on incorrect assumptions about the real state of flood occurrences. As such, there is a need to provide evidence in relation to the impact of land use change on surface runoff and flood extent in the area.

In practical terms, the research has direct significance for policy-making and planning in Lagos. Evidence-based information is needed by the Lagos State government, developers, and environmental authorities to formulate drainage master plans and zoning policies (Lagos State Government, 2013). Findings from this study can support the design of structural interventions, such as improved drainage infrastructure, and non-structural approaches, such as sustainable land management policies and the adoption of green infrastructure.

To address the identified problem, the study is guided by two objectives. First, to quantify the changes in land use and land cover between 2015 and 2025 in the Lekki/Ajah area using remote sensing and geographic information system (GIS) tools, thereby identifying the extent and pattern of land transitions such as vegetation to residential or commercial land. Second, to model the impact of these land use transitions on flood hydrological parameters, specifically runoff volume, peak discharge, and flood extent using hydrological simulation models for baseline and scenario years. These objectives are specific to Lekki/Ajah, measurable through spatial and hydrological indicators, achievable within the available methodological framework, relevant to the flooding problem, and time-bound to the decade under review.

The scope of the study is limited to Lekki and Ajah corridor of Lagos state. The area was selected for the study due to its ongoing rapid urbanisation and incessant flooding. The analysis spans from 2015 to 2025 in order to capture the land use patterns and their implications on flooding. The study utilised hydrological modelling and quantitative analysis and does not cover socio-economic vulnerability aspects. A limitation of the study is the fact that it relied on remotely sensed data and rainfall records which may have some uncertainties in their predictions. However, the study still offers implications for other coastal urban areas that may be experiencing similar urban changes and challenges.

The study area is the Lekki and Ajah area in the Eti-Osa Local Government Area in Lagos State, Nigeria. Geographically, it is located in a low-lying coastal region that occupies about 1,620 km². The area is bounded to the south by the Atlantic Ocean and a northern boundary on Lagos Lagoon. Geologically, it is an area of coastal plain sands, mangrove sediments, and reclaimed lands, which are subject to flooding (Obiefuna et al., 2021). The climate type is tropical wet and dry with rainfall between 1,500 to 2,500 mm and temperatures between 24-32°C. The drainage is characterized by the lagoons, creeks, wetlands, and man-made drains, whereas the elevation of the area is below 5 meters above sea level. The rapid rate of urbanization has contributed to a rise in the population of Eti-Osa. According to the 2006 National Population Census, the population of Eti-Osa Local Government Area was put at 287,785. The population for 2025 based on annual projected growth rate is about 470,000 residents (City Population, 2025).

