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TRENDS IN URBAN EXPANSION AND ITS SOCIO-ECONOMIC REPERCUSSIONS IN UYO CAPITAL CITY, AKWA IBOM STATE, NIGERIA (1986–2024): A GEOSPATIAL AND HOUSEHOLD SURVEY ASSESSMENT

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Abstract

Urban expansion in Nigerian cities is altering land use and livelihood systems with far-reaching socio-economic consequences. This study assessed the trends, drivers, and socio-economic repercussions of urban expansion in Uyo Capital City, Akwa Ibom State, Nigeria, from 1986 to 2024. A mixed-methods approach was used. Remote Sensing and GIS analysis of Landsat imagery for 1986, 2004, 2014, and 2024 was performed in ERDAS IMAGINE 10.5. Five LULC classes were mapped: forest, disturbed forest, compound farmland, farmland, and built-up/bare land. Classification accuracy ranged from 79% to 96% with kappa values of 0.68–0.93. A structured questionnaire was also administered to 382 households across twelve settlements. Results revealed that built-up/bare land increased from 15.02% (6,022.08 ha) in 1986 to 52.30% (20,966.12 ha) in 2024, a net increase of 14,944.12 ha. Expansion accelerated to 19% annually between 2014 and 2024. During the same period, compound farmland declined by 22.52%, disturbed forest by 14.83%, forest by 6.27%, and farmland by 6.37%. Trading (n=142) has replaced farming (n=116) as the main livelihood. Key drivers were population growth (n=119), infrastructural development (n=95), and desire for home ownership (n=91). Major impacts included loss of farmland (n=125), high cost of living (n=73), and reduced crop yield (n=64).The study concludes that urban growth in Uyo is largely unplanned, converting agricultural and forest land into built-up areas and increasing vulnerability. It recommends zoning enforcement, compact development, rural decentralization, stronger environmental laws, and a GIS monitoring unit for sustainable growth**.**

Keywords*: Urban expansion; Land use/land cover change; GIS/Remote sensing; Socio-economic repercussions; Uyo; Nigeria*

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1. Introduction

Urban centres worldwide have continued to experience unprecedented population growth, driven by the concentration of economic activities and the expansion of industries, which in turn increase employment potential and trade prospects in cities (Celik *et al.,* 2024). This growth,

together with the accompanying expansion of infrastructure, properties and community activities, constitutes what is broadly termed urban expansion, the outward growth of cities in spatial dimension alongside their human population (Wilcox *et al.,* 2017). As populations increase, pressure mounts on existing urban infrastructure, driving the physical transformation of the surrounding landscape and standing as a key indicator of economic growth in most countries of the world (Rahman and Alam, 2021).

In the early 1950s, roughly 66 percent of the world's population lived in rural areas; today, cities are home to half of humanity, and by 2030 about 60 percent of the global population is projected to live in urban areas, with more than 90 percent of this urbanisation occurring in the developing world (UN-Habitat, 2010). Urban populations in developing countries are expected to grow by roughly 70 million people annually, and by 2030, 80 percent of the world's urban population will reside in developing countries (UN-Habitat, 2010). As urban centres grow in population and extent, peri-urban areas undergo a parallel transformation, with arable and non-arable land increasingly built up for commercial, industrial and residential use (Agbo, Ikpe and Mayowa, 2022).

Since the creation of Akwa Ibom State in 1987, Uyo, its capital, has grown rapidly in number and size of settlements, sprawling into surrounding suburbs to accommodate the continuous influx of people and their infrastructural needs (Obot, 2018). This growth has been accompanied by the progressive depletion of natural vegetation. Historically, the effective monitoring of such urban expansion was constrained by limited access to information and appropriate technology; however, the integration of Remote Sensing (RS) and Geographic Information Systems (GIS) has since become a powerful and widely recognised tool for detecting and quantifying urban growth trends (Ituen, 2007). This study therefore combines field survey data with remote sensing data in a GIS environment to assess the trends of urban expansion and its socio-economic repercussions in Uyo Capital City between 1986 and 2024.

Globally, urban expansion results in land taking that strips populations of valuable agricultural land, leaving many without sustainable livelihoods; displaced residents often resort to informal petty trading, while displaced youth are increasingly drawn into crime. In China, for instance, rapid urbanisation annexed over 10% of arable land between 1990 and 2010, directly threatening national food security objectives (Liu, Zong, *et al.,* 2014). In Latin American cities, affluent neighbourhoods enjoy the benefits of ecosystem services such as shade and air purification, while low-income peripheral settlements bear the brunt of extreme heat and environmental degradation, a clear expression of environmental injustice (Angotti, 2013). Within Africa, UN-Habitat (2014) reports that

African cities are growing faster than any other world region, but this growth is frequently informal and poorly aligned with planning frameworks. In Accra, Ghana, rapid expansion has eroded green spaces and heightened vulnerability to flooding and heat stress (Aboagye, 2017), while in Addis Ababa, Ethiopia, peripheral expansion has sparked conflict over land dispossession and eroded agricultural livelihoods (Abebe, 2019).

Nigeria offers a well-documented microcosm of these continental challenges. Lagos's transformation from a series of islands into a sprawling megacity has involved extensive land reclamation and mangrove destruction, altering the coastal ecosystem and elevating flood risk (Adelekan, 2016). In Abuja, peripheral growth has consumed surrounding villages and farmlands, fuelling conflict between indigenous landowners and new urban elites and raising food security concerns for the urban poor (Mabogunje, 2015). Port Harcourt and Ibadan have likewise recorded steep declines in vegetation cover alongside surging built-up areas, with attendant rises in land surface temperature and biodiversity loss (Ejaro & Abubakar, 2013; Adegboyega *et al.,* 2018).

