Urbanization Impacts on Land Use in Rural–Urban Fringe: Case Study of Epe as Fringe of Metropolitan Lagos—A Review

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Abstract

This study attempts to fill the literature gap and extend prior studies by exploring existing studies on land use changes with a focus on different factors affecting the rural urban fringe area and urban expansion of Epe in Metropolitan Lagos, highlighting the major impacts of rapid urbanization and population growth on land cover changes. Findings suggest that the city is expanding into its peripheral regions as rural areas are converted into urban spaces, highlighting the need for urban planning concepts that prioritise the preservation and management of natural land use classes to enhance the quality of life in an urban environment. While the complexity of emerging methodologies, though, deepens the overall understanding of changes in land use and land cover, findings reveal that continuous shifts of land from non-developed natural categories to developed land use are typical of urban sprawl, but the city is also facing severe land transformations in response to the demands of the Lagos Metropolitan City. Therefore, this study raises concern over the restructuring process that affects the economic, social, and environmental spheres and requires sensitivity from institutional decision-makers towards the complex and diverse realities of relevant actors on ground, through which all current and future land use policies are mediated.

Keywords: development drivers, land use, urban sprawl, rural urban fringe

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Introduction

Urbanisation is a worldwide occurrence associated with human settlements and related anthropogenic activities that significantly influence land use and land cover change (Jagadeesh et al., 2015). Urban expansion is a critical aspect of economic, social, and physical transformation. Consequently, amid swift transformations, it is accurate to assert that the future of the globe is urban (Simon, 2007; Pieterse, 2008). The swift expansion of urban populations has resulted in a heightened demand for urban land, especially for housing, as well as for other urban applications (Aguilar & Ward, 2003).

In numerous nations, the rising demand for land is impacting rural-urban peripheries, as urban sprawl is intruding upon agricultural land and tiny settlements (Thuo, 2010). Research indicates that few landscapes on Earth remain in their pristine condition. Anthropogenic activities have substantially modified the Earth's surface, with human presence exerting a profound influence on the natural environment, leading to discernible changes in land use and land cover over time (Zubair, 2006; Long et al., 2022).

Hence, urban sprawl is a prominent consequence of urbanisation on land utilisation (Bhagwat, 2014). This tendency has resulted in the steady conversion of rural landscapes into urban environments, wherein land use systems such as agricultural land, barren land, fallow fields, woods, pastures, and grazing grounds are transformed into developed and non-agricultural uses. Urban effects lead to the expansion of zones designated for non-agricultural purposes over time. Li et al. (2013) assert that urban expansion correlates with a reduction in agricultural land use intensity; analogous findings were discovered by Eyaya (2014) and Seema (2014). Maconachie (2007) and Masuda and Gavin (2008) assert that the conversion of agricultural land to urban uses precipitates swift changes in agricultural production, spatial organisation, social dynamics, land tenure, and land markets in the rural urban fringe.

Despite the importance of the rural–urban edge, Maconachie (2007), Simon et al. (2006), and Mbiba and Huchzermeyer (2002) say that this area is

still not well understood, especially in developing countries. The comparatively low number of research on the rural–urban fringe can be attributed to the divide of academic specialities, which mostly concentrate on either rural or urban issues. Maconachie (2007) and McGregor et al. (2006) assert that regulating urban growth is intricate and contentious, especially in developing countries, where the legal and policy frameworks governing land use and ownership are inadequate. As a result, land development has unfolded in a disorganised fashion, leading to urban sprawl. The result is the suboptimal use of land within designated or regulated regions (Mundia & Aniya, 2006). In developing nations characterised by elevated urbanisation rates, urban sprawl substantially influences land use transformation.

More so, sprawls typically denote disorganised development, resulting in the degradation of agricultural land, open spaces, and ecologically sensitive ecosystems surrounding metropolitan areas due to insufficient, integrated, and comprehensive regional planning (Sudhira & Ramachandra, 2007). The global acceleration of urbanisation, particularly in developing nations, has resulted in substantial alterations to the urban–rural framework due to the swift growth of major cities (Adeel, 2018). The demarcation between urban and rural regions has become ambiguous, leading to a transitional zone where urban and rural elements interrelate and influence one another (Buliung & Kanaroglou, 2006).

However, land usage, employment opportunities, and public service facilities in urban edge and rural areas markedly contrast with those in urban regions (Zhao, 2016). Sociologists and policymakers frequently presume that rural regions have inferior access compared to urban areas. The low density and subsequent distances between residences, service centres, educational institutions, retail establishments, and businesses hinder rural families' access to numerous destinations (Lucas et al., 2018). The rural urban edge serves as both space for urban development and a temporary habitat for a transient population from rural regions pursuing employment in urban centres (Zhang

et al., 2015). As urban areas expand, the demand for the preservation of agricultural land intensifies, rendering the rural–urban fringe a contested zone between urban and rural stakeholders. This dynamic results in chaotic land use alterations, environmental degradation, and uneven rural urban development (Liu et al., 2010).

Subsequently, in 2000, rural-urban migration was driven by significant natural population growth, of which 38% of the continent's population resided in urban locales, a figure projected to increase to 47% by 2015 (UNCHS, 2001). Hall and Pfeifer (2000) project that Africa's urban population will double by 2025, mirroring other developing world regions. Accelerated urban population expansion indicates a rising need for urban land, especially for housing and diverse urban applications. In several nations, escalating demand is likely impacting rural-urban edge regions (Aguilar, 2008). The ongoing expansion of urban built environments and the establishment of peripheral new towns have resulted in alterations to land use, industrial organisation, and population distribution in the urban periphery, posing new difficulties to urban-rural integration (Zhu et al., 2018).

In this regard, land development and utilisation in peripheral new towns typically pertain to extensive residential areas where inhabitants face a deficiency of economic possibilities and public amenities, leading to considerable strain on centripetal traffic flow (Fu & Lehto, 2018). Furthermore, the expansion of new urban fringe towns in the last decade, along with accelerated population growth near major cities, may indicate the relocation of individuals and enterprises from other areas and metropolitan centres to the urban fringe (Porru et al., 2020). The economic and demographic transformations have influenced land development and travel demand. Thus, the extent of the disparity among residents in urban, rural, and peripheral areas remains ambiguous. The efficacy of policy efforts, such as land development and work-residence balance, in alleviating the challenges faced by residents in urban edges and rural areas is yet to be determined.

This paper contends that the processes operating at the rural-urban fringe remain inadequately documented, as they typically become apparent only with the initiation of physical land change. At the rural urban fringe, we can most effectively comprehend the dynamics of modern urbanisation, particularly in developing nations, land transformation and growth, along with the emerging disputes around land utilisation. Opportunities to regulate urban growth patterns arise at the periphery before they become entrenched in the terrain. This study reveals the gaps that offer a scientific foundation for developing land-use strategies that facilitate urban-rural integration. This study aims to enhance the comprehension of urbanisation issues in Epe, Lagos State, Nigeria, to inform the policy development process rather than suggest specific actions or normative solutions to land use challenges (Thuo, 2008). The subsequent section of this article is organised into general themes intended exclusively to facilitate the discussion of impacts, recognising that these concerns are interconnected and recursive.