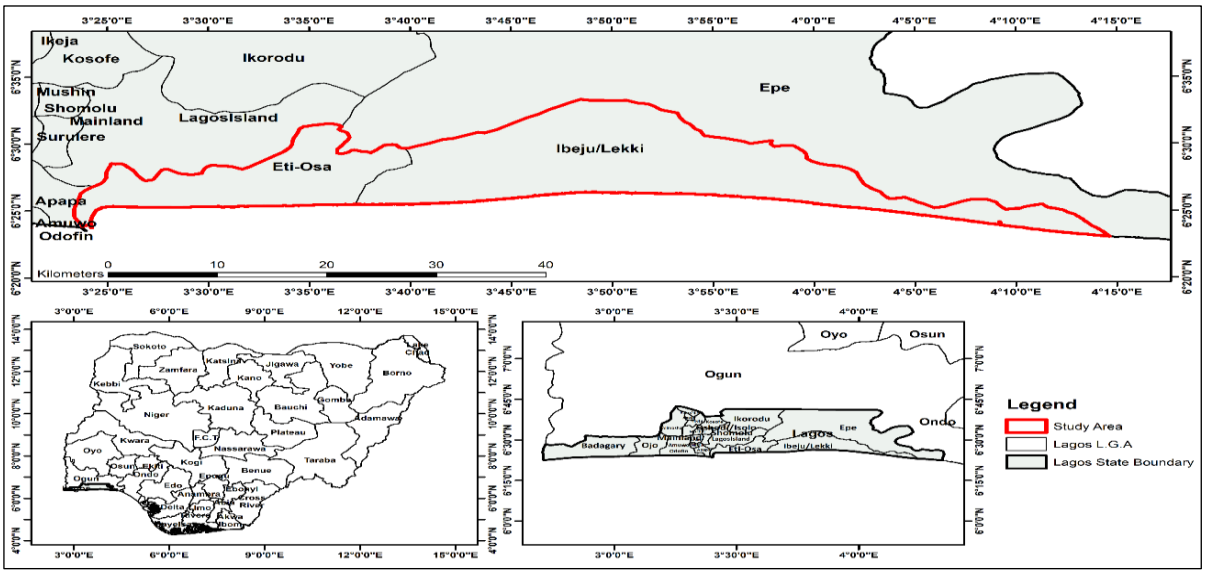

Figure 1: Study Area
Source: Author's Design,2025

2.0 Materials and Methods

Land use change is defined as the modification of natural or semi-natural systems to become human-altered systems of various forms, including the establishment of buildings, factories, industries, roads, and transport infrastructure (Yang et al., 2021). This process involves the replacement of natural water cycles with the destruction of permeable surfaces by impermeable ones in the urban context. Such modifications arise due to factors like growing population, increased economic activities, and real estate development in metropolitan areas such as Lagos.

Floods is described as the submergence of land with water in excess which is usually caused by excessive rainfall, poor drainage systems or overflowing of water bodies. Flooding can be assessed on the basis of its magnitude, depth, duration, and impact. Hydrologically, the occurrence of floods in an urban area depends largely upon runoff, peak flow, and the capacity of the drainage system (IPCC, 2022).

The study is grounded upon two related theories namely: Urban Ecology Theory and Human-Environment Interaction Theory. The Urban Ecology Theory, which was developed by Park and Burgess in 1925 and further elaborated by Alberti (2019), presents a holistic interpretation of cities as socio-ecological systems where human action affects natural processes and thus determines environmental impact. The theory posits that urban morphology and land-use play an important role in regulating ecological functions like infiltration, evaporation, and biodiversity; these functions have a direct impact on hydrologic threats (Sun et al., 2019). Specifically, the key assumption underpinning the theory is that growth of urban environments influences natural ecologic processes, leading to increased environmental hazards, including flooding. The application of the theory to the Lekki/Ajah axis implies that construction and development are changing natural hydrological dynamics, which contributes to increased flood risks.

The Human-Environment Interaction Theory, initially formulated by Turner, Kates, and Meyer in 1994, and expanded by Turner et al. (2020), stresses the interdependent relation between human activity and the environment. Inherent to the theory is the assumption that through human activities, including land-use change and infrastructural development, natural hazards may be worsened or minimized, depending on how sustainable the methods used are. The relevance of this theory to the study lies in its portrayal of flooding as not merely an environmental hazard but also as a consequence of unsustainable land use by humans. These theories provide a framework to understand how the rapid growth in the urban area of Lekki/Ajah influences the ecological processes to generate flood threats.

Some recent studies have examined the relationship between land use change and flood occurrences. For instance, in their study on Shanghai City, Li et al. (2020) used remote sensing techniques and hydrologic models in order to identify land cover changes, and reported that an increase of 25 percent in built-up areas resulted in a corresponding increase of 40 percent in the magnitude of the peak of surface runoff. The importance of land use change as an aggravating factor for flood phenomena can also be seen on a global scale as reported by Yang et al. (2021).

In addition, research done by Mustapha et al. (2021) on the city of Kano, Nigeria, revealed that the lack of proper management of land use activities was a major contributor to seasonal flooding. Also, in a similar vein, Oladipo & Olaniyan (2023) argued that coastal cities in West Africa are at increased risk of flooding because of sea-level rise and mismanagement of land use activities.

Idowu et al. (2021) carried out a study to examine the relationship between fast-growing cities and the problem of surface runoff in Lagos. The researchers found out that inadequate implementation of

zoning laws resulted in flooding. This aligned with another study by Ndimele et al. (2024), who assessed wetland destruction in Lagos and demonstrated that wetland loss reduces the natural ability of the city to cope with rainwater. In addition, Olowu & Omotola (2023) in their study of Lekki Peninsula, found out that the conversion of wetlands to residential areas significantly contributes to the recurrent cases of flooding.

Further empirical evidences from international case studies were also reviewed. For instance, in one such study conducted in Beijing, China, by Chen et al. (2023), using rainfall-runoff modeling, it was found that there was a positive correlation between the amount of expansion in impervious surfaces and flooding events. The same is true of another example from Nigeria. According to Adeleke & Adebayo (2025), in their study out carried out by in Ibadan, the expansion in urban areas caused a 30 percent rise in flood events from 2010 to 2020. In policy, according to the National Emergency Management Agency (2022), mismanaged land use practices were the major reasons behind the nation-wide floods.