While the macro-dynamics of primary Nigerian cities such as Lagos and Abuja are well chronicled, a significant knowledge gap remains regarding the spatio-temporal dynamics of secondary cities like Uyo, which absorb a substantial share of Nigeria's urban population growth yet receive disproportionately little scholarly attention, with existing local studies now dated. Furthermore, most studies note threats to livelihoods and food security only in passing, without integrating the direct socio-economic repercussions of land use cover loss, such as the depletion of active farmlands and forests that provide non-timber products, on communities' economic resilience and food sovereignty. Similarly, the widely reported non-adherence to Uyo's master plan has not been empirically investigated through the mapping of actual deviation patterns from planned development. This study addresses these gaps by providing an up-to-date, geospatially grounded and socio-economically integrated assessment of urban expansion in Uyo Capital City, by carrying out a land use/land cover assessment of the study area for 1986, 2004, 2014 and 2024; analyses the LULC changes between 1986–2004, 2004–2014 and 2014–2024; assesses the major socio-economic activities of residents; identify/evaluate the major causes of urban expansion; and assesses the socio-economic repercussions of urban expansion in the study area.

2. Literature Review

2.1 The Global Urban Expansion Discourse

Urban expansion describes the growth of cities in spatial dimension alongside human population, driven fundamentally by population increase and the concomitant demand for residential, commercial,

industrial and institutional land uses (Odama, 2013; Uttah *et al.,* 2023). The spatial configuration and dynamics of this growth are central concerns of contemporary urban studies (Hall & Barrett, 2018). Globally, the conversion of natural landscapes for urban use is recognised as a primary driver of habitat fragmentation, biodiversity loss and the alteration of local microclimates, frequently exacerbating the Urban Heat Island effect (Oke, 1982). Wang *et al.* (2025) similarly note that urban expansion often occurs at the direct expense of agricultural land, a practice particularly intense in developing countries with rapidly expanding urban centres. This conversion threatens food security by reducing the physical farm base and increasing reliance on food imports, thereby making food systems more vulnerable (Andrade *et al.,* 2022).

2.2 Urban Expansion in the African Context

UN-Habitat (2014) reports that African cities are growing faster than any other region globally, but this growth is frequently characterised by informality and weak adherence to planning frameworks. Roy (2005) theorises informality as a dominant "mode of urbanisation" in the Global South, whereby informal land transactions and settlement become the primary process through which cities are built rather than a marginal or exceptional activity, a pattern documented empirically by Nikuze *et al.* (2019) in Kigali and Dar es Salaam. This informality is compounded by what Goodfellow (2017) identifies as the political economy of urban land, in which speculation and the deliberate maintenance of land scarcity by urban elites inflate the cost of housing and living. Côté-Roy and Moser (2022) further describe how state infrastructural interventions, new roads, utilities and public facilities, act as a form of "infrastructural futuring", proactively scripting the developmental trajectory of peripheral land and foreclosing alternative (typically agrarian) futures. In Nigerian cities, Achunine (2021) similarly finds that such infrastructural investment can create "corridors of exclusion", disproportionately benefiting political and economic elites with prior knowledge of, or holdings in, affected land, while displacing existing farmers.

These processes converge with weak environmental governance to heighten climate vulnerability. Douglas *et al.* (2019) argue that the combination of unplanned urban expansion and weak environmental regulation in West African cities produces "hotspots" of flood and erosion risk, disproportionately affecting the urban poor. Brenner and Schmid (2015) situate these dynamics within the broader theory of "planetary urbanisation", which holds that urban processes now actively produce and reshape entire territories, including ostensibly rural hinterlands rather than merely absorbing them, blurring the conventional urban–rural divide.

2.3 The Nigerian Urban Experience

The transformation of Lagos from a cluster of islands into a sprawling megacity, achieved substantially through land reclamation and mangrove destruction, has significantly altered its coastal ecosystem and elevated flood risk (Adelekan, 2016). In Abuja, rapid peripheral growth has devoured surrounding villages and farmlands, generating conflict between indigenous landowners and incoming urban elites and threatening food security for the urban poor (Mabogunje, 2015). Comparable trends of declining vegetation cover alongside expanding built-up area, increased land surface temperature and biodiversity loss have been documented in Port Harcourt and Ibadan (Ejaro & Abubakar, 2013; Adegboyega *et al.,* 2018), and more broadly across developing-nation cities experiencing rapid, uncoordinated expansion without commensurate planning capacity (Ogunbode and Oyebamiji, 2022; Essien, 2023; Akadiri *et al.,* 2024). Marondedze and Schütt (2019) note that such planning deficits typically produce haphazard development patterns that intensify the negative environmental and social consequences of growth, a pattern that Nigerian secondary cities like Uyo appear to replicate at a scale that remains empirically under-documented.

2.4 Socio-Economic Dimensions and Livelihood Transitions

Urban expansion reshapes local economies as much as it reshapes landscapes. As agrarian land is converted, households are compelled to diversify income sources, typically shifting toward trading and other urban-oriented, informal livelihoods (Simon *et al.,* 2022). Acham (2024) frames this shift as a process of "productive displacement", in which a land-based, productive economy is replaced by a speculative, rent-based one. Agyeman *et al.* (2023) describe the resultant socio-economic impacts as radiating outward from the urban core in a "shockwave" effect that diminishes with distance, producing an urban-rural gradient of vulnerability across peri-urban settlements. Collectively, this body of scholarship establishes a consistent global-to-local pattern: urban expansion, especially where unplanned, systematically displaces agrarian livelihoods, degrades ecological assets, and inflates the cost of urban living, with the heaviest burden borne by the poorest and most peripheral communities.

2.5 Theoretical Framework

This study draws on three complementary theoretical strands to interpret its findings: (i) planetary urbanisation (Brenner & Schmid, 2015), which frames Uyo's hinterlands as being actively produced as urban space through infrastructure, land commodification and livelihood transformation, rather than passively absorbed; (ii) informality as a mode of urbanisation (Roy, 2005), which explains the prevalence of unregulated land transactions and housing supply on the

city's fringes; and (iii) infrastructural futuring and corridors of exclusion (Côté-Roy & Moser, 2022; Achunine, 2021), which explain how state infrastructural investment proactively scripts peripheral land for urban rather than agrarian futures, often to the disproportionate benefit of elites. Together, these perspectives provide an integrative lens through which the empirical geospatial and socio-economic evidence generated by this study can be understood as a coherent, self-reinforcing cycle rather than a set of isolated phenomena.

