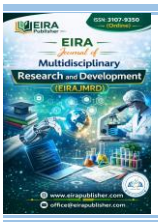

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From Farmland to Forest: Spatiotemporal Evidence of Rural Depopulation and Agricultural Decline in Southwestern Nigeria

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Abstract **Original Research Article**

This study employs a comprehensive geospatial analysis to examine the geographical and temporal effects of rural depopulation on agricultural productivity in Igunshin, Ondo West Local Government Area, Ondo State, Nigeria. The study categorised and examined land-use and land-cover (LULC) changes utilising multi-temporal Landsat datasets (2000–2025) through advanced remote sensing and GIS methodologies in ENVI 5.6 and ArcGIS Pro 3.0 platforms. The application of the Maximum Likelihood Algorithm in supervised classification, with accuracy ratings over 85%, facilitated the accurate demarcation of agricultural land, urban areas, vegetation, and open spaces. The research indicated a notable reduction in agricultural land from 14.76 km² (13.01%) in 2000 to 7.27 km² (6.41%) in 2025, although vegetative cover rose from 52.78% to 79.80%. Urban regions had temporary growth until 2010, followed by a significant decline, signifying the spatial manifestation of rural depopulation. These dynamics underscore the negative correlation between population reduction and agricultural production, hence reinforcing the migration-productivity theoretical paradigm. The results indicate that persistent emigration, an ageing rural demographic, and inadequate infrastructural development together lead to agricultural decline and ecological regression. The study indicates that agricultural production would persist in its fall unless strategic rural revitalisation, encompassing young agripreneurship, infrastructural investment, and integrated land-use policy, is enacted. This work enhances the discourse on rural spatial change in Sub-Saharan Africa by illustrating the efficacy of geospatial analytics in elucidating the demographic factors influencing agricultural sustainability.

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Introduction

Rural areas are often defined by their unique geographical, economic, and socio-cultural traits that set them apart from cities. For example, they tend to have low population densities (usually less than 400 people per square kilometre) and a lot of farming, fishing, and livestock raising (Ofuaku, 2012). These areas are often limited by poor infrastructure, such as poor roads, unreliable electricity, and limited access to healthcare and education (World Bank, 2022). At the same time, they keep traditional ways of life, strong community ties, and social structures based on family ties. Natural resources like land, water, and forests are very important for people's economic livelihoods because they provide food and income (FAO, 2021; Fasakin, 2018). Many production processes rely on manual labour and traditional methods, which lowers productivity and raises poverty levels because there aren't many job opportunities. In Nigeria, the ongoing depopulation of rural areas due to continued rural–urban migration has had significant effects on agricultural production, food security, and sustainable development. The decline in the rural workforce has caused labour shortages, lower crop yields, and a general drop in agricultural output (Adepoju, 2018; Olaleye, Ogunboye, & Olanusi, 2014; Olaniyan & Okunmadewa, 2019).

The migration from rural areas is primarily motivated by the quest for enhanced opportunities and improved living standards, particularly in response to the broader array of amenities and prospects found in urban settings, which are

often lacking in rural areas (Awumbila, Owusu, & Teye, 2014; Onyebueke & Geyer, 2011). This movement is driven by a mix of economic and non-economic factors. Economically, people often move to find work or improve their income and overall financial situation. Non-economically, people may be pushed to look for better conditions elsewhere by social pressures and inequalities, where less privileged groups are forced to do so by more powerful actors.

A migrant's choice to relocate may ultimately stem from a wish to evade economic adversity and discrimination, a quest for liberation from political or religious persecution, a yearning for autonomy from personal maladjustments within familial and communal contexts, and military or national factors (Olaleye, 2023). Migration may occasionally be prompted not by opportunity but by a necessity for self-preservation in response to persecution. The factors influencing migration can be categorised as extreme poverty, disruption of the existing economic balance, repulsive or enticing incentives, and psychological motivations.