All the studies mentioned above suggest a strong agreement regarding the role of land use changes as an important factor contributing to urban flooding. Nevertheless, the methodology applied in various researches differ from one another. While some of them use majorly geospatial analysis, other studies incorporate hydrological models as well. Although past researches have made the connection between land use change and floods at both a global scale and a national one, there is still more to be done. In Lagos, most researchers look into the entire metropolis, while there has been no detailed analysis of flood occurrences in rapidly urbanizing areas such as Lekki and Ajah. Also, in many past studies, the focus has largely been on describing the changes or using satellite images for visualization without incorporating the hydrology simulation technique. This paper fills that gap by bringing together the two approaches for the region of interest.

In this study, a descriptive and analytical design was employed to explore the effect of changes in land use on flooding within the Lekki-Ajah corridor of Lagos State. While the descriptive aspect helped in identifying and quantifying changes in land use/land cover from 2015 to 2025, the analytical design examined households' experiences and perceptions about flooding relative to land use change. This approach is suitable because it takes into consideration both the spatial perspective of environmental change as well as household-level experiences with floods.

This study area includes the Lekki-Ajah axis, located in the Eti-Osa Local Government Area, Lagos State. The location is among the fastest growing urban axes in Lagos, marked by rapid developments in real estate, transformation of wetlands, and population growth. The data for the study were derived from both primary and secondary data sources. The Primary data collection involved the use of a self-designed questionnaire administered to households' heads within the area. Out of the total population of 470,000 residents, 400 copies of questionnaire was distributed to the population in order to collect data using Yamane's formula at a 5% margin of error, with 360 valid responses recorded. Twenty (20) respondents each were sampled in Lekki Area and Ajah area. These includes Ajah town, Ogombo, Abraham Adesanya estate, Ajah market area, Badore, Sangotedo, Lakowe, Ibeju-Lekki, Awoyaya, Okun Alfa coastal community which are selected areas affected by flooding within Ajah axis. For Lekki area, the ten locations included Lekki phase I, Lekki Peninsula, Igbo Efon, Kusenla Road, ChuAgungi, Ajiran Road, Ilasan, Ologolo, Chevron Drive and Ikate-Jakande Estate.

The secondary data used for this research is the land use/land cover (LULC) datasets for Lekki-Ajah in the year 2015 and 2025. The satellite data from Landsat 8 and Sentinel-2 satellites extracted from satellite images were classified remotely through the use of GIS technology. The data offered

information on various forms of land uses such as built-up land, vegetation, wetlands/mangroves, bare land and water bodies. The spatial datasets from the satellites were used to analyze changes in land use and land cover for the specified period.

The geospatial analysis of land use changes was done using ArcGIS 10.8 and QGIS software programs. First, the images were imported into ArcGIS for processing and analysis. Geo-referencing of the images was done to facilitate the accurate positioning of the image with respect to the study area. Following the geo-referencing, the image was clipped using the Lekki-Ajah boundary shapefile to get the exact boundaries of the study area. It ensured that the spatial data within the study area alone was analyzed.

For the classification of land use/land cover in ArcGIS 10.8, supervised classification methods were adopted. Training samples were developed for each land use class depending on the spectral signature and classified into the five major land use classes using Maximum Likelihood Classification method. The classified images were then converted into rater and vector formats for further analysis. These thematic maps indicating the spatial distribution of the land uses for 2015 and 2025 after being created, the various land use categories were mapped using unique colors. A legend, scale, north, and title were added to these maps to enhance clarity. These thematic maps help visualize the spatial pattern and temporal changes in the land uses of Lekki-Ajah area for the given period.

After the categorization, the spatial analysis tool available in ArcGIS was employed to determine the extent of each land use type. Using the tool, “Calculate Geometry”, the corresponding area of each land use in hectares was calculated. Subsequently, the area of each category was transferred to Microsoft Excel and percentage area for each land use was calculated using the formula: Percentage (%) = (Area of each land use/Total study area) × 100

Validity and reliability of the research tool were attained by having experts review the questionnaire in order to establish relevance and clarity of the data. Additionally, the questionnaire was subjected to a pilot test and the internal reliability was determined via the use of Cronbach’s alpha. The reliability coefficient higher than 0.70 was accepted. Finally, visual validation was done for the classified satellite images by comparing them with those on Google Earth.

