ANALYSIS OF LAND USE CHANGE INEPETEDO, LAFIAJI/EBUTE, AND SANDGROUSE COMMUNITIES FROM 2002-2022

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Abstract - Unplanned land use transition connotes disorder in an urban environment. This study analyzed land use change in Epetedo, Lafiaji/Ebute and Sandgrouse communities in Lagos Island. Burgess theory of Invasion and succession was used to explain the stages of land use change.Both qualitative and quantitative techniqueswere used in measuring the change in land use from year 2002-2022. The study employed observation and descriptive survey method to facilitate the realization of the study objective. The entire study area (33 Streets) was studied using base map to delineate the study area, while satellite imagery to determine the extent of land use change on ground. A checklist of streets and house numbers was obtained to take inventory of land uses. The study revealedsignificant change in land use over 20 years. Residential landuse shrank from 49.66% in 2002 to 31.23% in 2022. Mixed land use emerged in the study area between 2002-2022occupying a land area of 114,082.13m^2 (14.23%) of the overall land area (801,546.89m^2). This study concluded that land use change has taken place in the study area over twenty years and there was no deliberate attempt to plan for the change.Adequate delineation of land uses in Lagos Island along, strict land use regulation, responsive land use administration and policy implementation were recommended to curb unplanned land use changes.

Keywords: Change, Lagos Island, Land use, Lagos Island &Residential

I. INTRODUCTION

Land use according to United States Environmental Protection Agency (US EPA, 2022) is the term used to describe the human use of land. Land use is seen as a human activity to change the natural landscape and emphasize the role and function of land for socio-economic activities such as residential, commercial, public/institutional, industrial, circulation, and agricultural (Paul & Rashid, 2017).

Land use change is a human process aimed at transforming the natural landscape and emphasizing the role and function of land for socio-economic activities (Tuan,2022).Change in land use occurs majorly in two forms; conversion from one use to another; and modificationof certain type of land uses (Nkolika, Oluwatosin, Olayinka &Iyanda, 2018).Chen, Sun, Chen, XinWu, Guo & Wang (2014) asserted that in the last five decades, there has been enormous change in the pattern of land use either from one use to another or in the intensity of uses in cities globally because it is necessary and essential for economic development and social progress.The ever-growing human capacity to modify landscapes raises concerns about the consequences these changes will bring for humans' and nature's well-being (Garcia-Martín,Quintas-Soriano, Torralba, Wolpert, &Plieninger,2021), especially when land use change prevails without any detailed and comprehensive attempt to evaluate and plan for such change over time as observed in Epetedo, Lafiaji/Ebute, and Sandgrouse communities.

Unplanned land use change could allow for slum formation, reduction of housing stock, encroachment on right-of-way which may lead to traffic congestion, waste pollution, loss of public space, road accident, and obstruction of drainage system. Data on land use change are imperative to development control agencies, town planners, and other professionals in the built environment in Lagos Island. The recommendations of this research will be valuable for the efficient and effective management of land uses, infrastructure, slum prevention, and it will establish and dictate the trend and pattern of land uses in the study area over time.

Hence, this study focused onanalysing land use changeinEpetedo, Lafiaji/Ebute, and Sandgrousecommunities from 2002-2022with a view of using the information gathered to suggest recommendations that will ensure sustainable management of urban land uses. The objectives of the study are;

1. To clearly define the boundaries of the study area, including the spatial extent and land use of the study area in year 2002.
2. To analysethe land use of the study area in year 2022.
3. To analyse the extent of land use change in the study area between year 2002 – 2022.

II. LITERATURE REVIEW

2.1. Land Use Change

Land use change is a human process that is aimed at transforming the natural landscape and emphasizing the role and function of land for socio-economic activities (Tuan, 2022). Change in land use occurs majorly in two forms according to; conversion from

one use to another; and the modification of certain type of land uses. Land use conversion is concerned with changes in the mixpattern of land uses while land use modification involves changes in the intensity of use of a particular landmajorly from underutilization to enhanced exploitation (Nkolika, Oluwatosin,Olayinka, &Iyanda,2018).