Literature Review and Rural Urban Linkages Theory

Rapid urbanisation facilitates the execution of urban-rural integration strategies and offers unparalleled development potential for urban peripheries (Whitehand & Gu, 2017; Liu et al., 2018). The urban fringe is an area situated on the periphery of a city that functions as a transitional zone between urban and rural environments, including suburban developments and rural regions experiencing urbanisation (Simon et al., 2004). Urban margins serve as the nexus between urban and rural regions, marked by rapid transformations in land use and spatial configuration amid urban expansion, demonstrating diversity, dynamism, and transition (Gant et al., 2011; Wadduwage et al., 2017). Rural areas exhibit a varied landscape that is characterised by distinct demographic and occupational patterns among their inhabitants. It is inherently multifunctional and is defined by novel land use and employment patterns (Holmes, 2005).

Furthermore, the commodities and services generated in this domain contribute to wider local and national objectives beyond food security and rural development (McCarthy, 2005). The rural urban fringe (RUF) in this rural area functions as the boundary between urban regions and the countryside, characterised by a very dynamic change process. Despite differing interpretations of RUF (Vizzari, 2011), rural areas within RUF are typically marked by significant integration into metropolitan institutions. Their proximity to urban areas facilitates regular travel and elevated levels of commercial engagement (Razin, 1996). RUF is a transitional area where urban and rural uses intersect and frequently conflict due to diverse influences impacting farmers, homeowners, and institutions.

RUF faces the loss of prime agricultural land, heightened population mobility, altered location advantages for peripheral rural communities, an increase in employment opportunities, diversification of the economic base, escalating land costs, changes in preferred lifestyles, and shifts in housing patterns (Heimlich & Anderson, 2001). Research on land use in the RUF has found a mix of activities that show how the city is slowly spreading into rural areas at different rates and directions, highlighting the difficulties rural areas and their residents face in adjusting to these changes. The outcome is that the preeminence of productive uses transitions to a blend of production- and consumption-orientated activities, resulting in rural areas adjacent to urban centres losing their conventional identity as agricultural zones (Clouser, 2005).

Nevertheless, numerous issues have emerged on the urban fringe throughout the urbanisation process, including chaotic spatial configurations, ecological deterioration, and land resource wastage (Ahani & Dadashpoor, 2021; Lyu et al., 2022). The swift and precise identification of urban edges is critically important for improving urban spatial organisation, conserving land resources, and facilitating urban-rural integration. Numerous studies have developed index systems using elements intimately connected to urban growth to delineate urban outskirts through mathematical models

(Wang et al., 2021; Dong et al., 2022). Methods for identifying urban fringes encompass the urban-rural gradient perspective, threshold analysis, and mutation/breakpoint analysis (Van Vliet et al., 2019; Yang et al., 2021).

The urban rural gradient perspective delineates urban peripheries by analysing geographical gradient variations in regional land utilisation, socioeconomic conditions, and population density (Van Vliet et al., 2019). Changes in land-use gradients are widely recognised as determinants of landscape structure disparities between urban and rural areas, thereby minimising the subjectivity of land-use variability assessments (Wadduwage et al., 2017). Moreover, socioeconomic characteristics and population density variations can accurately illustrate the distinctions between urban and rural regions (Vizzari & Sigura, 2015). The urban-rural gradient perspective encounters difficulties in mitigating subjectivity when establishing delineation sites in regions characterised by dispersed landscape configurations (Peng et al., 2016; Sharaf El Din, 2020).

The threshold technique finds the edges of urban areas by looking at factors like how far they are from developed places, how many people live there, how many buildings there are, and the variety of information available (Peng et al., 2016; Yang et al., 2017). Presently, investigations on urban fringe identification predominantly concentrate on larger metropolitan areas (Cai et al., 2017; Yang et al., 2021), while appropriate extraction models for small- or medium-sized urban fringes are few. The peripheries of large cities display elevated population densities and increased commercial activities, while those of small and medium-sized cities are generally more isolated and rural (Long et al., 2022). The deterioration of major cities and the populace's desire for a rural lifestyle have collectively facilitated suburbanisation, resulting in the swift expansion of the rural–urban edge.

As a result, residential land has been delineated from other land categories, leading to extensive residential zones in the rural urban edge (Anderson

et al., 1996). The rural urban edge is crucial for fostering urban economic development while ensuring system stability (Li et al., 2021). Collective rural land in the rural urban fringe has emerged as a principal source for urban development at minimal transaction costs, while the transient population residing there offers a substantial labour supply for the city (Zhang et al., 2015). Spatial and regional development theories underpin the transformation of connections between urban areas and their hinterlands. These theories demonstrate how urban areas might affect the evolution of adjacent rural communities.

Von Thünen's land use model posits that land rent and transport expenses dictate economic activities in a city's hinterland, suggesting that rural specialisation is contingent upon proximity to the central city (Von Thünen, 1826). Christaller's central place theory elucidates the spatial arrangement of central locations (cities) of varying sizes upon which their surrounding areas rely for diverse services and amenities (Christaller, 1933). This theory posits that cities of varying sizes possess distinct connections with their rural hinterlands, contingent upon the nature of commodities and services and their physical proximity to those services. The growth pole model (Perroux, 1955) and the core-periphery model (Friedmann, 1966) elucidate that core regions and cities are the epicentres of economic activities, whereas peripheral andrural areas provide resources in the form of manpower and goods.

Both ideas illustrate the supremacy of core regions, while periphery regions continue to exhibit dependency (Friedmann, 1966). Exchange relations between the core and the periphery organise this reliance. The virtuous cycle model illustrates how the exchange of individuals, commodities, information, and capital between rural and urban regions can foster rural development and advantage inhabitants (Evans, 1992). This model has a spatial dimension that highlights closeness to urban areas as a source of income opportunities and services. The urban ecological footprint idea posits that cities necessitate a greater land area than their physical dimensions for resources, sustenance,

and carbon sequestration (Wackernagel & Rees, 1996).

This dependence on rural regions for sustenance and other natural resources highlights rural urban connections. These theories suggest a fundamental interconnection between rural and urban regions. The principal characteristics of these theories include the dimensions and proximity of urban cores or cities in relation to their connections with rural settlements. Nonetheless, several social, institutional, infrastructural, geographical, and environmental factors also influence these interactions.

Typologies of Rural Urban Linkages

Four categories classify the connections between urban and rural areas: the movement of individuals, information, financial resources, goods, and services (Lynch, 2005). A trade-off exists between rural and urban areas, as urban regions rely on rural resources (such as food and labour), whereas urban services are essential for rural populations (Tacoli, 1998). The movement of individuals reflects human mobility between these places. This mobility predominantly pertains to rural regions and is characterised as "one response to the uneven spatial distribution of resources, including natural resources, markets, and employment opportunities (Tacoli et al., 2010).