Descriptive statistics like frequency and percentages were used to analyse the data collected from the respondents in the study area in order to describe and interpret the respondents' socio-demographic characteristics and experiences with flooding. This technique helped to give clear interpretations of land-use changes and flood characteristics within the study area.

3.0 Results and Discussions

Table 1 shows the respondents demographic attributes and experience of flooding in Lekki-Ajah. From Table 1, it is clearly seen that there are slightly more females (53%) than males (47%). This means that the population has a relatively equal composition. Also, a large number of people (75%) are of working age, with the majority being aged between 31-45 years (45%) and 18-30 years (30%). Most people live in formal estates (62%), while some are found in informal settlements (25%) and other places (13%). This suggests the diverse composition of housing areas in the area. Flooding occurs every year, as indicated by 81% of the affected people. About 72.4% of those affected have faced flooding for over 24 hours. Damage to property has been common (85%), and about 41% of the affected have been displaced due to floods.

Table 1: Household Demographics and Experience of Flooding in Lekki/Ajah (n=360)

Socio-Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	169	47
	Female	191	53
Age group	18–30 years	108	30
	31–45 years	162	45
	46–55 years	72	20
	Above 55 years	18	5
Place of residence	Formal estates	223	62
	Informal settlements	90	25
	Commercial/Mixed-use areas	47	13
Flood occurrence (annual)	Yes	290	81
	No	70	19
Flood duration (n = 290)	> 24 hours	210	72
	< 24 hours	80	28
Property damage experienced (n = 290)	Yes	245	85
	No	45	16
Displacement from homes (n = 290)	Displaced	118	41
	Not displaced	172	59

Source: Author's Survey, 2025

Table 2 shows the landuse factors causing flooding in the study area. Encroachment on wetlands had the highest mean (3.12), indicating that it is perceived as the most significant cause of flooding in the area. This is closely followed by inadequate waste disposal, which blocks drainage channels (3.08), and land reclamation, which blocks natural waterways (3.07), implying that rapid urbanisation and poor environmental management have a significant impact on flood occurrence. Poor drainage systems (3.06) and lax enforcement of planning regulations (3.03) also received support, albeit slightly less than the other factors. These identified factors have mean scores that are above the decision threshold. This suggest that the respondents perceived each of the items as major contributors to flooding in the study area.

Table 2: Land Use Factors Contributing to Flooding in Lekki/Ajah

Items	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean
Poor drainage systems contribute to flooding in Lekki/Ajah	160	100	60	40	3.06
Land reclamation and blockage of natural waterways increase flood risk	150	120	55	35	3.07
Weak enforcement of planning and building regulations worsens flooding	140	125	60	35	3.03
Encroachment on wetlands contributes to frequent flooding	155	125	50	30	3.12
Inadequate waste disposal blocks drainage channels and causes flooding	145	130	55	30	3.08

Source: Author's Survey, 2025

Table 3 shows that in 2015, vegetation was the dominant land use in Lekki-Ajah, covering 40% of the total area. This means that a large part of the area is still covered by natural or green plants.

Built-up areas make up 26% of the total, which shows the rapid growth of urban areas. Wetlands/mangroves and water bodies each make up 12%, which means that there are important natural water-related features in the area. There are areas with little or no vegetation that are covered by bare surfaces (10% of the total). This could be because land is being developed or cleared. The distribution shows a mix of natural and man-made land uses, but vegetation is still the most important.

Table 3: Land Use/Land Cover Distribution in Lekki-Ajah, 2015

Landuse	Count	Area(ha)	Percent
Built-up	209291	18836.19	26%
Vegetation	325191	29267.19	40%
Wetland/Mangroove	100335	9030.15	12%
Bare Surface	82482	7423.38	10%
Water Body	95342	8580.78	12%
Total		**73137.69**	**100%**

Source: Arc GIS 10.8

Figure 2 shows the spatial distribution of landuse in Lekki-Ajah in 2015. Vegetation being the most dominant land cover is widely spread across the central part of the area. Built-up areas are mainly concentrated along the coastal and western sections. Wetland/mangrove areas are found in patches, especially around low-lying and coastal zones, while water bodies are visible along the shoreline and in some inland locations. Bare surfaces appear in scattered locations, which means there are areas under development or recently cleared land. The map shows a mix of natural and developed land uses, with vegetation still covering a large portion of the area. The spatial pattern indicates that natural land cover, especially vegetation remained dominant in 2015, despite the concentration of urban development in specific parts of the study area.