The process of land use change follows a particular process as identified in Ericksen (2007); Gimba (2022) this process includes;concentration and dispersion of services and populations.; centralisation and decentralization; segregation of populations into various distinctive areas; dominance and the gradient of receding dominance in the successively more peripheral subareas of the city; invasion of areas by groups, giving rise to succession of one group by another.

In a related study on urban land use change, Atalel (2014) analyzed land use and land cover changes in Bahir Dar, Ethiopia. The study revealed that there was an increased expansion of built-up areas in the last 25 years from 1.5% in 1986 to 4.1 % in 2001 and 9.4% in 2010 at the expense of agricultural areas. Also, there was a growing trend in the western part of Bahir Dar relative to other directions. Oyinloye&Kufoniyi (2013) analysed urban land use change in Ikeja Government Reserved Area (G.R.A), Lagos and it revealed that residential land use has changed rapidly for the periods (2000-2010). The results also showed increase in commercial land uses between the same periods. However, this study was conducted in a planned neighbourhood, it was conducted nine years ago which indicates location and time gap.

2.2. Causes of Land Use Change

In determining the factors causing land use change, Antrop (2012) identified six categories as determinants of land use change in urban areas as social, cultural, economic, environmental, infrastructure and institutional factors. In similar vein, the causes and consequences of land use change were investigated in FCT, Abuja by Nkolika et al. (2018)economic, spatial, and political factorswere discovered as the major determinants of land use change were.

Several researches have been conducted on the nature and causes of land use change by different authors.Oyinloye&Kufoniyi (2013) analyzed land use change between commercial and residential in Ikeja G.R.A without considering other land uses i.e., institutional, and also the study did not reflect emerging land use (mixed use) over time. Atalel (2014) was based on conversion of agricultural land to residential land use in Bahir Dar, Ethiopia. However,this study focused on analysing land use change in Epetedo, Lafiaji/Ebute, and Sandgrouse communities from 2002-2020 with a view of using the information gathered to suggest recommendations that will ensure sustainable management of urban land uses.

2.3. Theoretical Framework

2.3.1. Invasion and Succession

The processes of invasion and succession were adopted from urban ecology to describe the neighborhoods' change and growth of the city whereby one social group (land use) succeeds in establishing itself by pushing out another in the valued urban space. These terms are associated with the Burgess' Zonal Model (1927). According to this model, the growing demand for land of the immigrant population for housing and other activities forces them to move to outward areas. Invasion refers to the extension of a particular land use towards an intermediate zone.Succession means a process that shows successive movement of people towards outward zones as the need arise. Succession is a complementary process to invasion as it proceeds only after the invasion.

The illustration (Figure 2.1) below shows the gradual process of invasion and succession of different categories of population (land uses). Different shapes and shades represent different categories of population which ranges from alphabet A-E. The first circle indicates the pre-invasion stage, the second circle indicates the emergence of invasion by population C, the third circle indicates the pre succession stage whereby population B has been dispersed to the fringe to invade population A, and the third circle indicates the succession of population B and the eventual invasion and succession of population A.

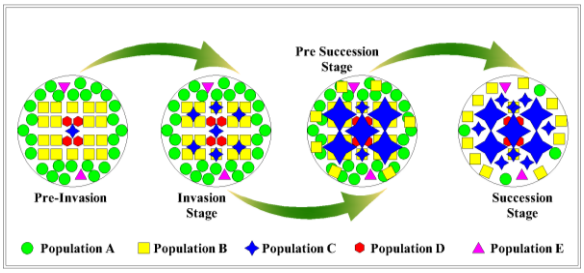


Figure 2.1: Invasion and Succession
Source: Author, 2022.

In relation to this study, invasion and succession theory explains the centripetal spatial structure of urban area, how land usechanges, invade, and succeed each other.