Hence, mobility manifests in various forms, including temporary, permanent, circular migration, and commuting. The exchange of information and ideas signifies interactions between rural and urban regions concerning population demands, employment prospects, market conditions, innovations, and advancements in technology aimed at enhancing agricultural output and lifestyles (Sirvastava & Shaw, 2016). Financial flows can be classified into three categories: i) formal and institutional, ii) informal, and iii) investments from government and aid organisations (Lynch, 2005).

Initially, formal flows encompass micro-credit programs for economically engaged impoverished households provided by official financial entities like banks. Secondly, informal financial transactions encompass remittances and

loans from moneylenders, landlords, and various relatives. Third, investments from urban governments and assistance organisations facilitate the human, economic, and physical development of rural regions (Lynch 2005). The exchange of commodities and services constitutes a critical component of rural urban links. Urban areas rely on rural resources, including agricultural commodities and water (Gebre & Gebremedhu, 2019).

Rural residents acquire both durable and nondurable commodities for domestic purposes and improve output. Examples of products required by rural settlements include agricultural inputs, tools, building materials, and household items (Douglass, 1998). Urban areas offer educational, healthcare, and emergency services, along with off-farm livelihood diversification prospects for rural households (Tacoli, 2003). Furthermore, enhanced information services regarding market demand and trends augment the well-being of rural businesses (Mayer et al., 2016). When comprehended accurately, these connections are crucial for formulating development strategies and essential for alleviating poverty and social vulnerability in rural regions.

Historical Urban-Led Narrative of Rural Urban Fringe (RUF) Evolution and Disintegration

This section reviews the historical narrative of RUF evolution, aiming to derive insights from previous policy initiatives in both global and Western contexts to inform enhanced responses. The notion of RUF is widely recognised as stemming from interwar literature in sociology, geography, and planning (Gant et al., 2011; Qvistrom, 2010). Within a decade, it garnered explicit academic attention in the USA (Wehrwein, 1942), with the latter characterising it as a "twilight zone."

This characterisation underscores that RUF is a theoretical construct rather than a concrete reality in numerous urban or rural environments. Several theories or models elucidate the evolution of the RUF; however, in practice,

the RUF manifests as a fragmented assemblage of land uses and ad hoc policies. Therefore, the subsequent section examines the analytical principles used in this work, as articulated by Stead (2002).

Analytical Concept adoption for Urban Rural Planning of this Study

The analytical notions articulated by Stead (2002), which are readily comprehensible and self-evident, were situated at one extremity of the spectrum. This part introduces analytical models to meet the practical requirements of planners, administrative professionals, and other stakeholders engaged in land management in urban-rural regions. There is a link between the discussion about how urban and rural areas interact and the topics of governance, knowledge about governance, and innovation; looking at the history of these areas shows a significant change. Compact cities dominated until the nineteenth century, establishing a distinct separation between rural and urban regions; however, subsequent industrialisation and urban development blurred this distinction, resulting in a rural urban continuum (Borsdorf & Bender, 2012).

Consequently, by the mid-twentieth century, urbanisation and socio-economic growth had led to the convergence of these previously divergent areas (Schaeffer et al., 2013). Seto et al. (2012) validated this shift in comprehension by labelling the rural-urban dichotomy a "false idea". Schaeffer et al. (2013) even described it as "one system", reflecting Jefferson's (1931) belief that "urban and rural, city and country, are one thing, not two things." Despite this, only a limited number of initiatives have been undertaken to address the interconnections comprehensively between rural and urban areas, although numerous specific aspects (such as commuting) have been extensively examined as isolated phenomena (Smith & Courtney, 2009; Schaeffer et al., 2013). The intricacy of the connections between the two areas seems to have been undervalued (Smith & Courtney, 2009).

Land use planning and management at the urban-rural interface present substantial difficulties (Geneletti et al., 2017). In furtherance of the Habitat process, the UN released Urban Rural Linkages: Guiding Principles and Framework for Action to Advance Integrated Territorial Development" in 2019 (UN-Habitat, 2019). This document expands and broadens our awareness of urban-rural interrelations. The ten guiding principles, grounded in human rights, encompass integrated governance, equitable partnership, participatory methodologies, environmental awareness, and data-driven, evidence-based interventions. They ought to be locally anchored, functional, and spatially orientated and financially inclusive and should not cause harm while delivering social protection. The final point emphasises the necessity of enhancing urban–rural connections to mitigate conflicts and diminish inequalities.

More so, several scientists have sought to create models to elucidate spatial phenomena and interdependencies, beginning with Von Thünen, Launhardt, and Losch in Europe throughout the late nineteenth century (Scholer, 2005). Researchers from diverse fields have contributed to this developmental process. Since the 1970s, researchers have sought increasingly advanced models to enhance comprehension of the complex interactions and interdependencies between rural and urban regions. Multiple models exhibit distinct beginning points and differing degrees of complexity (Kasper & Giseke, 2017). Stead's model of urban-rural flows is employed in the subsequent analysis.

Stead's Model of Urban Rural Flows

Regardless of their definitions, Stead (2002) posits that people perceive urban and rural areas as distinct entities, yet they remain interrelated and interdependent. His paradigm employs functional linkages (flows) to delineate urban-rural relationships. Stead (2002), building on Preston's (1975) theoretical framework, emphasises the functional relationships between urban and rural

areas in his model, distinguishing between the flows of people and materials/goods (Fig. 1). The "flows of people" category comprises six subcategories: Work, Education and Training, Migration, Recreation and Tourism, Cultural Activities, and Commerce (Fig. 1). The second category, "flows of materials", comprises two subcategories: waste and pollution, and food, water, resources, and environmental benefits.

Furthermore, the flows are assigned to directions that delineate the movement within the interconnections of spatial units. As illustrated in the figure. Flows might be unidirectional (garbage) or bidirectional (recreation and tourism). This concept aims to encompass "observable and quantifiable" exchanges between rural and urban areas and vice versa (Stead, 2002). Stead (2002) employed this paradigm to analyse conventional urban-rural interconnections in West England. This analysis was restricted to flows with available quantitative data, neglecting challenging-to-measure interdependencies, including information and financial flows, due to data scarcity (Repp et al., 2012).

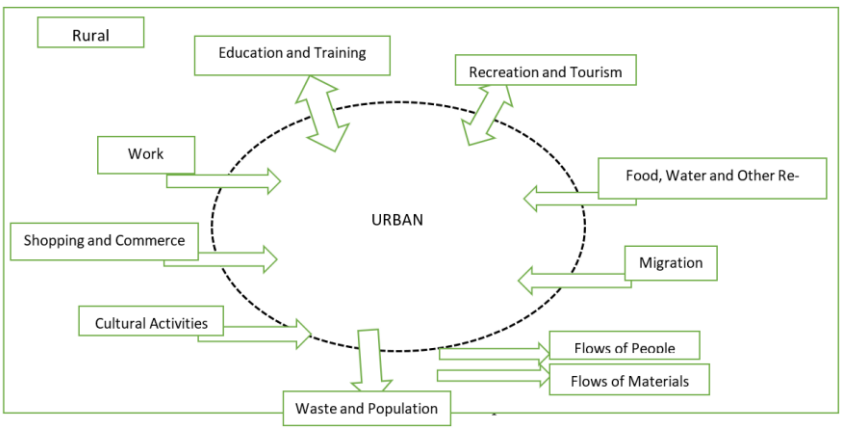

Fig. 1: Original model of flows of people and materials by Stead (own illustration based on Stead 2002) adapted from Doernberg and Weith, (2021).