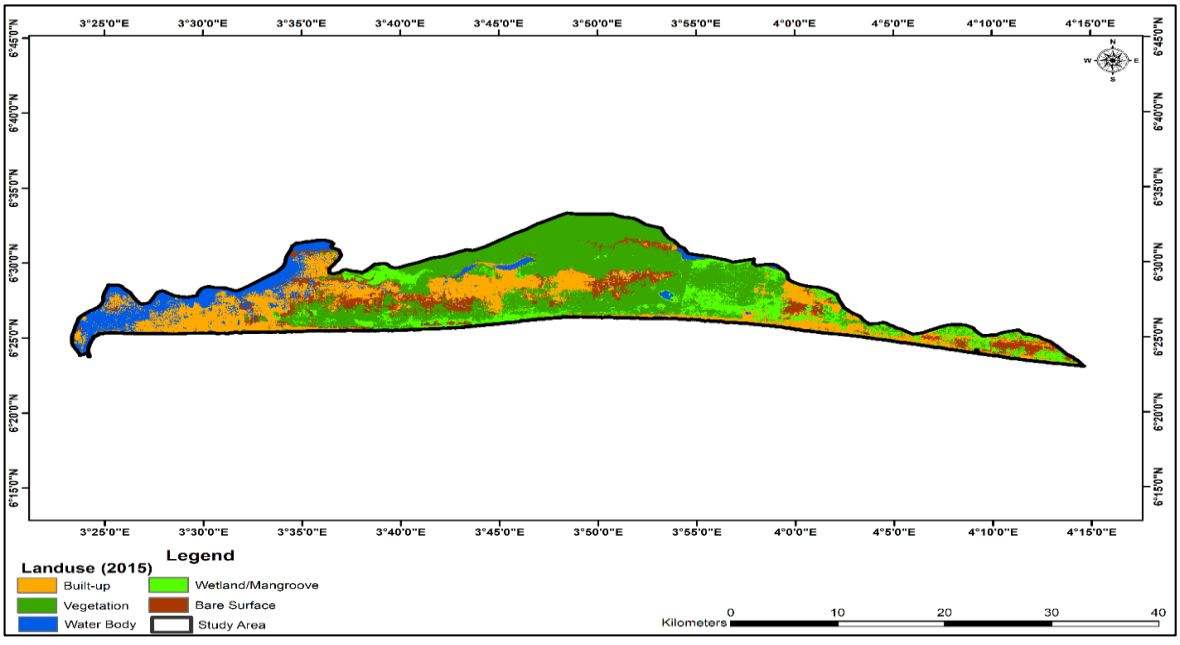

Figure 2: Land Use/Land Cover Distribution in Lekki-Ajah, 2015

Source: ArcGIS 10.8

From Table 4, we see that the major type of land cover in 2025 was built-up area, which took 36% of the total area. Vegetation came next at 27%, showing a notable drop. Bare lands covered 21%,

probably because of construction activities going on. Wetlands constituted 11%, while water bodies comprised only 6%. These two types of land covers are the smallest of all percentages. This indicates a shift towards an urban landscape made up of man-made structures and development. The distribution of land cover indicates that developed land occupied a greater proportion of the study area, than natural land cover as at 2025. This reflects a predominantly urban landscape in lekki-Ajah within this time.

Table 4: Land Use/Land Cover Distribution in Lekki-Ajah, 2025

Landuse	Count	Area(ha)	Percent
Built-up	295374	26583.66	36%
Vegetation	192951	19570.23	27%
Wetland/Mangroove	85933	7733.97	11%
Bare Surface	166717	15004.53	21%
Water Body	47170	4245.3	6%
Total		73137.69	100%

Source: Arc GIS 10.8

Figure 3 showed spatial distribution of landuse for Lekki-Ajah in 2025. On the map, built-up areas have expanded, especially in the western and coastal regions. Although there is still vegetation, it is now concentrated in the central area. Bare surfaces are more noticeable, while wetland and mangrove ecosystems seem diminished and fragmented. There are still bodies of water in a few inland locations and along the shore. This spatial pattern indicates an increase in urban development and a corresponding reduction in the extent of natural landcover between 2015 and 2025.