Despite the depth of the existing literature, a detailed, up-to-date, empirically integrated analysis of LULC change and its socio-economic repercussions in Uyo Capital City using current geospatial technologies alongside household-level survey data has been lacking. This paper addresses that gap by providing a 38-year (1986–2024) empirical baseline that links spatial land transformation directly to the lived socio-economic experiences of affected communities.

3.0 Materials and Methods

3.1 The Study Area

Uyo Capital City comprises all areas within a 10-kilometre radius of the capital city centre, as demarcated by the Uyo Capital City Development Authority Law, CAP 136 of 1988. It doubles as the headquarters of Uyo Local Government Area (LGA) and the capital of Akwa Ibom State, having attained this status on 23 September 1987 following the creation of Akwa Ibom State from the former Cross River State (Ofem and Udida, 2014). The city lies between latitudes 4°58′ and 5°04′N and longitudes 7°51′E and 8°01′E, bordered by Ikono, Itu and Ibiono Ibom LGAs to the north, Uruan LGA to the east, and Ibesikpo Asutan and Nsit Ibom LGAs to the south (Figure 1). It sits at a mean elevation of about 61 metres above sea level and covers approximately 214.31 km² (Njungbwen and Roy, 2010; Obot, 2018), incorporating 99 settlements spread across six LGAs; Ibesikpo Asutan, Ibiono Ibom, Itu, Nsit Ibom, Uruan and Uyo.

The study area lies within the tropical rainforest belt, though urbanisation and unsustainable environmental practices have reduced much of this to a modified rainforest dominated by oil palm bush (Ituen, 2010). Falling within the coastal plain sand geomorphic formation, the terrain is largely flat, with poor drainage that predisposes many parts of the city to flooding (Usoro, 2010). Based on the 1991 census, the city had a population of about 276,927 persons, which has since grown considerably and continues to spread into surrounding LGAs. The city's economy is dominated by public service, trading and, at the periphery, compound farming, with the indigenous Ibibio people constituting roughly half of the population alongside residents of other Akwa Ibom and Nigerian ethnicities (Okon, 2008; Obot, 2018).

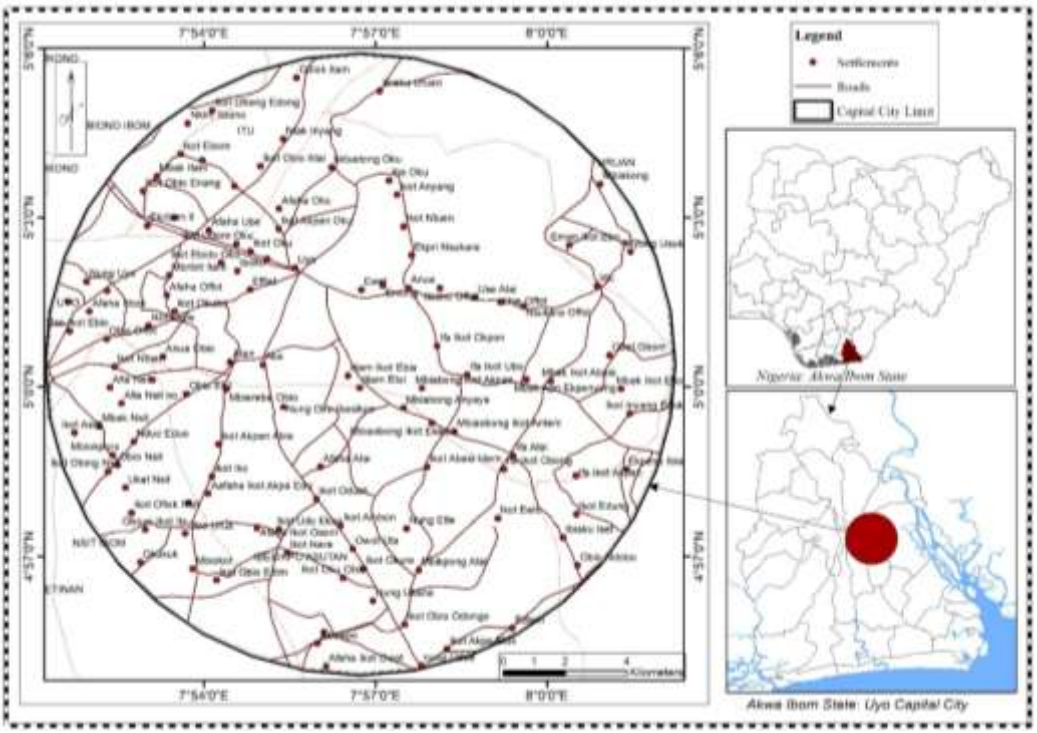

Figure 1. Uyo Cpital City the study Area with Akwa Ibom and Nigeria as Insert
Source: Ministry of Lands and Town Planning, Uyo (2024)

3.1 Research Design

This study employed a mixed-methods design integrating geospatial and social science data collection to strengthen the validity and reliability of its conclusions. The physical analysis of urban development relied on quantitative geospatial techniques, using Remote Sensing (RS) data processed in ERDAS IMAGINE 10.5 to detect changes in Land Use/Land Cover (LULC) over the 38-year study period (1986–2024), establish historical trends, calculate the rate of change, and identify the spatial direction of expansion. A complementary survey design was used to collect socio-economic information through structured questionnaires and direct interviews with residents, capturing the human and policy dimensions of urban growth, including its drivers and its effects on the livelihoods of the local population.