Stead's approach is effective for hypothetically examining the connections between rural and urban regions. Revisions have been implemented to account for the current spatial dynamics and to comprehend more intricate relationships (Repp et al., 2012). One alternative was to revise the model (Fig. 2). Initially, adjustment of the flow directions was based on recent scientific insights into multi-local workplaces and re-urbanisation processes. In certain instances, a bidirectional dimension must be incorporated into the existing flows, or the directions may require alteration, as the present conditions do not mirror the situations in West England from fifty years prior.

The alternative is to establish new categories of interlinking "immaterial flows" that more accurately represent contemporary developmental tendencies, extending beyond the mere exchange of things and individuals. The inclusion of the categories “Knowledge and Innovation,” “Habitation,” and “Lifestyle, Consumption Patterns, and Social Values” increases the importance of connections pertaining to information, knowledge, and network integration (Repp et al., 2012). Figure 2 displays grey arrows. The revised model illustrates modifications that emphasise the increased complexity of urban-rural interdependencies, particularly in terms of reciprocal relations concerning housing and employment, along with the presence of nonmaterial flows.

Repp (2012) acknowledges in this updated framework that power dynamics and remote impacts influence urban-rural connections (Putz, 2004). According to the authors, the flow-based model offers a valuable systematisation framework that is versatile and can be broadly used to illustrate various developmental phases (the urbanisation cycle of cities) or, more specifically, the interconnections within a specific urban-rural area under examination. Numerous policy and planning papers indirectly allude to themes, such as regional development frameworks for retail, transportation, or housing, without expressly identifying them. The Stead model proposed by Repp et al.

(2012) and its subsequent adaptations remain mostly unfamiliar to the scientific community (Eppler et al., 2015; Kasper & Giseke, 2017).

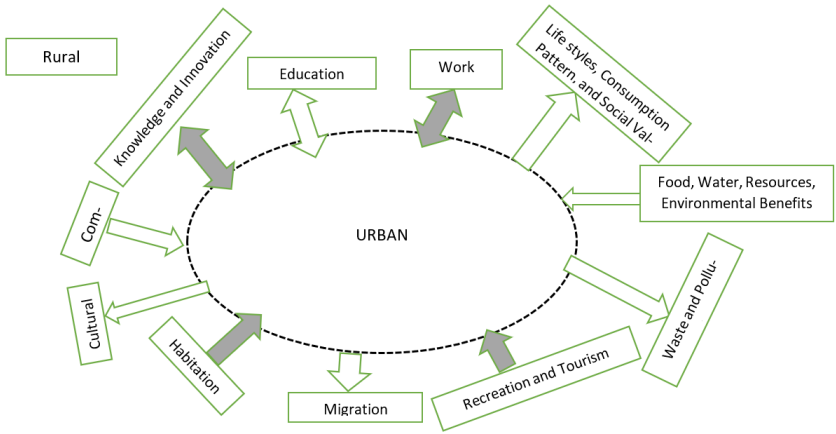

Fig. 2: Adapted model of rural-urban interlinkages by Repp et al. (2012) (own illustration, modified and extended based on (Stead, 2002; Doernberg & Weith, 2021).

The Stead model, along with its adaptation by Repp et al. (2012), emphasises the nature and orientation of functional interconnections; yet, the model's capacity to date landuse changes is notably constrained. While these models don't directly focus on managing land use and urban-rural relationships, they help identify important topics, people, and projects for urban rural relations and regional planning by clarifying functions and flows (Repp et al., 2012; Kasper & Giseke, 2017). Their simplicity renders them less intricate and more comprehensible, enhancing their feasibility for practitioners. Consequently, due to the Stead model's low efficacy, this study incorporates the Rural-Urban Continuum model to tackle rural-urban periphery challenges. The model will be addressed in the subsequent section.

Rural–Urban Continuum as Urban Fringe Models in the Study

This model incorporates the variable indicating that suburban communities

are part of the peri-urban periphery, as demonstrated by Waugh (2000). The rural-urban continuum encompasses fringes, and urbanisation significantly transforms the area's functions permanently. Cloke's 1979 model of the urban-rural continuum demonstrates the variation in land usage relative to proximity to the city. This model does not present a singular archetypal rural settlement; instead, it encompasses a continuum from deteriorating villages in remote areas to suburbanized villages and overflow towns on the urban periphery, making the distinction between rural and urban unavoidable for descriptive analysis.

Nonetheless, it frequently suggests a duality that includes both spatial and sectoral dimensions (Tacoli, 1998). Rural and urban populations are typically delineated by certain settlement sizes for practical applications, including censuses and statistical analyses. Agriculture is regarded as the primary occupation of the rural populace, whereas industrial manufacturing and services are linked to metropolitan regions. Nations' definitions of urban and rural are often more intricate than they appear (Anbumozhi, 2007). The boundaries of urban areas are often unclear compared to what is officially shown; changes in population, including temporary and seasonal moves, are not included in census data, making the population numbers for rural and urban areas unreliable (Anbumozhi, 2007).

Notably, a significant proportion of households in urban regions depend on rural resources, while rural inhabitants are progressively involved in non-agricultural pursuits. The delineation of urban centres limits is essential and subjective. Consequently, the differentiation between rural and urban areas has become contentious (Anbumozhi, 2007). The relationship between urban and rural areas is undergoing significant transformation, moving beyond conventional paradigms to innovative conceptual frameworks that redefine rural-urban connections (Nottingham & Liverpool Universities, 1998).

Notwithstanding, within this conceptual domain, the peri-urban interface

is typically regarded as a transitional zone between urban and rural environments, often characterised as not a discrete area but rather a diffuse territory identified by combinations of features and phenomena generated largely by activities within the urban zone proper (Nottingham & Liverpool Universities, 1998). Nonetheless, urban-rural interface regions are consistently challenging to delineate and are associated with issues intrinsic to conceptualising both rural and urban environments. In this context, policies designed to mitigate poverty frequently acknowledge the presence of either rural or urban poverty.

However, the reality in numerous regions of the developing world indicates that the daily lives and livelihood strategies of "multi-spatial households" increasingly occur within a cohesive rural-urban framework (Rigg, 1997; Tacoli, 1998). A clear demarcation between rural and urban settlements typically presupposes that the livelihoods of residents can be categorised into two primary sectors: agriculture in rural areas and manufacturing and services in urban centres (Tacoli, 1998).