III. STUDY AREA AND METHODOLOGY

The study area is located in Lagos Island Local Government Area, Lagos State, Nigeria. Lagos Island is bounded in the west by Lagos Harbour, in the North and Northeast by Lagos Lagoon, in the south

by Five Cowry creek, and towards the southeast by Macgregor Canal. Administratively, it shares its northern boundary with Lagos Mainland L.G.A and the Lagos lagoon, to the east it is bounded by Eti – Osa L.G.A. and to the west by Apapa L.G.A(see figure 3.1).

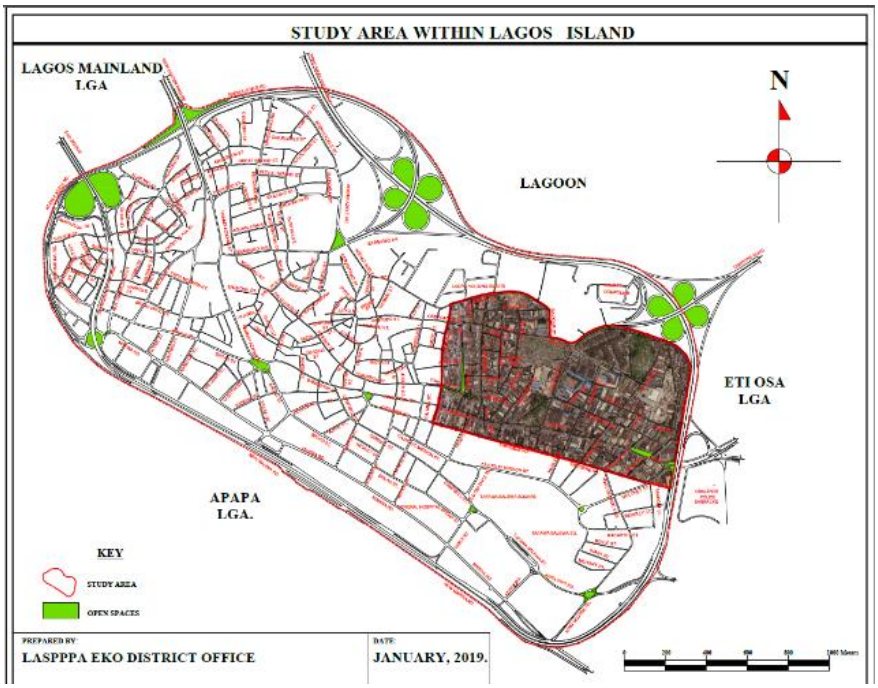


Figure 3.1: Map of Study Area within Lagos Island
Source: Lagos State Physical Planning Permit Authority (2019).

According to Independent National Electoral Commission Directory of Polling Units (INEC, 2015) Epetedo, Lafiaji/Ebute, and Sandgrouse communities are three of the nineteen registration areas in Lagos Island Local Government Area. These three communities constitute the study area, and they are located in the eastern part of Lagos Island. Geographically, the study area lies between latitude 6°27'04"N to 6° 27'23"N and latitude 3°23'49"E to 3°24'27"E. It is bounded by Popo Aguda Community in the west, in the North by Lagos State Property Development Corporation Estate (LSDPC) Phase 1-4, in the East by Obalende Community, and in the South by Igbosere road (See fig 3.2).