3.2 Dataset and Sources

Data for the study were obtained from both primary and secondary sources. Primary data, including socio-economic and demographic information, causes of urban expansion, and its repercussions, were collected via structured questionnaires and direct field observation. Secondary data comprised Landsat satellite imagery for 1986 (Landsat 5 TM), 2004 (Landsat 7 ETM), 2014 (Landsat 8 ETM) and 2024 (Landsat 8/9 OLI), obtained from the United States Geological Survey (USGS); population census figures from the National Population Commission; and political, capital-city, community and vegetation/land-use maps obtained respectively from the Office of the Surveyor-General, Akwa Ibom State, and the Cross River Basin Development Authority (CRBDA), Calabar.

Table 1 summarises the data types and sources used.

Table 1: Data Types and Sources

S/N	Data Type	Scale/Resolution	Year	Source	Format
1	Political Map of Akwa Ibom State	1:150,000	2016	Office of the Surveyor-General, AKS	Analogue
	Uyo Capital City Map (Base Map)	1:250,000	-	Uyo Capital City Development Authority (UCCDA)	Analogue
2	Thematic Map (Vegetation and Land Use)	1:250,000	1987	Cross River Basin Development Authority (CRBDA)	Analogue
3	Satellite Imageries (Landsat)	28.5 m	1986, 2004, 2014, 2024	United States Geological Survey (USGS)	Digital
4	Population	-	1991	National Population Commission	Numeric
5	Community Map	-	2016	Office of the Surveyor-General, AKS	Digital

Source: Researchers' Compilation, 2024

3.3 Population and Sampling

The study population comprised all settlements within Uyo Capital Territory. Following Udofia (2011), whereas 10% of the total population is generally considered an adequate sample fraction, this was increased to 11.3% (12 settlements) for wider coverage, selected via systematic random sampling at a regular interval of 8, beginning from settlement number 2. The twelve sampled settlements; Afaha Etok, Afaha Ube, Eman Ikot Ebo, Idu, Ikot Akpan Oku, Ikot Idaha, Ikot Oduot, Ita Uruan, Mbiabong Anyanya, Mbiokporo, Nung Ukot Itam and Okobo Ibiono had a combined 2024 projected population of 85,038, derived from the 1991 census using the exponential population growth formula $Pt = Po(1 + r)^n$, where Po is the base (1991) population, r is the state's population growth rate of 3.42%, and n is the number of years (38).

Sample size was determined using the Krejcie and Morgan (1970) formula, $S = X^2NP(1-P) / [d^2(N-1) + X^2P(1-P)]$, where N is the population, P is the population proportion (0.05), d is the desired degree of accuracy (0.05), and X^2 is the table value of chi-square for one degree of freedom at the 0.95 confidence level (3.841). Household numbers per settlement were derived by

dividing the 2024 projected population by an average household size of six (National Population Policy, 1988), yielding a total study population of 382 households, proportionately allocated across the twelve settlements as shown in Table 2.

Table 2: Sampled Settlements and Projected 2024 Population

Settlement	Population 1991	Projected Population 2024	Household	Sample Size
Afaha Etok	1,484	5,327	887	24
Afaha Ube	1,770	6,354	1,059	29
Eman Ikot Ebo	1,052	3,776	629	17
Idu	4,056	14,561	2,426	65
Ikot Akpan Oku	4,127	14,815	2,469	66
Ikot Idaha	1,548	5,557	929	25
Ikot Oduot	891	3,198	533	14
Ita Uruan	965	3,464	577	16
Mbiabong Anyanya	1,718	6,167	1,027	28
Mbiokporo	3,423	12,288	2,048	55
Nung Ukot Itam	2,207	7,923	1,320	36
Okobo Ibiono	448	1,608	268	7
Total	23,689	85,038	14,172	382

Source: Researcher's Extraction from National Population Census Figures (1991)

3.4 Land Use/Land Cover Classification Scheme

Based on prior reconnaissance of the study area, a modified Anderson et al. (2009) classification scheme was adopted, comprising five classes: Forest, Disturbed/Secondary Forest, Compound Farmland, Farmland, and Built-up/Bare Land. Forest denotes the original, largely undisturbed vegetation cover dominated by trees and undergrowth, occurring within the freshwater swamp ecology of the study area. Disturbed/Secondary Forest refers to woodland re-grown after major disturbance such as fire or timber harvest, typically featuring denser undergrowth and a single canopy layer. Compound Farmland describes land under multi-generational cultivation immediately surrounding dwellings, characterised by mixed and sequential cropping with short fallow periods. Farmland denotes land cultivated for specific crops through ploughing and sowing. Built-up/Bare Land comprises non-linear built areas covered by impervious structures, residential, commercial, industrial, institutional, recreational and infrastructural, connected by streets (FAO, 2005). This tailored scheme, particularly its distinction between compound farmland and

regular farmland, was designed to capture Uyo's characteristic low-density sprawl pattern and the frontier of urban encroachment into natural vegetation.

3.5 Method of Data Analysis

3.5.1 Land Use/Land Cover Mapping

The base map of Akwa Ibom State was georeferenced in ArcGIS 10.8, and the study area shapefile digitised and re-projected to the World Geodetic System (WGS) 1984, Universal Transverse Mercator (UTM) Zone 32 coordinate system to correspond with the orthorectified Landsat imagery. Image pre-processing (layer stacking, mosaicking and subsetting) and enhancement via Principal Component Analysis (PCA) were performed in ERDAS IMAGINE 10.5. Supervised image classification was then applied; whereby representative training signatures were digitised for each LULC class and used to classify the full image. The area (in hectares) of each resulting LULC class was calculated from the raster attribute table for each study year.