Not until recently, studies indicate that despite activities being classified as urban or rural and spatially distinct, there persists a continuous and diverse interchange of resources between rural and urban regions (Rigg, 1997). Sectoral interaction encompasses rural activities in urban settings (urban agriculture) and urban activities, such as manufacturing and services, in rural locales, as well as peri-urban exchanges involving rural industries concentrated near urban centres (Tacoli, 1998).Therefore, to enhance comprehension of urban development and spatial patterns in Lagos, Nigeria, an in-depth examination of land use changes and their influencing factors along the rural-urban edge is essential.

Methodology

Aim of the Study

The paper examines previous research on land use changes in Epe, located at

the rural-urban fringe of Lagos State. The emphasis stems from the observation that the most significant land use changes in the rural parts of Lagos have occurred within this zone. This region has experienced internal conflict within rural communities; however, business activities have continued for several decades. This concept is based on the premise that changes in land use patterns indicate shifting macroeconomic conditions, shaped by the decisions of individual farming households. The inquiry focuses on Epe, located at the outskirts of several metropolitan areas in Lagos. It is located near cities, inside regional councils generally seen as the rural zone around the metropolitan area, enabling frequent commuting and considerable interaction between rural and urban regions.

Methods

The selected approach for this study is contingent upon the research topic, the nature of the accessible data, and the objectives of the review. Consequently, this study employed systematic reviews, which encompass the following methodologies:

i. Systematic Search Strategies: Employing keywords, Boolean operators, and database queries to locate pertinent literature.
ii. Methodological Rigour: Systematic reviews adhere to a systematic approach with established protocols.
iii. Selection Criteria: Defining explicit inclusion and exclusion parameters to identify pertinent studies.
iv. Data Extraction: Systematically obtaining essential information from chosen studies.
v. Quality Assessment: This process evaluates the calibre of primary studies included in the review.
vi. Critical Appraisal: Assessing the quality and validity of the included studies.

Tools and Techniques

i. Citation Management Software: Applications such as Mendeley, Zotero,

or EndNote for the organisation and management of references.

ii. Qualitative Data Analysis Software: Applications such as NVivo or ATLAS.ti for the examination of textual data.

iii. Literature Databases: Utilising online databases such as PubMed, Scopus, or the Web of Science.

Study Selection Procedure

The study's design sought to collect qualitative data using a varied methodological approach from existing literature. Urban studies often favour this paradigm because it allows for a thorough examination of the subjectivity inherent in urban environments. This is crucial for understanding the effects of urbanisation on land use in the rural urban edge, as it encapsulates the subjectivity of urban space. A literature review was performed from January 2024 to September 2024. This methodological approach involved a rigorous process of identifying and selecting pertinent articles, assessing them against clearly defined criteria, extracting relevant information, and synthesising associated insights to further the research objectives, as seen in Fig. 3.

For this review, a comprehensive evaluation of pertinent information was conducted through an extensive review of selected articles from the ScienceDirect, Scopus, and Google Scholar databases. Priority was given to empirical studies from peer-reviewed scholarly publications. The majority of the acquired papers were published during the past three years, subjected to rigorous peer review, composed in English, and meticulously assessed and selected for their uniqueness and relevance.

The selection criteria guaranteed that each article provided insights into at least one of the following domains: the effects of urbanisation on land use systems; the integration of ecosystem services, green infrastructure, and nature-based solutions in sustainable urban land management; and the advantages of urban ecosystems. The study rigorously selected and incorporated a total of one hundred seventy-four (174) pertinent publications into the analysis, seamlessly integrating them into the comprehensive study.

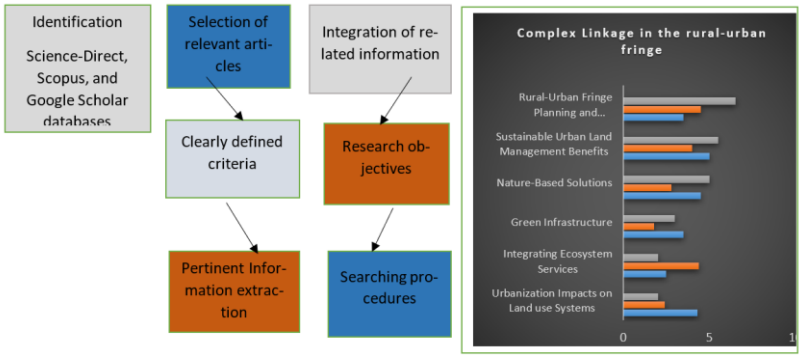

Fig. 3: Flowchart of the study based on process of identification, selection of relevant articles, clearly defined criteria, pertinent information extraction, and integration of related information to the research objectives. Sources: Authors's diverse sources

Searching Procedures

The literature review was segmented into two sections. A thorough investigation was conducted regarding the effects of urbanisation on land use systems, incorporating ecosystem services, green infrastructure, and nature-based solutions and novel approaches in sustainable urban land management practices, along with the advantages of urban ecosystems and the integration of nature's benefits into green urban infrastructure within cities. This investigation concentrated on the titles, abstracts, and keywords of pertinent articles in sustainable urbanism research, as seen in Table 1.

In the next step, the snowball method was used, which involved looking at the reference lists of important articles and new papers to find related studies and the earlier research they mentioned. This method was utilised to obtain articles that significantly influenced the subject under investigation, as the search results from most databases consisted of freshly published and extensively cited works. The primary search terms encompassed "urbanisation, urban sprawl, rural-urban edge, land use, drivers, and development", yet they extended beyond these specific subjects.

Table 1: Thematic analysis of papers on urbanization impacts on land use in rural-urban fringe (between 2013-2024) of previous research contributions

	Year	Author	Study area focus	Study findings
1	2021	Zhao and Wan	Urban-rural integration, land use, urban fringe, travel burden, transport disadvantage	Land use and travel burden of residents in urban fringe and rural areas: an evaluation of urban-rural integration initiatives in Beijing
2	2022	Feng et al.	rural–urban fringe, production–living–Ecological space, driving factors, spatial econometric, model, Beijing	Land use change and its driving factors in the rural–urban fringe of beijing: a production–living–ecological perspective
3	2013	Bittne and Sofer	Rural–urban fringe, land use, Moshav, Israel	Land use changes in the rural–urban fringe: an Israeli case study
4	2017	Harishkumar and Reddy	Urbanization, area under non-agricultural uses, net sown area, correlation, production systems, agrarian community	Impact of urbanization on land use pattern of rural-urban gradient of Bengaluru north: an economic analysis
5	2023	Li et al.	landscape disorder degree, kernel density estimation (KDE), night light intensity, geographical detector (Geodetector), urban fringe	An accurate fringe extraction model of small- and medium-sized urban areas using multi-source data
6	2020	Pandey and Lal	Urbanization, Urban fringe, Urban sprawl, Land use, Gaindakot (Nepal)	Impacts of urbanization on land use in urban fringe (a case of Gaindakot as fringe of Bharatpur metropolitan city)
7	2017	Nengroo et al.	LULC, food security, land transformation, urban sprawl, biodiversity	Dynamics of land use change in rural-urban fringe: a case study of Srinagar city
8	2021	García-Martín et al.	Land use and land cover change, intensification, abandonment, drivers of change, transdisciplinary approaches	Landscape change in Europe
9	2021	Nuissl and Siedentop	Urban land use change · measurement of urban sprawl · drivers and impacts · planning policy	Urbanisation and land-use change