Rural depopulation denotes the reduction of population in rural regions, mostly attributed to out-migration. This phenomena has been observed globally and is affected by several causes. Progress in agricultural technology has diminished the necessity for labour in rural regions, resulting in a decline in job prospects (Ikwuyatum, 2006). As a result, folks relocate to metropolitan areas in pursuit of enhanced employment opportunities. Urban regions frequently provide enhanced access to education, healthcare, and other vital services, drawing rural residents in pursuit of a superior quality of life. The exodus of younger inhabitants to urban centers leads to an ageing rural demography. This transition results in increased mortality rates and decreased birth rates, hence exacerbating depopulation.

A variety of interconnected factors limit Nigeria's agricultural productivity, which in turn limits output and efficiency. Climate change and variability, which mess up planting cycles and lower yields (Adejuwon, 2004; Enete & Amusa, 2010), and soil degradation, which happens when erosion, nutrient depletion, and bad land management practices (Lal, 2007; Ogundele, 2018) are all important. Limited access to important agricultural inputs, such as better seed varieties, fertilisers, and irrigation infrastructure (Akinwumi, 2011), as well as problems with rural infrastructure, such as transportation networks, storage systems, and market access (Adepoju, 2018; Oluwasegun & Ojo, 2018), make productivity even worse. Demographic factors, notably rural–urban migration and the ageing of the farming population, have exacerbated workforce shortages and diminished agricultural performance (Olaniyan & Okunmadewa, 2019; Afolabi et al., 2022).

Recent empirical studies (2020–2025) on rural depopulation in Nigeria indicate a persistent and significant migration of populations towards urban centers, primarily due to insufficient infrastructure, increased insecurity, and the diminishing sustainability of agricultural livelihoods. A significant characteristic of this trend is the unequal out-migration of younger demographics, frequently referred to as “youth flight,” which results in a progressively ageing rural populace. This demographic change has made it harder for farmers to find workers and made rural communities less able to handle economic shocks (Obilor, N. M., Amadi, F. U., & Ahamefula, G. C., 2024; Adam, O. B., Enemi, A. G., & Zakari, M., 2024).

The depopulation of rural areas is a long-term structural problem in Nigeria that has serious effects on food security and agricultural output. Empirical evidence demonstrates that persistent rural–urban migration diminishes the agricultural labour force, resulting in decreased output and increased threats to food availability (Afolabi, 2022; NBS, 2020). This population outflow is driven by a combination of factors, including limited employment opportunities, inadequate infrastructure, restricted access to finance (Oluwasegun & Ojo, 2018), and the pursuit of improved education, healthcare, and overall living standards, alongside environmental pressures such as climate change, land degradation, and natural hazards. The ensuing decrease in the number of people who work in rural areas leads to a lack of workers, an older farming population, and fewer young people working in agriculture, all of which make it harder to be productive (Afolabi, 2022; NBS, 2020). As a result, large sections of arable land are still not being used to their full potential, which leads to lower agricultural output and a weaker rural economy.

The growth rate of Nigeria's rural population has been slowly going down over time, from 1.11% in 2010 to 0.94% in 2020. This is a sign of the country's steady shift toward urbanisation. This tendency is directly linked to more people moving from rural to urban areas, especially younger people. This means that older people are mostly responsible for farming activities. These changes in the population have led to a smaller rural workforce, lower agricultural yields, and a drop in overall food production. In the Ondo West Local Government Area (LGA), people are moving away from rural areas, which has caused the population to drop significantly. This has led to a lack of workers and lower agricultural productivity. This trend is very bad for long-term growth, rural jobs, and food security. Rural depopulation persists as a longstanding challenge in Nigeria, significantly affecting agricultural

productivity (Adepoju, 2018; Olaniyan & Okunmadewa, 2019). Its impact is particularly pronounced in predominantly rural areas like Ondo West LGA, where youth out-migration has markedly reduced agricultural labour and production capacity (Ondo State Government, 2020). Despite several initiatives to improve agricultural performance, the precise effects of rural depopulation on productivity have not been thoroughly investigated, hindering the formulation of effective policy solutions. Consequently, this research seeks to investigate the spatiotemporal aspects of rural depopulation and its impact on agricultural productivity in Ondo West LGA, Nigeria. The importance of this study is in filling the gaps in the literature on the spatiotemporal dynamics of rural depopulation and giving knowledge that is relevant to the situation to help policymakers and strategic planners make decisions.