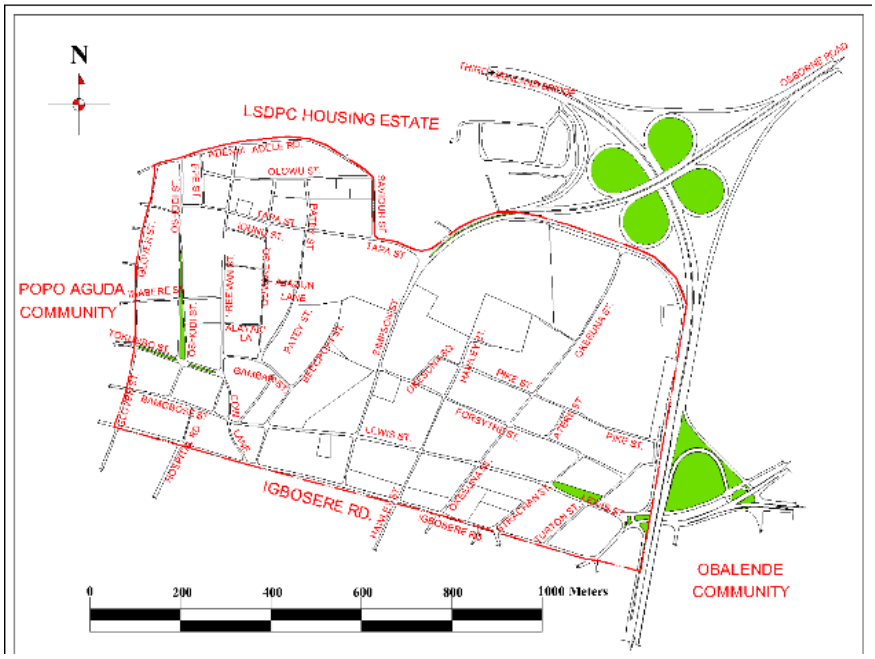


Figure 3.2: Map of the Study Area
Source: Field Survey, 2022.

Methodology

The study utilized qualitative and quantitative technique in measuring the change in land use from year 2002-2022. The study employed observationand descriptive survey method as the most appropriate to facilitate the realization of the objectives of this study. The whole of the study area (33 Streets) was studied using base map to delineate the study area, satellite imagery to determine the extent of land use change on ground, checklist of streetsand house numbers to take inventory of land uses.Data obtained from field survey were analysed using descriptive statistics such as tables and with the aid of Google earth pro and digitized maps. Results were presented in maps, and tables, for better understanding.

IV. FINDINGS

4.1. Land Use Analysis of the Study Area, Year 2002.

Land use analysis of the study area in year 2002 as presented in table 4.1 below revealed that residential land use was the predominant land use in the study area occupying 398,052.57m^2 (49.66%). Institutional/Public land use occupied 182,147.12m^2(22.72%), Commercial 105,520.21m^2 (13.16%), Circulation 77,282.02m^2 (9.65%), Industrial 33,245.38m^2 (4.15%), and Open Space/Recreational use occupied 5299.59m^2 (0.66%).

Land use type	Land area (m^2)	%
Residential	398,052.57	49.66
Commercial	105,520.21	13.16
Public / Institutional	182,147.12	22.72
Open Space / Recreational	5,299.59	0.66
Industrial	33,245.38	4.15
Circulation	77,282.02	9.65
Total	801,546.89	100

Table 4.1Land Use Analysis of the Study Area, Year 2002 according to Lagos Regional Plan.
Source: Lagos State Regional Plan, 2002.