	Year	Author	Study area focus	Study findings
10	2021	Doernberg and Weith	Urban-rural interrelations, · land management · telecoupling, regional governance	Urban-rural interrelations–a challenge for sustainable land management

Sources: Authors's diverse sources

Results/Findings

Consequences of Urbanization on Land Use Systems

Significant apprehensions exist concerning the environmental consequences of urban land use transformation. Consequently, movement of labour away from agriculture and increasing urbanization have neither yielded industrial growth nor increased the share of manufacturing employment in Lagos State (Folawewo, 2024). This has made effective structural transformation elusive in the country (Adam 2005; Okereka 2015; World Bank 2021). With a land-mass of about 3,500 km2 and an estimated population of about 22 million, Lagos is the most densely populated state in Nigeria with a population density of approximately 8,000 persons/km2, which is about 40 times Nigeria's average of 200 persons/km2 (Lagos State Ministry of Economic Planning & Budget 2022).

The city of Lagos is the largest city in West Africa and third in Africa. Lagos state as a whole, comprising 20 local government areas (LGAs) and 37 local council development areas (LCDAs) which includes Epe that plays a significant role in the national economy and that of sub-Saharan Africa. Lagos is home to most of Nigeria's manufacturing firms, as well as many service industries such as finance, information and communication technology (ICT), construction, and others. According to BudgIT (2018) and Lagos State Ministry of Agriculture and Food Systems (2022), the state accounts for around 27% and 50% of national GDP and non-oil GDP, respectively. Furthermore, the

structure of Lagos is such that each geographical areas and districts have peculiar and unique characteristics in terms of business activity and economic clusters (Folawewo, 2024).

However, according to a study carried out by Folawewo (2024) on urbanisation without structural transformation in Lagos, Nigeria reported that Epe has no agriculture- or manufacturing-based business establishments and has the least shares of services-based firms. But recently, in the year 2025, Epe has become the centre of investment. The rural communities in Epe include Naforija Odomola, Epe, Ilara, Otta-Ikosi, Ejinrin, Eredo, Odoragunsen, Mojoda, Ibowon, Itoikin, Ketu, Odo-Ayandelu, Orugbo, Igbonla, Ita oko, Yegunda, Molajoyo Oke egun, Erinmope, Iganke, Araga, and Aferan, among others (Ashimolowo et al., 2010). It is located about 90 kilometres to the northeast of Lagos metropolis (Babalola & Aina, 2004). The land scarcity in Lagos Metropolis has created an increase in demand for land in Epe and surrounding areas. Inadvertently, urban characteristics are making inroads into the previously rural communities, thereby creating a rural-urban transition zone that keeps getting urbanised with time (Ogbu & Iruobe, 2018).

This transitioning process led to the coexistence of both formal and informal land acquisition and administration processes (Ogbu & Iruobe, 2018). Due to its proximity to Lekki, Victoria Island, Ikoyi and environs, medium-income workers in these areas demand the relatively cheap land in Epe and neighbouring peri-urban local government areas for the construction of residential buildings (Ogbu & Iruobe, 2018). In addition, the presence of Lagos State University (Epe Campus), banks, hospitals, and other institutions (notably, the Lekki Free Zone) attracts the presence of non-natives to the area. These prospective land buyers are often exposed to the complexities of land acquisition worsened by the simultaneous existence of formal and informal land markets in the periurban area (Ogbu & Iruobe, 2018).

Additional environmental consequences of urban growth in Lagos in-

clude the danger of wetland loss (creeks, swamps, and lagoons), soil degradation and erosion, biodiversity loss of coastal vegetation, and fish population decline. These repercussions may have a detrimental impact on vegetation growth, drinking water quality, and infrastructural sustainability, while ecosystem changes may affect insect habitat and migration patterns, raising the risk of contagious human diseases (Kasim et al., 2021; Abass, 2021).

The repercussions are mostly associated with alterations in land cover, particularly the sealing of land, which often transpires during land development (Pauleit et al., 2005). Urban land use change results in a greater proportion of artificial, impermeable surfaces, encompassing built environments such as rooftops, highways, parking lots, and pavements (Haase & Nuissl, 2007). Consequently, imperviousness restricts the penetration of rainfall into the soil. Rainfall that fails to infiltrate transforms into surface runoff. Flood hazards significantly contribute to soil sealing in densely urbanised areas (Frenkel, 2004).

Additionally, urban runoff transports chemical pollutants from vehicular traffic and industrial activities, exacerbating the biochemical degradation of water supplies. Moglen and Kim (2007) found from various studies that when more than 10 to 50 percent of an area is covered with pavement, many signs of healthy stream life drop significantly. Furthermore, the spatial aggregation of artificial land coverings possessing distinct thermal properties generates localised temperature anomalies, resulting in an elevated average temperature within the dense urban core relative to the surrounding periphery, commonly referred to as the urban heat island effect (Watkins et al., 2007). Alongside the extent of urban land use alteration, its spatial configuration must also be considered.

Spread-out and broken-up land use patterns greatly lead to the splitting and separation of habitats and natural areas (Jaeger, 2000). Consequently, numerous scholars consider urban land use change a principal factor contributing to the concerning decline of species globally (Cieslewicz, 2002). The

comprehensive effect of urban land use change is contingent not only upon the environmental quality of the resultant patterns but also necessitates an economic analysis of the characteristics of the land that undergoes urbanisation over a defined timeframe. A significant worry is the depletion of valuable agricultural land, essential for the enduring competitiveness and sustainability of agriculture (Hasse & Lathrop, 2003). Researchers currently recognise that low-density and dispersed urban development incurs higher costs compared to more compact development patterns (Burchell et al., 2005).

Integrating Ecosystem Services, Green Infrastructure and Nature-Based Solutions-New Perspectives in Sustainable Urban Land Management

Findings from the study reveal that in Lagos, there is an infrastructure deficit in the urban fringe of Lagos, Epe, since the public sector is unable to cover the infrastructure demands of a contemporary megacity and a growing population (Abass, 2021). And due to the difficulty in obtaining affordable housing, many Lagos residents have relocated to the suburbs and what used to be rural regions, resulting in the formation of new settlement belts such as Epe, Lagos State.

In this regard, because of the current land scarcity, many large-scale initiatives to recover land from the lagoon systems have been underway. Despite the adverse effects, successive administrations continue to approve land reclamation from the sea, the most notable of which is the development of the dreamscape Eko Atlantic City project (Abass, 2021). Eko Atlantic City, a free trade zone and financial centre in Lagos that will house 500,000 people, is being built on land reclaimed from the Atlantic Ocean. And this contemporary, advanced new town construction promises to provide a countermeasure to rising coastal erosion and storm surge protection (Abass, 2021).