3.5.2 Accuracy Assessment

Classification accuracy was assessed by comparing interpreted features on the imagery with their corresponding classification outputs. Classified data were converted from polygon to raster format, and 200 random points were generated across each image using the ArcGIS Fishnet tool and attributed with reference class codes. Overall accuracy and the kappa coefficient were then computed using the following formulae:

Overall Accuracy = (Total Number of Correctly Classified Pixels ÷ Total Number of Reference Pixels) × 100

Kappa Coefficient (κ) = [(TS × TCS) − Σ(Column Total × Row Total)] ÷ [TS² − Σ(Column Total − Row Total)]

3.5.3 Analysis of Land Use/Land Cover Change

Change was analysed by comparing LULC statistics across study years, identifying changes in hectares and percentage, and computing the trend and annual rate of change (ARC) as follows:

Percentage (Trend) Change = (Observed Change ÷ Sum of Change) × 100

Annual Rate of Change = (Percentage Change ÷ 100) × Number of Study Years

3.5.4 Analysis of Socio-Economic Activities, Causes and Repercussions of Urban Expansion

Data on socio-economic activities, the drivers of urban expansion, and its repercussions were analysed using descriptive statistics (frequency distributions, cross-tabulations, and percentages), presented through frequency tables, pie charts and bar graphs. Cross-tabulations were used to correlate proximity to urban sprawl with specific livelihood outcomes, such as the relationship between farmland conversion and diminished crop

yield or income loss.

4.0 Results and Discussion

4.1 Demographic Characteristics of Respondents

Of the 382 respondents surveyed, males (205) outnumbered females (177), a pattern most pronounced in rapidly growing settlements such as Idu (38 male, 27 female) and Ikot Akpan Oku (34 male, 32 female), consistent with a "male-led" migration pattern typical of rapidly urbanising contexts in which men arrive first in search of economic opportunity. Educational attainment was almost evenly split among primary (131), secondary (111) and tertiary (112) qualifications, with a smaller group (28) having no formal education, reflecting a three-tiered workforce structure in which tertiary-educated residents are better positioned to benefit from urban economic opportunities while those with only basic education face heightened risk of displacement from traditional agricultural livelihoods. Occupationally, self-employment (103) and trading (72) dominate alongside civil service (75) and farming (50), while 82 respondents reported being unemployed, an indication that the pace of formal job creation has not kept up with population growth. Household size was predominantly medium (4–6 members, 153 households) and small (1–3 members, 139 households), with larger (7–9, 77 households) and very large (10–12, 13 households) households less common.

4.2 Status of Land Use/Land Cover, 1986–2024

Table 3 presents the LULC status of the study area for 1986, 2004, 2014 and 2024. In 1986, compound farmland was the dominant land cover (29.00%, 11,628.00 ha), followed by farmland (26.11%, 10,468.26 ha), disturbed forest (21.37%, 8,566.01 ha), built-up/bare land (15.02%, 6,022.08 ha) and forest (8.50%, 3,407.86 ha). By 2024, this configuration had reversed dramatically: built-up/bare land had become the dominant class at 52.30% (20,966.12 ha), followed by farmland (21.35%, 8,559.55 ha), compound farmland (12.22%, 4,897.28 ha), disturbed forest (10.31%, 4,134.58 ha) and forest (3.82%, 1,534.68 ha).

Table 3: Status of Land Use/Land Cover in the Study Area, 1986–2024

LULC Class	1986 (ha)	%	2004 (ha)	%	2014 (ha)	%	2024 (ha)	%
Forest	3407.86	8.50	3055.37	7.62	2813.76	7.01	1534.68	3.82
Disturbed Forest	8566.01	21.37	6980.68	17.41	5985.29	14.93	4134.58	10.31
Compound Farmland	11628.00	29.00	7815.53	19.49	6186.60	15.43	4897.28	12.22
Farmland	10468.26	26.11	12487.06	31.15	10133.64	25.28	8559.55	21.35

LULC Class	1986 (ha)	%	2004 (ha)	%	2014 (ha)	%	2024 (ha)	%
Built-up/Bare Land	6022.08	15.02	9753.57	24.33	14972.92	37.35	20966.12	52.30
Total	40092.21	100	40092.21	100	40092.21	100	40092.21	100