To make good policies and interventions that will help rural development, boost agricultural productivity, and make sure there is enough food in Nigeria, it is important to have a full understanding of the spatiotemporal dynamics of rural depopulation and how they affect agricultural output. The results of this study have important effects on policy, practice, and future research. The findings are anticipated to influence governmental decision-making in domains such as rural development planning, agricultural policy, and migration management, while also offering empirical insights that can direct focused strategies for enhancing agricultural productivity and bolstering food security. The study adds to what we already know about migration, rural depopulation, and agricultural production in Nigeria. The evidence produced may facilitate the formulation and execution of projects aimed at enhancing rural livelihoods, updating infrastructure, and promoting sustainable development within rural communities.

Aim and Objectives

The aim of this study is to analyze the spatiotemporal effects of rural depopulation on agricultural productivity in Nigeria. The specific objectives are:

1. To analyze the spatiotemporal dynamics of rural depopulation in Ondo West Local Government between 2000 and 2025.
2. To assess the effects of rural depopulation on agricultural productivity, land-use pattern and rural livelihoods.

Research Questions

1. What are the spatiotemporal trends of rural depopulation in Ondo West LGA between 2000 and 2020?

2. How does the spatial distribution of agricultural productivity relate to population decline in rural areas?

3. What are the differences in agricultural productivity between areas with high and low levels of depopulation in Ondo West LGA?

Study Area

The Ondo West Local Government Area (LGA) is in the southwestern part of Nigeria, in the tropical rainforest ecological zone (Ondo State Government, 2020). The area covers approximately 1,500 square kilometres and lies between latitudes 7°5′N and 7°15′N and longitudes 4°30′E and 4°45′E (Ogundele et al., 2018). It has a typical tropical environment, with average temperatures between 24°C and 32°C and yearly rainfall between 1,500 mm and 2,000 mm (Ondo State Government, 2020). These circumstances are good for dense vegetation and a lot of different kinds of plants and animals. The land is mostly made up of gently rolling plains that are between 50 and 200 meters above sea level. The 2006 national census found that the area had a population of 283,672, with 141,759 men and 147,109 women. This means that there are about 481.4 people living in each square kilometre (Olaleye, 2023; National Bureau of Statistics, 2022).

The Ondo West Local Government Area (LGA) is an important agricultural center. The local economy is based on the production of important goods including cocoa, palm oil, and cassava. For most people who live here, farming is their main source of income and work. The larger state is also recognised for growing significant cash commodities including cocoa, palm oil, and lumber. Along with farming, people do a lot of other things to make a living, especially women in rural areas. These include petty trading, garri processing, palm oil extraction, fruit gathering, food collection, logging, hawking, basket weaving, collecting fuelwood, and making textiles. Notably, Ondo State is known as Nigeria's top cocoa-producing area, making up around 40% of the country's total cocoa exports.

Research Methodology

This study employs a spatiotemporal research framework to analyse the impact of rural depopulation on agricultural productivity in the Ondo West Local Government Area (LGA), utilising geospatial methodologies, remote sensing, and statistical correlation approaches. The method allows for both temporal analysis (2000–2025) and spatial mapping of land-use and land-cover (LULC) trends in Igunshin, chosen as a representative rural settlement. The data were obtained from both primary and secondary sources. We looked at changes in land use and land cover every five years over the research period. We used multi-temporal Landsat images, including Landsat 7 ETM+ (2000, 2005, and 2010), Landsat 8 OLI/TIRS (2015 and 2020), and Landsat 9 OLI-2 (projected for 2025). All satellite photos were chosen based on similar seasonal times and low cloud cover (less than 10%) to make sure that the analysis was consistent and could be compared.