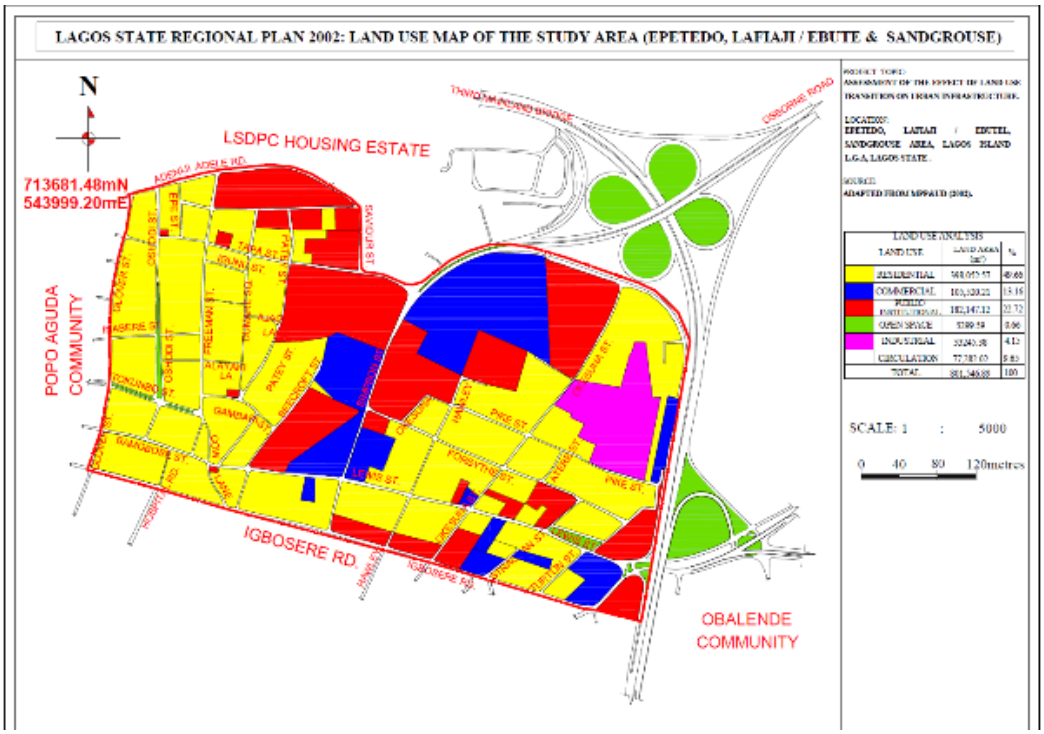


Figure 4.1 Lagos Regional Plan, Year 2002 (Land Use of the Study Area)
Source: Adapted from Lagos State Regional Plan, 2002.

4.2. Land Use Analysis of the Study Area, Year 2022.

Land use analysis of the study area as indicated in table 4.2 below revealed that residential land use occupies 250,350.61m^2 (31.23%). However, 147,701.96m^2 (37.10%)of the initial residential land use area (398,052.57m^2) has been converted. Institutional/Public land use occupies 177,353.90m^2 (22.72%) of the overall area. However, this indicates 4,793.22m^2 (2.63%) loss from the initial 182,147.12m^2. Commercial land use gained 36,273.11m^2 which is equivalent to 34.38% of its initial 105,520.21m^2 as a result of the land usechange. Hence, commercial land use currently covers

141,793.32 (17.69%). Circulation covers 77,864.43m^2 (9.71%) of the overall area and this implies that road expansion/extension has taken place and such change accounts for 582m^2 (0.75%) of its initial land cover.Industrial land use covers 33,245.38m^2 (4.15%), and Open Space/Recreational use occupies 6,857.12m^2 (0.86%). Field surveyrevealed the emergence of mixed land use in the study area. It accounts for 114,082.13m^2 (14.23%) of the overall land area (801,546.89m^2) of the study area.

Land use type	Land area (m^2)	%
Residential	250,350.61	31.23
Commercial	141,793.32	16.69
Public / Institutional	177,353.90	22.13
Open Space / Recreational	6,857.12	0.86
Industrial	33,245.38	4.15
Mixed	114,082.13	14.23
Circulation	77,864.43	9.71
Total	801,546.89	100

Table 4.2. Land Use Analysis of the Study Area, Year 2022.
Source: Field survey, 2022.