Source: Researchers' LULC Analysis Compilation, 2025

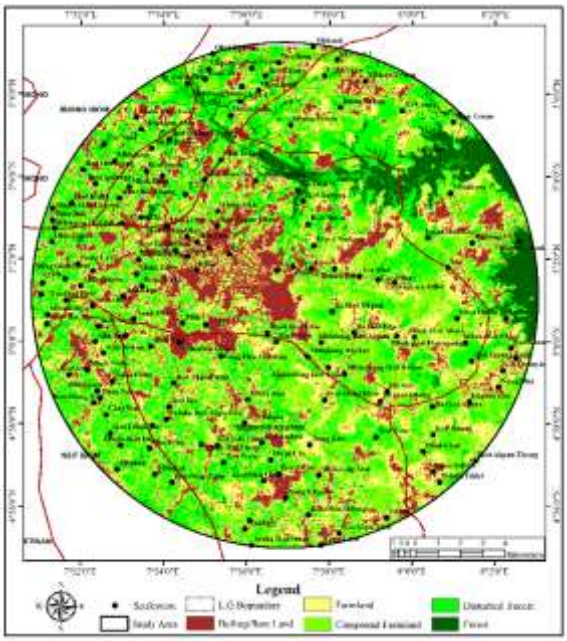

Figure 4.1: LULC Image Map 1986

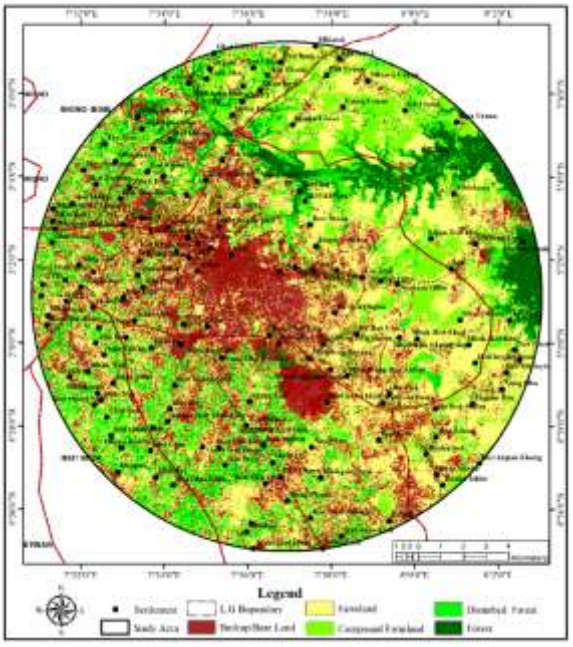

Figure 4.2: LULC Image Map 2004

Source: Researcher (2025) extracted from Landsat 5 & 7 TM Imagery of 1986 & 2004

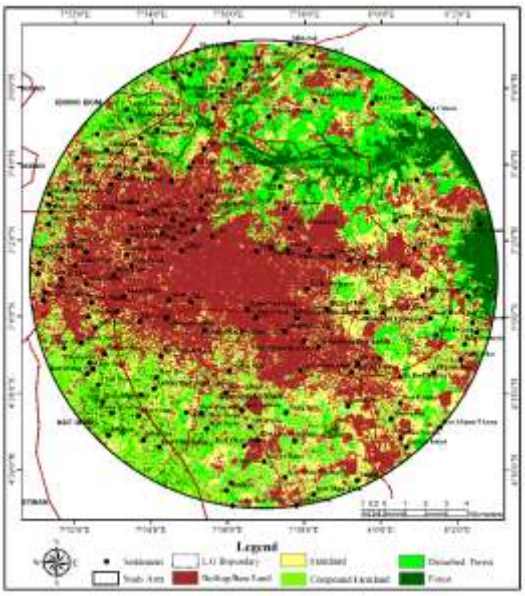

Figure 4: LULC Image Map 2014

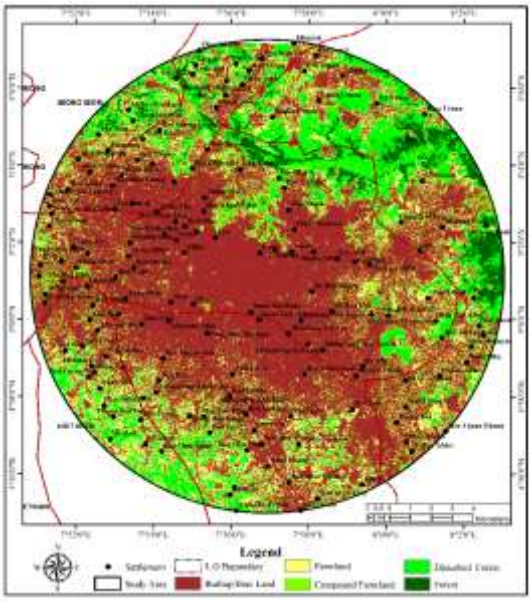

Figure 5: LULC Image Map 2024

Source: Researcher (2025) extracted from Landsat L8/9 OLI_TIRS Imagery 2014 & 2024

Table 4: Classification Accuracy Assessment

Year	Overall Accuracy (%)	Kappa Coefficient
1986	86	0.7362
2004	79	0.6815
2014	92	0.9094
2024	96	0.9332

Source: Researchers' Compilation, 2025

The lowest classification accuracies were recorded for 1986 and 2004, while the highest were achieved for 2014 and 2024, an improvement attributable to the superior spectral and spatial quality of Landsat 8 OLI imagery compared with the older Landsat 5 TM and 7 ETM+ data. All accuracies nonetheless exceeded generally accepted minimum thresholds for land cover classification, lending confidence to the change detection results reported below.

4.3 Magnitude, Trend and Rate of Land Use/Land Cover Change

Table 5 summarises the magnitude, trend and annual rate of LULC change across the three sub-periods and the full 1986–2024 span. Between 1986 and 2004, built-up/bare land expanded by 3,731.49 ha (32.45% of total change; ARC 12.33%), while compound farmland contracted by 3,812.47 ha (33.16%; ARC 12.60%), disturbed forest by 1,585.33 ha (13.78%; ARC 5.24%) and forest by 352.49 ha (3.06%; ARC 1.16%); farmland alone increased in this period, by 2,018.80 ha (17.55%; ARC 6.67%), consistent with a transitional phase of agricultural intensification at the urban fringe. Between 2004 and 2014, built-up/bare land gained a further 5,219.35 ha (50.00%; ARC 19.00%), while all other classes, including farmland, which had grown in the previous period, declined: forest by 241.61 ha, disturbed forest by 995.39 ha, compound farmland by 1,628.93 ha, and farmland by 2,353.42 ha. Between 2014 and 2024, built-up/bare land again gained 5,993.20 ha (50.00%; ARC 19.00%), with forest recording its steepest proportional loss of the study period (1,279.08 ha, 10.67%; ARC 4.05%).

Over the full 38-year period, built-up/bare land recorded a net gain of 14,944.12 ha (50.01% of total change), while compound farmland lost 6,730.72 ha (22.52%), disturbed forest lost 4,431.43 ha (14.83%), farmland lost 1,908.71 ha (6.37%), and forest lost 1,873.18 ha (6.27%). The consistently accelerating annual rate of built-up land expansion from 12.33% (1986–2004) to 19.00% in both subsequent decades indicates that urbanisation in Uyo Capital City is intensifying rather than stabilising.