We used ENVI 5.6 and ArcGIS Pro 3.0 to pre-process the images. This included important steps including radiometric calibration, geometric correction, and atmospheric correction using the Dark Object Subtraction (DOS) approach. Based on the WGS84 datum, all of the images were co-registered to the Universal Transverse Mercator (UTM) Zone 31N coordinate system. This made sure that the images were all in the same place and aligned. After that, the Maximum Likelihood Algorithm (MLA) was used to do supervised classification. This put land-use and land-cover (LULC) into four main groups: agricultural land, built-up regions, open space, and vegetation.

In order to evaluate the accuracy of the classification, confusion matrices and kappa statistics were utilised. The results showed that the classification accuracy was greater than 85 percent for each year. The Post-Classification Comparison approach was then utilised in order to compute the area and percentage changes that occurred between the various temporal layers (2000–2005, 2005–2010, etc.). This was done in order to confirm the change detection study. Cross-tabulation matrices and yearly rate of change formulae were utilised in order to investigate the temporal dynamics of LULC. In order to quantify the conversions that occur between different categories, the Land Use Transition Matrix (LUTM) was developed.

Results and Discussion

Land Use Pattern in 2000

The baseline situation of land use in the area under study is represented by the year 2000 by this context. As can be seen in figure 1 and table 1, agricultural land occupied 14.76 square kilometers (13.01%) of the total land area, vegetation covered 59.87 square kilometers (52.78%) of the total land area, open space covered 32.27 square kilometers (28.45%), and built-up areas filled 6.52 square kilometers (5.75%). This distribution indicates that the rural landscape was marked by a robust agricultural presence, bolstered by accessible land and rural labor. Agricultural land was a substantial element of the landscape, signifying ongoing farming operations and comparatively consistent agricultural output.

Such land-use patterns are characteristic of rural agrarian societies where agriculture constitutes the principal means of subsistence. In numerous developing nations, rural households depend significantly on agriculture for income and food security, with land availability and familial labor as critical factors influencing output capacity. The very modest percentage of developed land in 2000 suggests that the community retained a primarily rural identity with little urban expansion.

Nonetheless, at this juncture, the significant extent of open spaces indicates the existence of fallow lands or temporarily unutilized agricultural fields. Conventional agricultural practices frequently utilize fallowing as a method to rejuvenate soil fertility. However, similar areas may also indicate the initial phases of land abandonment as rural populations start to diminish.

Table 1: Igunshin Land Use Land Cover Analysis (2000)

Class Name	Area (sq. km)	%
Agricultural Land	14.76	13.01
Built-Up	6.52	5.75
Open Space	32.27	28.45
Vegetation	59.87	52.78
Total	**113.42**	**100**

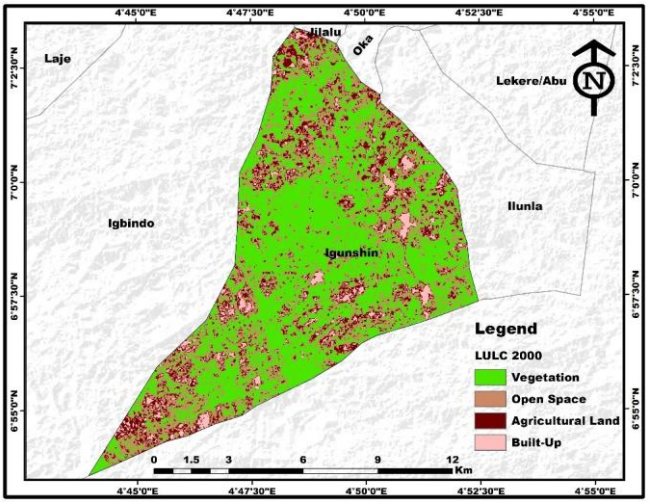

Figure 1: Igunshin Land Use Land Cover Map (2000)

Land Use Pattern in 2005

According to the findings presented in Table 2 and Figure 2, the area under investigation had undergone substantial transformations by the year 2005. While vegetation cover rose to 67.41 sq. km (59.43%), agricultural land fell precipitously to 9.41 sq. km (8.29%). The decrease in agricultural land over the course of five years implies a decrease in agricultural activities and potentially the onset of farmland abandonment.