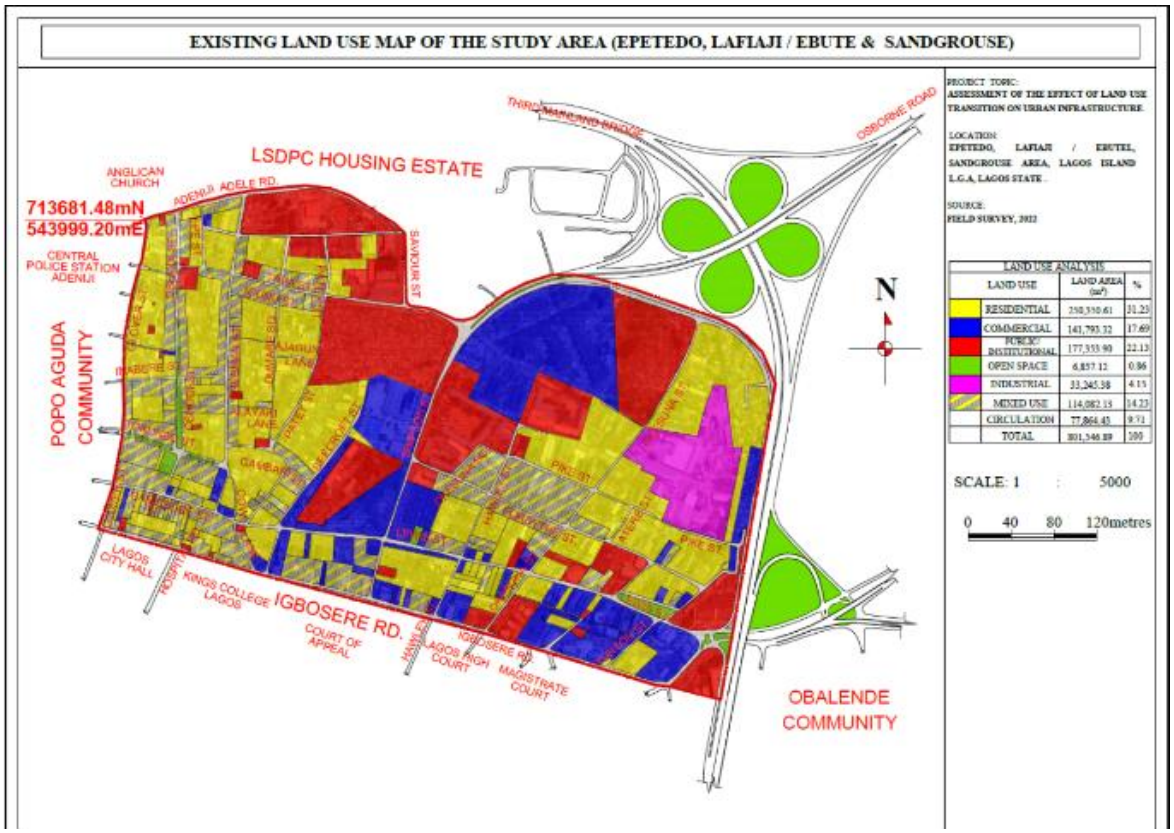


Figure 4.2Existing Land Use Map of the Study Area, Year 2022.
Source: Field Survey, 2022.

4.3. Extent of Land Use Change in the Study Area, Year 2022.

Figure 4.3 below revealed the extent of land use change/conversion in the study area. It revealed that mixed land use emerged in the study area between the period of 2002-2022. The figure below revealed that majority of the residential buildings have been redeveloped and converted to mixed use buildings, consisting residential and commercial uses.