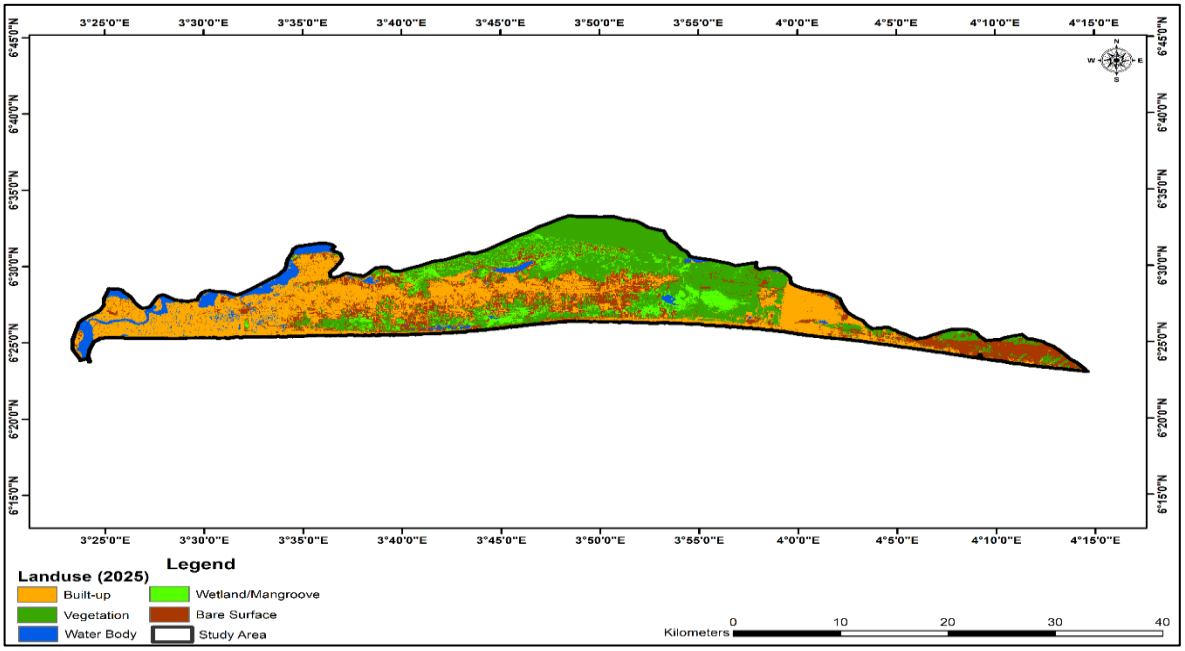

Figure 3: Land Use/Land Cover Distribution in Lekki-Ajah, 2025
Source: ArcGIS 10.8

As shown in table 3, the land use in Lekki-Ajah has changed significantly between 2015 and 2025. The built-up area grew by 10%, while bare surface also increased by 11%, indicating increased land clearing and development activities. However, vegetation declined by 13%, which indicates a reduction in natural cover. Wetland/mangrove areas declined by 1%, while water bodies decreased by 6%. Changes in land use between 2015 and 2025 have serious consequences for flooding in Lekki-Ajah. The increase in built-up area from 26% (18,836.19 ha) to 36% (26,583.66 ha) and bare surface from 10% (7,423.38 ha) to 21% (15,004.53 ha) suggests more impervious surfaces, which reduce water infiltration and increase surface runoff. At the same time, vegetation decreased from 40% (29,267.19 ha) to 27% (19,570.23 ha), while wetlands/mangroves fell slightly from 12% to 11%. These natural features usually play an important role in the absorption of surplus water, hence removing such elements is likely to affect the level of flood control in the region. In addition, water bodies decreased from 12% to 6%, which can affect drainage capacity. These changes in landuse increase the risk and severity of flooding by increasing the runoff and decreasing natural absorption. Generally, the results suggest that there is a significant amount of growth in developed land cover while there is a reduction in natural land cover from 2015 to 2025.