Migration from rural to urban areas may be one of the main causes of this shift. People from rural areas frequently relocate to cities in pursuit of better living conditions, work prospects, and educational chances. The availability of agricultural labor decreases as economically active people migrate, which leads to less farmland being cultivated. Studies have found that youth migration has a major impact on agricultural output since young people are the most productive part of the rural workforce (Salau et al., 2020).

The assumption of farmland abandonment is further supported by the growth of vegetation during this time. Natural vegetation progressively reappears on uncultivated land. Increased forest or shrub cover is frequently the result of such biological succession, especially in tropical regions where natural vegetation regrowth happens quickly. Vegetation regeneration frequently indicates a decline in agricultural output and land utilization efficiency, even if it may enhance environmental sustainability and biodiversity.

Table 2: Igunshin Land Use Land Cover Analysis (2005)

Class Name	Area (sq. km)	%
Agricultural Land	9.41	8.29
Built-Up	4.99	4.40
Open Space	31.62	27.88
Vegetation	67.41	59.43
Total	**113.42**	**100**

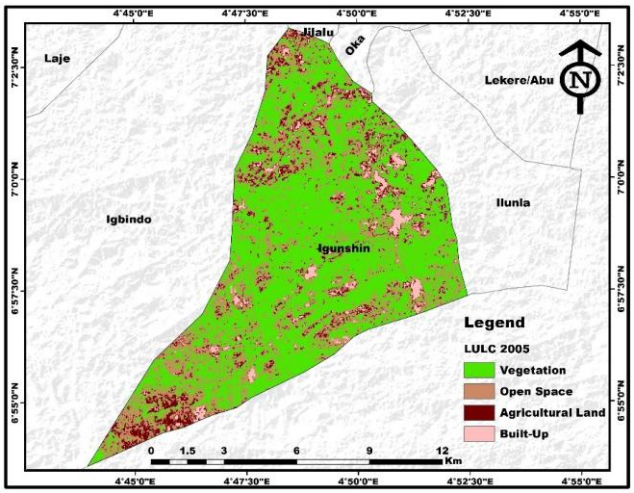

Figure 2: Igunshin Land Use Land Cover Map (2005)

Land Use Pattern in 2010

The changes grew more pronounced in 2010, as illustrated in Table 3 and Figure 3. Agricultural land dropped to 5.58 sq. km (4.92%), marking the lowest amount documented throughout the study period. Simultaneously, vegetation expanded markedly to 85.59 sq. km (75.47%), and built-up areas grew to 7.95 sq. km (7.00%).

The significant decrease in agricultural land signifies a considerable downturn in agricultural activities. This trend may correlate with escalating rural depopulation, so diminishing the labor force accessible for agriculture. Rural-urban migration has been extensively recorded as a significant determinant of agricultural productivity in numerous regions of Africa. As migration escalates, the quantity of active farmers diminishes, leading to a reduction in the cultivation of agricultural land (Rufai et al., 2021).

It's interesting to note that, despite the loss in agriculture, there may have been some infrastructure building or settlement growth during this time, as evidenced by the rise in built-up areas. This may indicate alterations in settlement patterns or the emergence of small rural hubs. Nonetheless, such expansion does not inherently result in enhanced agricultural output, especially when population out-migration diminishes the agricultural labor supply.

Table 3: Igunshin Land Use Land Cover Analysis (2010)

Class Name	Area (sq. km)	%
Agricultural Land	5.58	4.92
Built-Up	7.95	7.00
Open Space	14.29	12.60
Vegetation	85.59	75.47
Total	**113.42**	**100**