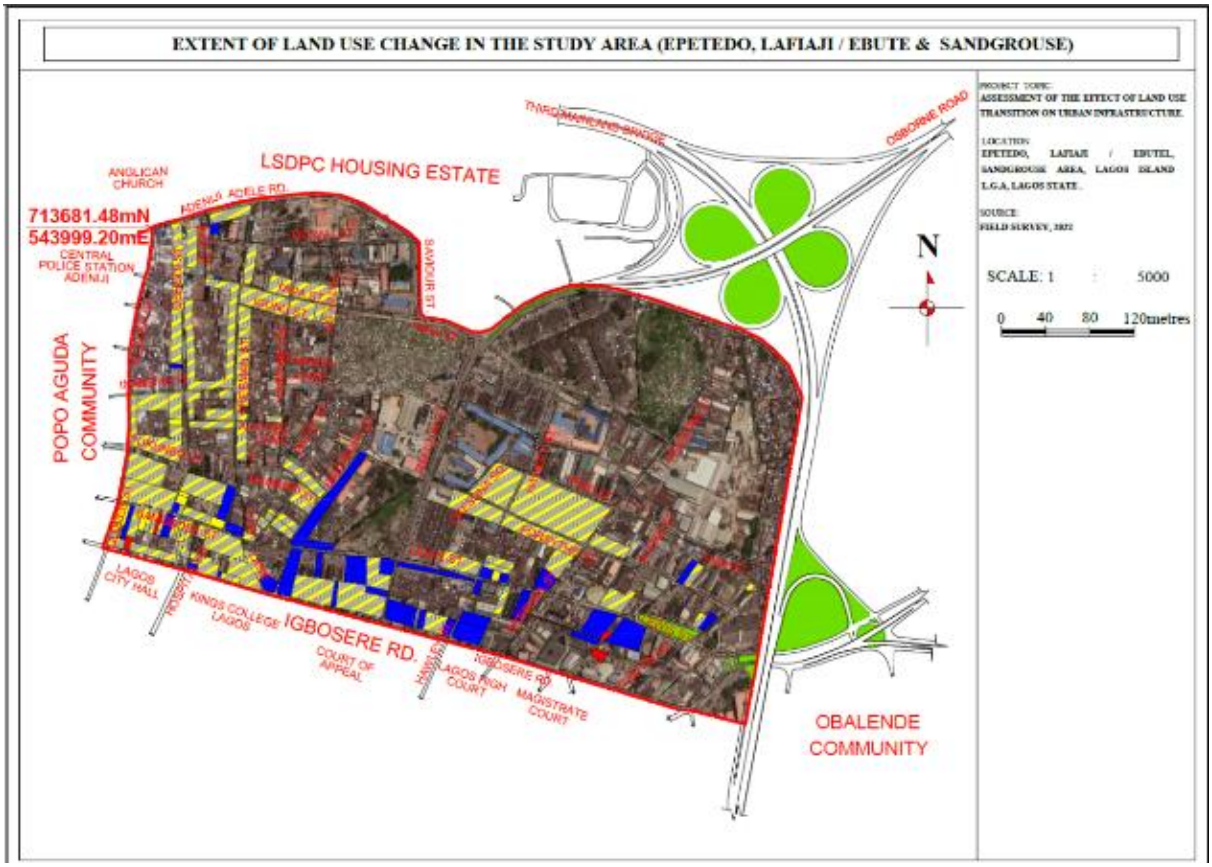


Figure 4.3 Extent of Land Use Change in the Study Area, Year 2022.
Source: Field Survey, 2022.

In conclusion, land use transition occurred in the study area significantly between the period of year 2002-2022. The transition process has benefited commercial land use, and it has paved way for the emerging land use (mixed use). Residential land use was greatly impacted, and institutional land use is slightly impacted. This finding agrees with the assertion of Chen et al (2022) that there has been enormous transition in the pattern of land use either from one to another or in the intensity of uses in cities globally. It also corroborates Burgess (1927) theory of invasion and succession.

V. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

In conclusion, land use change is a complex and multifaceted issue that has been studied extensively in this literature. This researchrevealed that land use change has taken place in the study area overtime and there is no comprehensive attempt to evaluate and plan for the change over time. Although much progress has been made in understanding land use change, there is still much that we do not know, and much more research is needed to fully understand the factors, impacts, and potential solutions to this issue. Nonetheless, the literature provides a solid foundation for policymakers and stakeholders to make informed decisions about land use change and to work towards more sustainable and equitable land use practices in the future.

5.2. Recommendation

1. The Local Government should delineate areas in Lagos Islandaccording to their functions, and the delineation should properly define the boundary of every community in Lagos Island.
2. Strict land use regulation: Government should provide a responsive land use administration law in Lagos Island and regulatory agencies/ministries/department should uphold the provisions of the law.
3. Since mixed use development is the reality of development in Lagos Island, policies should be in place mandate property developers to provide for facilities that will ensure smooth transition of land uses.

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