Table 3: Landuse/Land cover Analysis in Lekki-Ajah between 2015 and 2025

Landuse	Percentage 2025	Percentage 2015	% change
Built-up area	36	26	10%
Vegetation	27	40	-13%
Wetland/Mangroove	11	12	-1%
Bare Surface	21	10	11%
Water Body	6	12	-6%

Source: ArcGIS 10.8

The results from this study show an existing correlation between land use changes and flood risks in Lekki-Ajah. The socio-demographic characteristics revealed that most of the participants belonged to the economically productive age groups and lived in both formal and informal settlements, which implies that floods affect a wide cross-section of people. In addition, the high percentage of respondents (81%) who experienced flooding every year, along with a long period of flood occurrence, property destruction, indicates that floods have become a persistent environmental problem in the study area. This means that the processes of urbanization and land use changes in the area have made people vulnerable to flood disasters. This finding corroborates the results of Aderogba (2012) who found that urbanization and lack of drainage system are the primary causes of flooding in Lagos.

From the perceptions of people concerning floods in Lekki/Ajah, it is evident that factors such as wetland encroachment, lack of adequate drainage systems, land reclamations, and weak implementation of land use plans cause floods in Lekki/Ajah. This conclusion corroborates the findings of Nkwunonwo et al. (2015) where they observed that conversion of wetlands and flood plains to urbanized land increases surface run-off and flood intensities in Lagos.

The prevalence of vegetation in 2015 implies that there was a considerable amount of the Lekki-Ajah landscape that remained untouched by the conversion to urban uses. At the same time, the clustering of the built-up landscape in the western and coastal regions of Lekki-Ajah indicates that the process of urbanization is already taking place in more accessible parts of Lekki-Ajah, which have developed infrastructure. The existence of small patches of barren surfaces also shows that there is land clearing and constructions taking place, which are typical signs of urbanization processes. There were some wetlands and mangrove landscapes remaining at the low-lying coastal parts of Lekki-Ajah. This means that the ecologically significant landscapes were not totally substituted with developments.

Nonetheless, the presence of built-up landscapes near these wetlands also shows that there is growing pressure on environmentally sensitive ecosystems. These observations are supported by previous studies, which demonstrate that rapid urbanization processes in the Lekki corridor (Salami et al, 2024) and Lagos state in general (Idowu & Zhou, 2021), were characterized by the substitution of natural landscapes with infrastructures, as evident in the expansion of built up areas.

Furthermore, the prevalence of developed landuse reflects the fast-growing trend of urbanisation in the Lekki-Ajah area due to residential and infrastructural development. The decline in the vegetative land cover and the minimal wetlands indicate that natural land use has progressively been changed to cater for the growing urban land uses. These findings agree with those of Oyalowo (2022), who noted the growing trend of urbanisation in the Lekki axis.

In contrast, the wetlands and water body types that provide natural protection against floods have decreased slightly during the period of analysis. This finding corroborates the claim made by Rojas et al. (2022) that the destruction of coastal wetlands decreases natural water storage capacity, leading to increased vulnerability to floods in urban environments. The loss in coverage of water bodies from 12% to 6% is particularly concerning since it means a decrease in the landscape's drainage capability.

In summary, through the incorporation of both survey responses and changes in land use, a clear trend can be established. As seen in the findings, the increase in urbanization has led to significant changes in the ecological dynamics of Lekki/Ajah. It is clear that such a trend is causing an increase in flooding events in the area, and this actually agrees with a report by the IPCC (2021) that landuse change is among the major causes of floods in coastal cities.

4.0 Conclusion and Recommendations

In conclusion, the study established that there has been a drastic change in the land use pattern in Lekki-Ajah from 2015 to 2025. This is characterized by the constant urban development activities and reduction of vegetation, wetlands, and water sources. Surface runoff has increased due to high impervious surfaces in the region. Moreover, the predominance of built-up land uses, together with inadequate waste disposal and ineffective planning and monitoring of development activities, increases flood risk. In summary, urbanization is identified as a key cause of flooding, hence the need for sustainable land use planning in the study area is of high priority. From the findings above, the study recommends the following:

1. Encroachment on wetlands and lack of strict enforcement of physical planning and building regulations contribute significantly to flooding within Lekki-Ajah. It is thus important for government agencies to strictly enforce physical planning and building regulations to curb any further encroachment on the wetlands, flood plains, and other ecologically sensitive areas.
2. There have been substantial reductions in vegetation, wetlands, and water bodies from 2015 to 2025 in the study area, thereby limiting the natural ability of the area to absorb excess rainfall. The area should be restored through vegetation, wetlands, and mangrove forest conservation and restoration projects.
3. Majority of the residents cited poor drainage and inefficient waste disposal as major causes of the flooding within the study area. It is therefore imperative that the Lagos State government improves their drainage system and ensure frequent emptying of the drainage channels to facilitate smooth flow of water.

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