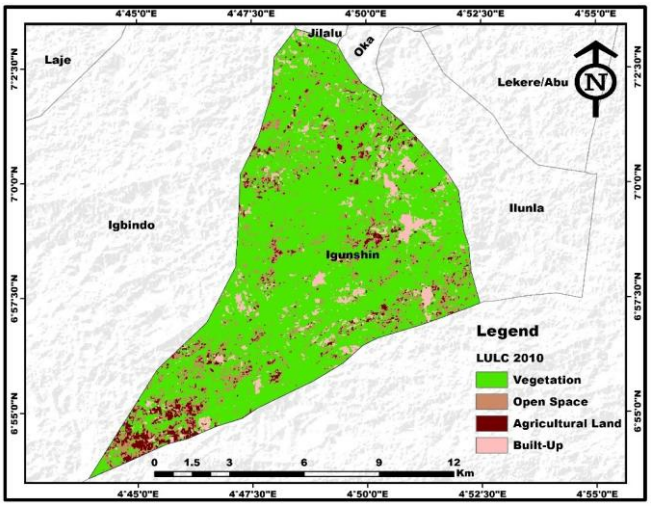

Figure 3: Igunshin Land Use Land Cover Map (2010)

Land Use Pattern in 2015

In 2015, a little reversal in the decreasing trend of agricultural land was indicated in Table 4 and Figure 4. Agricultural area expanded to 6.60 sq. km (5.82%), but vegetation experienced a minor reduction to 75.74 sq. km (66.77%). This alteration indicates that certain formerly forsaken regions may have been restored for agricultural use.

Various causes may elucidate this small rebound. Farmers may have implemented enhanced agricultural techniques or increased cultivation to offset previous reductions in output. In numerous depopulating rural villages, the remaining farmers frequently consolidate agricultural acreage and enhance cultivation intensity to maintain production levels.

An alternative argument is the implementation of agricultural support programs or enhanced market opportunities that stimulated renewed participation in farming operations. Agricultural production may improve when farmers implement new technologies, enhance land management methods, or obtain institutional support, like extension services and access to credit.

Nonetheless, the agricultural land area in 2015 was markedly diminished compared to 2000, signifying that the recovery was constrained and that the repercussions of rural depopulation persisted in shaping land use patterns.

Table 4: Igunshin Land Use Land Cover Analysis (2015)

Class Name	Area (sq. km)	%
Agricultural Land	6.60	5.82
Built-Up	7.33	6.46
Open Space	23.75	20.94
Vegetation	75.74	66.77
Total	**113.42**	**100**

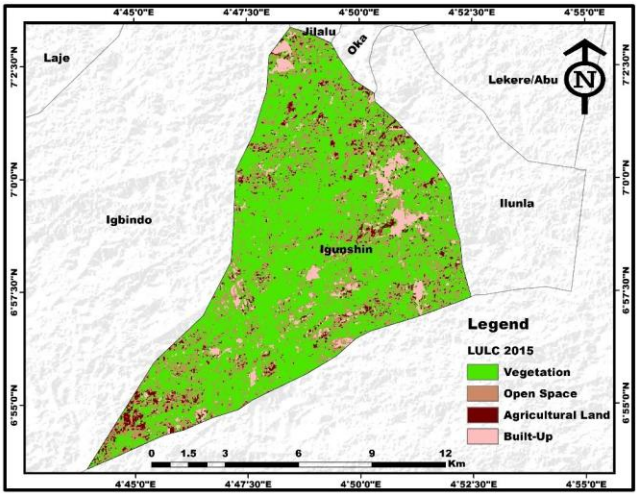

Figure 4: Igunshin Land Use Land Cover Map (2015)

Land Use Pattern in 2020

Agricultural land increased even further to 7.69 square kilometres (6.78%) in the year 2020, as shown in table 5 and Figure 5. Vegetation, on the other hand, increased somewhat to 77.14 geographic square kilometres (68.01%). This pattern indicates a gradual stabilisation of agricultural operations in the study area.

The expansion of agricultural acreage may signify adaptive strategies employed by rural households in response to diminishing labour availability. Farmers may have implemented mechanisation or enhanced agricultural methods that enable the cultivation of wider regions with a reduced workforce. Mechanisation and technology advancements are acknowledged as crucial techniques for sustaining agricultural output in regions facing rural population decrease.