Hence, the project itself may worsen current environmental and socioec-

onomic problems in the surrounding communities. As a result of the projected man-made climate change caused by the project, the landfill in the open sea is likely to increase the risk of flooding in nearby areas and along the coast. Hence, it is also likely to exacerbate the wealth disparity and divide the city (Abass, 2021). Thus, its growing population, driven by a never-ending quest for survival and economic migration, as well as its porous border with the Republic of Benin, makes it an ideal environment for unstoppable population growth (Abass, 2021).

More so, the intricacies of large-scale land deals for megaprojects have become a typical consequence of neoliberalism across Africa. Essentially, the Lekki Free Trade Zone (LFTZ), launched in 2006, is one such megaproject (Abass, 2021). Free trade zones have grown in popularity as a means of regulating urbanisation by attracting foreign capital. And the goal of the project is to fully exploit Lagos' investment, business, and tourism potential, strengthening the city's position as an economic and financial centre and fostering a space for wealth, job creation, and inclusivity (Abass, 2021). However, during the first phase of this project's activities, nine coastal settlements that extended to Epe were impacted, leaving the impoverished inhabitants with deteriorated livelihood conditions due to the acquisition of their land.

The memorandum of understanding between the Lagos State Government and representatives of the impacted communities adopted a compensation formula that devalued the farmlands, leaving locals undercompensated. Furthermore, possible environmental dangers have already begun to negatively impact neighbouring communities as the project's subsequent phases, including a refinery, are near completion (Olajide, 2021). The LFTZ project exemplifies an urban development paradox in which there is a misalignment between the developmental goals and the livelihood aspirations and demands of local communities. While the majority of the locals rely on agriculture for sustenance, the development plan has created a challenge regarding their source of income and dreams for economic growth (Abass, 2021).

Nevertheless, the adoption of the following green approaches to sustainable urban land management would aid the strategic planning methodology that assumes the inherent functional advantages of ecosystem services. Thus, it involves these three concepts. The three ideas i) Urban ecosystem services (demand, flow, supply; Haase et al., 2014), ii) Green infrastructure and its types (Pauleit et al., 2018), and iii) Nature-based solutions (Nesshoever et al., 2017) are connected and work well together. Urban ecosystem services (ES) emphasise the processes and structures of urban nature and the advantageous effects of ecosystem processes on individuals, especially urban inhabitants and society at large (Haase et al., 2014). Urban green infrastructure (UGI) is a strategic planning methodology that assumes the inherent functional advantages of ecosystem services (ES);

The methodology seeks to establish networks of green and blue spaces within urban environments, which are meticulously designed and managed to provide a diverse array of ecosystem services and additional benefits across all spatial dimensions (Pauleit et al., 2018). The notion of nature-based solutions (NBS) tackles environmental and societal issues and concerns. NBS utilises the ecosystem services functional approach and the design principle of green (blue) infrastructure to tailor both ecosystem services and urban green infrastructure to the unique requirements of cities. Nature-based solutions (NBS) can be characterised as cost-effective living solutions that are inspired and supported by nature, offering environmental, social, and economic advantages while enhancing resilience and adaptation to climate change (Kabisch et al., 2017).

Table 2: Core properties of the three "green approaches" to sustainable urban land management (own conceptualisation and content compilation)

Approaches	Urban ecosystem services	Urban green infrastructure	Nature-based solutions for cities
Basic response or "working" units	Ecosystems (patterns and processes) and elements of them, such as soils, the water cycle and trees in an urban environment	Vegetation and vegetation types, their design and management in a city	Materials, structures and processes that function as, or like, ecosystems
How the approach works, or the idea behind it	Outcomes of ecosystem processes represent flows of material or energy that facilitate human life in cities, such as temperature cooling or water purification by soil sediment fixation	Elements of vegetation are planted and/or designed as well as maintained to make use of their ecosystem service flows for human well-being	Elements of nature are either used or constructed (mimicry) to produce ecosystem service flows to address issues related to climate change (solve the temperature problem) or facilitate human life in cities
Role of society	Beneficiaries of flows from ecosystem services at both individual and societal level; reduction of replacement costs	Users of the green Infrastructure, whether as recreational users in parks or as urban gardeners (to provide two examples)	Active engagement in the (co-)development and (co-)design of nature (mimicry) and monitoring NBS success
State of implementation	Partly in implementation in cities; still criticism of the concept; ES indicators are in proper use in most urban planning departments across Europe	Widely implemented and refined in European cities; suffers from limited municipal budgets, but is also implemented through NGO and citizen-based activities and programmes	Novel approach, with most implementations in flood management and climate adaptation in bigger cities across Europe, less in food production or environmental education

Adopted from Haase, (2021).

New Perspectives Benefits in Sustainable Urban Land Management

Research has also shown that over the years, economic and commercial activities in Lagos have continued to boom. The boom in economic activities has served as an impetus for the migration of people from different parts of the country into Lagos, leading to its large population size and the large urbanisation of the city (Omilusi, 2020; Folawewo, 2024). However, due to sluggish expansion of the industrial sector, economic activities in Lagos are dominated

by trade and commerce, mainly by micro, small, and medium enterprises, the majority of which are domiciled within the informal sector (Omilusi, 2020; Folawewo, 2024).

Thus, like many African cities, Lagos has evolved over time to become a highly urbanised city with little or no structural transformation and without a corresponding rise in income and welfare for its residents, as many of them are engaged in low-productive informal activities leading to land scarcity. And because of the current land scarcity in the Lagos metropolitan area, people and investment are moving to the urban fringe of Lagos known as Epe for land ownership and investment. To enhance social cohesiveness in urban environments of Epe, it will be of great benefit to integrate nature's advantages into urban green infrastructure in Epe, Lagos State.

Advantages of Urban Ecosystem

Urban green and blue spaces provide many ecosystem services that enhance the physical and emotional well-being of urban residents, thereby boosting their quality of life (Haase, 2021). Urban ecosystems in cities offer regulatory services (control of air temperature and humidity), cultural services (recreation and tourism), and fundamental provisioning services (food and forage) to inhabitants (Haase et al., 2014). Healthy ecosystems enhance social cohesiveness in urban environments by offering aesthetically pleasing spaces for interaction, which are fundamental aspects of urban land management (Kremer et al., 2016). Urban parks, gardens, rivers, and lakes, when readily accessible, provide sanctuaries for city dwellers to partake in various recreational and social activities with family and friends (Voigt et al., 2014).

Integrating Nature's Advantages into Urban Green Infrastructure in Cities

A second promising strategy for enhancing sustainable urban land use via management and design is the urban green infrastructure (UGI) approach

(Pauleit et al., 2018) (Table 2). The concept of UGI is founded on the assumption that the protection and enhancement of nature and natural processes are deliberately incorporated into urban spatial planning. UGI can be defined as a strategically organised network of semi-wild spaces with other natural elements, intended and administered to provide a diverse array of ecosystem services in an urban environment (EEA, 2019).