Table 5: Magnitude, Trend and Rate of LULC Change, 1986–2024

LULC Class	Δ 1986–2004 (ha)	%	ARC	Δ 2004–2014 (ha)	%	ARC	Δ 2014–2024 (ha)	%	ARC	Δ 1986–2024 (ha)	%	ARC
Forest	-352.49	3.06	1.16	-241.61	2.31	0.88	-1279.08	10.67	4.05	-1873.18	6.27	2.38
Disturbed Forest	-1585.33	13.78	5.24	-995.39	9.54	3.63	-1850.71	15.44	5.87	-4431.43	14.83	5.64
Compound Farmland	-3812.47	33.16	12.60	-1628.93	15.60	5.93	-1289.32	10.76	4.09	-6730.72	22.52	8.56
Farmland	2018.80	17.55	6.67	-2353.42	22.55	8.57	-1574.09	13.13	4.99	-1908.71	6.37	2.42
Built-up/Bare Land	3731.49	32.45	12.33	5219.35	50.00	19.00	5993.20	50.00	19.00	14944.12	50.01	19.00

Source: Researchers' Compilation, 2025. ARC = Annual Rate of Change (%)

4.4 Major Socio-Economic Activities in the Study Area

Table 6 presents the distribution of major socio-economic activities across the twelve sampled settlements. Trading is the most dominant activity (142 respondents), narrowly surpassing farming (116), with civil service the third-largest formal sector (80). Artisan work (19), hunting (15) and livestock rearing (10) remain minor, specialised pursuits. Idu (65) and Ikot Akpan Oku (66) are the largest activity hubs, both dominated by trading, followed by farming and civil service, while Mbiokporo (55) records the highest concentration of artisans. Smaller settlements such as Okobo Ibiono (7) show minimal and undiversified economic activity, illustrating a clear urban–rural gradient in livelihood diversification across the study area.

Table 6: Major Socio-Economic Activities of Respondents

Settlement	Civil Service	Trading	Farming	Livestock	Hunting	Artisan	Total
Afaha Etok	6	9	6	0	1	2	24
Afaha Ube	6	11	9	1	1	1	29
Eman Ikot Ebo	4	6	4	1	1	1	17
Idu	18	25	16	2	1	3	65
Ikot Akpan Oku	11	23	22	3	4	3	66

Settlement	Civil Service	Trading	Farming	Livestock	Hunting	Artisan	Total
Ikot Idaha	4	8	10	1	1	1	25
Ikot Oduot	3	5	3	1	1	1	14
Ita Uruan	2	6	7	0	1	0	16
Mbiabong Anyanya	5	12	9	0	1	1	28
Mbiokporo	11	18	17	1	3	5	55
Nung Ukot Itam	8	16	11	0	0	1	36
Okobo Ibiono	2	3	2	0	0	0	7
Total	80	142	116	10	15	19	382

Source: Researcher, 2025

4.5 Causes of Urban Expansion in the Study Area

The data on causes of urban expansion (Table 7) reveal a self-reinforcing cycle driven principally by population growth (119 responses), infrastructural development (95) and the desire for home ownership (91). Secondly, significant drivers include the lack of affordable housing in the city core (30, functioning as a critical 'push' factor) and rising socio-economic development/income (28). Physical constraints (3) and ineffective environmental laws (2) received negligible mention, suggesting that the terrain around Uyo is perceived as broadly permissive to construction and that environmental regulation is not viewed as a meaningful barrier to development, a governance vacuum that, as discussed in section 4.7, has direct environmental consequences.

Table 7: Causes of Urban Expansion in the Study Area

Settlement	Pop. Growth	Infrastructure	Physical Constraint	Home Ownership	Affordable Housing	Education	Environmental Laws	Socio-econ. Development	Total
Afaha Etok	8	6	0	7	1	1	0	1	24
Afaha Ube	11	7	1	6	1	1	1	1	29
Eman Ikot Ebo	7	4	0	4	0	1	0	1	17
Idu	23	18	0	19	2	1	0	2	65
Ikot Akpan Oku	23	15	0	11	7	3	0	7	66
Ikot Idaha	8	5	0	3	3	2	0	4	25

Settlement	Pop. Growth	Infrastructure	Physical Constraint	Home Ownership	Affordable Housing	Education	Environmental Laws	Socio-econ. Development	Total
Ikot Oduot	3	3	0	4	3	1	0	0	14
Ita Uruan	6	4	0	3	1	0	0	2	16
Mbiabong Anyanya	5	7	0	6	5	1	0	4	28
Mbiokporo	14	12	0	17	3	3	0	6	55
Nung Ukot Itam	8	11	2	11	3	0	1	0	36
Okobo Ibiono	3	3	0	0	1	0	0	0	7
Total	119	95	3	91	30	14	2	28	382

Source: Researcher, 2025

4.6 Socio-Economic Repercussions of Urban Expansion

Table 8 presents the socio-economic repercussions reported by respondents. Loss of farmland is by far the most severe and widely reported consequence (125 responses), concentrated in Idu (23), Ikot Akpan Oku (19) and Mbiokporo (15), directly contributing to diminishing crop yield (64) and, for 11 respondents, complete loss of livelihood. High cost of living (73), traffic congestion (17), exorbitant rent (15) and high dependency on cars (7) collectively reflect an escalating 'urban squeeze' in household budgets. Environmentally, loss of biodiversity (16), occurrences of flood and erosion (14), forest depletion (11), and pollution/waste management problems (9) chart a clear course of ecological decline. Increase in crime (12) and destruction of aesthetics (2), while less frequently cited, point to a fraying social fabric accompanying the physical transformation of the landscape.