Nonetheless, despite this slight rebound, the extent of agricultural land in 2020 remained significantly lower than that recorded in 2000. This indicates that agricultural productivity may not have completely rebounded from the preceding period of decline. Agricultural systems frequently necessitate continuous labour, capital, and institutional backing to uphold productivity levels.

Moreover, rural depopulation can result in an ageing agricultural workforce, thereby hindering the adoption of contemporary farming technologies and constraining productivity advancement. Younger generations are generally more inclined to embrace innovative agricultural practices, and their migration may impede the modernisation of farming.

Table 5: Igunshin LULC (2020)

Class Name	Area (sq. km)	%
Agricultural Land	7.69	6.78
Built-Up	4.65	4.10
Open Space	23.94	21.11
Vegetation	77.14	68.01
Total	**113.42**	**100**

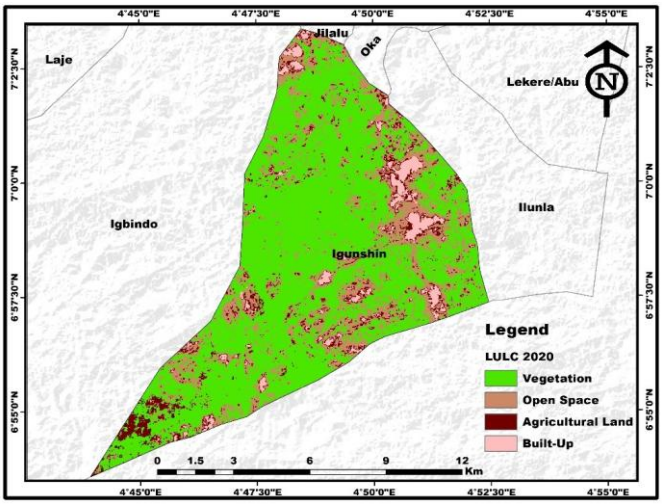

Figure 5: Igunshin Land Use Land Cover Map (2020)

Land Use Pattern in 2025

The data presented in Table 6 and Figure 6 for the land use and land cover study of 2025 in Igunshin indicate a modest decrease in agricultural land to 7.27 sq. km (6.41%), while vegetation experienced a substantial rise to 90.51 sq. km (79.80%). Additionally, built-up areas experienced a significant decrease, reaching 2.23 sq. km (1.97%). The significant rise in vegetation indicates ongoing land abandonment and natural regeneration. When agricultural land ceases to be cultivated, natural succession progressively reinstates vegetation cover. This approach may improve environmental sustainability, however it frequently indicates diminishing agricultural yield and decreased human activity.

The reduction in developed regions further substantiates the assertion that rural depopulation has escalated in the studied area. As rural residents relocate to metropolitan areas, towns may encounter population decline, housing neglect, and less infrastructure usage.

Migration has historically been seen as a critical element influencing rural economies and agricultural output. Studies indicate that rural-urban migration frequently transpires when urban income prospects surpass those in rural agriculture, motivating individuals to move in pursuit of improved livelihoods (Barrett et al., 2004). Although migration might augment household income via remittances, it may concurrently diminish the availability of agricultural labour and result in decreased agricultural production.

Table 6: Igunshin LULC (2025)

Class Name	Area (sq. km)	%
Agricultural Land	7.27	6.41
Built-Up	2.23	1.97
Open Space	13.41	11.82
Vegetation	90.51	79.80
Total	**113.42**	**100**

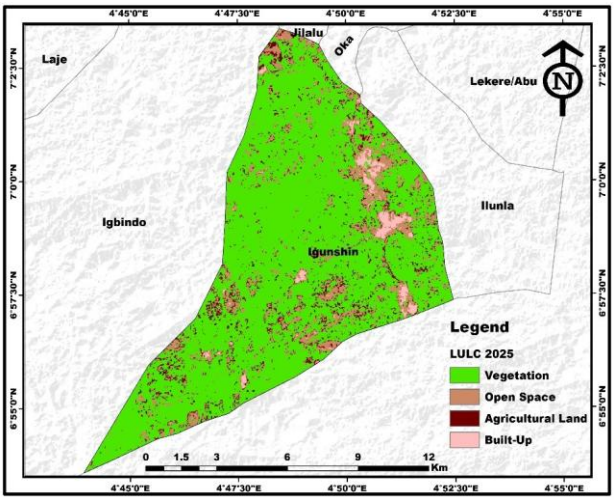

Figure 6: Igunshin Land Use Land Cover Map (2025)