Table 8: Socio-Economic Repercussions of Urban Expansion

Repercussion	Frequency (n = 382)
Loss of Farmlands	125
High Cost of Living	73
Diminishing Crop Yield	64
Traffic Congestion	17
Loss of Biodiversities	16
Exorbitant Rent	15

Repercussion	Frequency (n = 382)
Occurrences of Flood and Erosion	14
Increase in Crime	12
Loss of Means of Livelihood	11
Forest Depletion	11
Pollution and Waste Management Problems	9
High Dependency on Car	7
Damage to the Environment	6
Destruction of Aesthetics	2

Source: Researcher, 2025

4.7 Discussion of Findings

The results demonstrate a broad and consistent trend of urban expansion in which natural vegetation and agricultural land are being rapidly displaced by built-up areas. Built-up/bare land more than tripled, from 15.02% in 1986 to 52.30% in 2024, while combined farmland (compound and regular) fell from 55.11% to 33.57% and combined forest cover (forest and disturbed forest) fell from 29.87% to 14.13% over the same period. These findings closely mirror global patterns in which urban expansion occurs largely at the expense of agricultural land in developing countries (Wang *et al*., 2025), with direct implications for regional food production capacity and increasing reliance on food imports (Andrade e*t al.,* 2022). The corresponding decline in forest and disturbed forest cover is consistent with well-established evidence that urban growth drives biodiversity loss through habitat destruction and fragmentation and disrupts ecological processes such as climate regulation and water purification (Liu *et al.,* 2025; Simkin *et al.,* 2022).

The accelerating annual rate of built-up land expansion rising from 12.33% (1986–2004) to a sustained 19.00% in both subsequent decades indicates a pattern of unplanned, rapid urbanisation consistent with observations elsewhere in developing and African cities lacking comprehensive planning capacity (Ogunbode and Oyebamiji, 2022; Essien, 2023; Akadiri et al., 2024). The initial increase in farmland observed between 1986 and 2004 likely reflects a transitional phase of agricultural intensification or displacement to less urbanised fringes typical of peri-urban areas (Wang *et al.,* 2025; Andrade *et al.,* 2022); however, as expansion continued into subsequent decades, farmland itself was increasingly consumed, directly threatening food security and failing to provide sustainable alternative livelihoods for displaced farming households (Ogunbode and Oyebamiji, 2022).

The socio-economic data provide the human corollary to this spatial transformation.

Trading's ascendance over farming as the dominant livelihood (142 versus 116 respondents) reflects the broader Global South pattern in which informality becomes a dominant mode of urbanisation and urban informal trade absorbs labour displaced from agriculture (Roy, 2005). This mixed-livelihood adaptation, visible in hub settlements such as Idu and Ikot Akpan Oku, is a characteristic adaptive response in peri-urban zones undergoing spatial and economic restructuring (Simon *et al*., 2022). The pronounced urban-rural gradient observed with larger, integrated settlements exhibiting diversified economies and smaller, remote settlements like Okobo Ibiono showing minimal diversification corroborates the 'shockwave' effect described by Agyeman *et al.* (2023), in which the socio-economic impacts of urban expansion radiate outward and diminish with distance from the urban core.

The identified causes of expansion, population growth, infrastructural development and the desire for home ownership, interact as a self-reinforcing cycle. The proactive role of infrastructural development is consistent with Côté-Roy and Moser's (2022) concept of 'infrastructural futuring', whereby new roads and utilities script peripheral land for urban rather than agrarian futures; in the Nigerian context, this frequently generates 'corridors of exclusion' that primarily benefit elites with prior land holdings while displacing existing farmers (Achunine, 2021). The lack of affordable housing as a 'push' factor, alongside the pervasiveness of informal land transactions on the urban fringe, exemplifies Roy's (2005) theorisation of informality as a mode of urbanisation, and is consistent with Goodfellow's (2017) account of land scarcity being deliberately maintained within the political economy of urban land to the benefit of elites, a dynamic that plausibly underlies the high cost of living and exorbitant rents reported by respondents. The negligible perceived influence of environmental laws points to a governance vacuum that directly enables the observed forest depletion, biodiversity loss, and rising incidence of flood and erosion, consistent with Douglas *et al*. (2019) characterisation of West African cities as emerging climate-vulnerability 'hotspots' where unplanned expansion converges with weak environmental governance.

On the overall, the geospatial and socio-economic findings validate the concept of 'planetary urbanisation' (Brenner & Schmid, 2015): Uyo's hinterlands are not passively being absorbed into the city but are being actively produced as urban space through the interlinked processes of infrastructural futuring, informality, and regulatory neglect. This is not a neutral process but one of 'productive displacement' (Acham, 2024), in which a land-based, productive economy is progressively replaced by a speculative, rent-based one. The dramatic LULC changes documented here the tripling of built-up area and the sharp decline of

farmland and forest constitute the physical evidence of this production process, while the survey data give voice to its ground-level socio-economic consequences: livelihood destruction, escalating living costs, and heightened vulnerability, particularly for the rural and peri-urban poor.

5. Conclusion and Recommendations

5.1 Conclusion

This study has established that Uyo Capital City is undergoing rapid and largely disorderly urban expansion, consistent with patterns observed across many developing-country secondary cities. Combining remote sensing and household survey evidence, the study demonstrates a direct causal chain in which population growth, infrastructural development and the desire for home ownership drive significant land use/land cover change, most notably a more than threefold increase in built-up/bare land, from 15.02% in 1986 to 52.30% in 2024 at the expense of forest, disturbed forest, compound farmland and farmland. These physical changes, in turn, generate serious socio-economic repercussions, including the substantial and irrecoverable loss of productive agricultural land, depletion of natural vegetation, diminishing crop yields, rising cost of living, and mounting environmental hazards such as flooding and erosion. While urban expansion is, in principle, an indicator of economic growth, its unplanned and largely uncontrolled character in Uyo Capital City poses a significant threat to the city's environmental integrity and the socio-economic well-being of its residents, underscoring the urgent need for a shift from reactive to proactive, evidence-based urban planning.

5.2 Recommendations

Based on the findings, this study recommends that the Uyo Capital City Development Authority strictly enforce zoning laws to prevent urban expansion into farmlands and forests. To curb sprawl, the government should incentivize vertical, mixed-use development within the city while simultaneously investing in infrastructure and jobs in smaller towns to reduce migration pressure on the capital. Environmental legislation must be strengthened to protect wetlands and agricultural land, and a permanent GIS monitoring unit should be established to provide real-time data for transparent, evidence-based planning and land-use accountability.

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