Implications for Agricultural Productivity

The results from the study region offer empirical evidence of a direct and inverse correlation between rural depopulation and agricultural output. As the rural population diminishes, there is a concomitant decrease in the use of agricultural land, a fall in the labour force, and a decline in productivity per unit area. This observed pattern aligns with the agricultural labour productivity concept, which asserts that sustained agricultural output relies on a balanced relationship between land resources and the efficient use of labour (Hayami & Ruttan, 1985; Olayide et al., 2018).

The near-halving of agricultural acreage in the study area corresponds with national data indicating reduced smallholder production and heightened reliance on food imports (NBS, 2022). Furthermore, depopulation diminishes the labour force and erodes the social frameworks that support agricultural innovation and collaborative production, such farmer groups and knowledge exchange networks (Adesina & Ojo, 2020).

The effects are many and work together to make things worse. Less use of arable land leads to less agricultural production and income, which makes poverty worse and keeps people moving. At the same time, leaving marginal lands speeds up land degradation and changes patterns of biodiversity because natural succession processes change the composition of the soil and the cycles of nutrients. Also, when the number of people living in rural areas goes down, local market systems are weaker, making it harder for the farmers who are still there to sell their goods. These factors work together to create a self-reinforcing negative feedback loop in which depopulation leads to lower agricultural productivity, which then leads to more people leaving the area. This trend has been shown by Barrios et al. (2006) and Tacoli (2019).

The spatiotemporal trends identified in the research area signify a wider regional trend in southwestern Nigeria, marked by population decrease, diminished agricultural activity, and ecological transformations in rural environments (Fasona & Omojola, 2022). Similar studies in Ekiti, Osun, and Oyo States reveal analogous land-use shifts, indicating a decline in agricultural acreage by around 30–60% during the last twenty years (Akinbile et al., 2023). This convergence of evidence indicates that the dynamics observed in the study area are not isolated phenomena but are integrated within a broader structural transformation of rural spatial systems, influenced by national economic restructuring and policy frameworks that prioritise urban development (Egbetokun & Fashola, 2021).

The observed increase in vegetation and decrease in built-up areas is similar to the "green return" phenomenon in Africa, when people move from rural areas to cities, which indirectly encourages natural regeneration and reforestation (Van Vliet et al., 2020). This change has many positive effects on the environment, such as better carbon storage and the restoration of natural habitats. However, it also means that rural production systems are getting weaker and farming jobs are becoming less stable.

Policy and Theoretical Implications

There are major theoretical and policy implications that may be drawn from the findings of the LULC data collected in the research area. Theoretically, they bolster the land-use transition concept (Lambin & Meyfroidt, 2010), which asserts that economic and demographic transitions catalyse shifts from agricultural development to land abandonment and ecological restoration. The identified trends further elucidate the connection between rural depopulation and productivity, emphasising that demographic decline diminishes agricultural yield and alters spatial configurations and ecological equilibrium.

Evidence indicates an immediate necessity for rural revitalisation methods to combat depopulation and maintain agricultural productivity. These encompass:

- Youth re-engagement in agriculture via agripreneurship initiatives and mechanisation incentives.
- Investment in rural infrastructure specifically in roads, power, and digital connectivity to enhance the viability of farming.
- Frameworks for land-use planning that harmonise ecological preservation with agricultural restoration.
- Policies for population retention that enhance rural living conditions and deter outmigration (Olaniyan

& Ajibade, 2022). The revival of agricultural productivity in depopulated regions such as Igunshin necessitates not only technical measures but also socio-demographic reinvestment to guarantee the return of human capital to the land.

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