In addition, unlike traditional urban infrastructure that usually has one main purpose, UGI acts like a "living system" that can serve many different functions; the various parts of UGI can provide multiple benefits from urban ecosystem services as long as the ecosystems are healthy (Pauleit et al., 2018; Andersson et al., 2019). A single park facilitates climate change adaptation and mitigation, provides both active and passive enjoyment, offers educational advantages, and enhances species biodiversity (Rall et al., 2017). The multifunctional capabilities of individual infrastructure components facilitate a more sustainable and resource-efficient urban land development process in European cities, where space and resources are constrained (Andersson et al., 2019).

Nature-Based Solutions to Urban Land Management

A third strategy that has arisen uses urban environments for more sustainable land management in cities and metropolitan areas: nature-based solutions (NBS). The IUCN defines Nature-Based Solutions (NBS) as “actions to protect, sustainably manage, and restore natural or modified ecosystems that efficiently and adaptively solve societal concerns while simultaneously offering benefits for human well-being and biodiversity (Cohen-Shacham et al., 2016). NBS aim to support community development and protect people's well-being by i) reflecting the cultural and social values of a diverse city population and ii) improving the strength of urban ecosystems so they can provide important services (Kabisch et al., 2016a). NBS are structured akin to UGI and are employed to tackle the urban concerns enumerated in the preceding section:

food security, climate change, water scarcity, human health, and catastrophe risk (Nesshoever et al., 2017).

NBS are grounded in both the ES and UGI concepts, although they are innovative as they are designed and executed with particular urban challenges in consideration. NBS can be executed as standalone measures or in a cohesive manner alongside supplementary grey solutions (technological, engineering, or digital) to address urban difficulties (Haase, 2021). The efficacy of the three concepts and methodologies presented in this study resides in their integration and synergistic functioning, design, management, and uncomplicated execution, along with their problem-oriented focus on enhancing the sustainability of urban land management. Supply and demand, together with natural flows, are fundamental to all three notions. These complementary principles integrate several disciplines and their respective strengths, uniting them in a novel approach to sustainable urban land management.

Contribution to Knowledge

i. Bridging the Rural Urban Dichotomy: Traditional urban and rural land-use science often treated these as distinct categories, neglecting the interconnectedness and functional diversity of land within the fringe. Rural urban fringe studies have demonstrated that land use in the fringe is a gradient, incorporating both urban and rural characteristics. The study acknowledges the presence of residential areas, recreational facilities, and agricultural activities within the fringe.

ii. Understanding Land Use Change: Fringe studies have documented the processes of urban expansion and its impact on rural land use, including the conversion of agricultural land to residential, commercial, or industrial uses. Research has also examined the emergence of mixed land uses in the fringe, such as residential areas with agricultural ac-

tivities, reflecting the dynamic and evolving nature of this zone. Studies have identified various factors driving land use change, including economic development, population growth, and policy decisions.

iii. Impacts on Rural Livelihoods: Urbanisation along the fringe can have both positive and negative impacts on rural livelihoods. For instance, increased land values can generate higher income for farmers but also displace rural communities. The loss of agricultural land due to urbanisation can reduce agricultural productivity and affect food security.

iv. Environmental Considerations: Fringe studies have highlighted the environmental consequences of urbanisation, such as deforestation, reduced green spaces, and increased impervious surfaces, which lead to issues like urban heat island effects. This research has emphasised the need for sustainable land use planning and management in the fringe area to mitigate environmental impacts.

v. Informing Policy and Planning: Rural urban fringe studies provide valuable insights for developing policies and planning strategies that promote sustainable development, equitable access to resources, and a balanced integration of urban and rural functions.

Policy Implication of the Study

Policies play a critical role in shaping the urbanisation process and land use on the rural/urban fringe. Effective policies need to be designed to address the specific challenges of these transitional zones, promoting sustainable development, protecting natural resources, and ensuring equitable access to opportunities for all residents. Thus, the policies are as follows:

i. Urban-Rural Integration: Policies aimed at bridging the gap between

urban and rural areas, such as promoting urban-rural integration initiatives, can impact land use by encouraging more balanced development. This can involve policies that support rural development, improve access to urban amenities in rural areas, and facilitate the transfer of resources and expertise between urban and rural areas.

ii. Land Use Planning and Zoning: Regulations on land use, including zoning laws, have an important influence on the development pattern of the urban fringe. For instance, policies that prioritise compact urban development, protect agricultural land, or promote green infrastructure can have significant effects on the types and intensities of development in these areas.

iii. Investment and Infrastructure Development: Government investments in infrastructure, such as roads, utilities, and public transportation, can attract development and change the land use pattern in the urban fringe. For instance, improved access to transportation can lead to increased housing development or the expansion of industrial zones.

iv. Environmental Regulations: Policies related to environmental protection, such as those aimed at preserving natural habitats, managing water resources, or controlling pollution, can also influence land use. These regulations can limit development in certain areas or encourage more sustainable land use practices.

v. Property Taxes and Incentives: Tax policies can play a role in influencing development patterns and land use decisions. For instance, preferential tax treatment for certain types of development (green building or renewable energy projects) can encourage those types of development in the urban fringe.

Conclusion

This review revealed that many elements of urbanisation at the rural urban fringe interact in a contingent and recursive fashion throughout the transformation of agricultural land to urban land uses. Findings from the study reveal that in Lagos, there is an infrastructure deficit in the urban fringe of Lagos, Epe, since the public sector is unable to cover the infrastructure demands of a contemporary megacity and a growing population.

Thus, it indicates that numerous factors affecting urbanisation at the microlevel are not exclusively local but stem from broader social, cultural, political, and economic situations that undermine the economic sustainability of agricultural companies. Population increase alone does not precipitate land conversion on rural-urban margins.

Results from the study also reveal that land scarcity in Lagos Metropolis has created an increase in demand for land in Epe and surrounding areas. This comprehension arises from the reality that metropolitan regions may undergo population expansion within regulated and designated areas. Furthermore, population growth results in a rise in the quantity and variety of activities and participants, thereby amplifying the demand for land for many purposes. The findings from this study indicate that urbanising the Lagos fringe presents both opportunities and difficulties.

Nonetheless, the constraints are considerable, as this urbanisation occurs in an unstructured fashion. This observation poses a challenge to planning authorities and practitioners in mitigating the detrimental effects of urbanisation on the Lagos fringe, where certain regions confront significant issues jeopardising overall sustainability and environmental management. As population pressure intensifies in the core urban areas, leading to congestion, the peripheral fringe areas endure stresses from unregulated development. This results in issues such as substandard sanitation, insufficient road connectivity, and an unfavourable ratio of public facilities to the population. These difficulties impede sustainable urban development in the metropolis.

Consequently, the review's findings hold substantial practical relevance for enhancing urban spatial organisation, regulating unrestrained urban growth, and safeguarding land resources. Therefore, this review recommends three objectives of conservation, enhancement, and development, which are the foundational rules for the development of marginal areas. Recommendations ought to concentrate on four parameters: land use, infrastructure, transportation, and economics, as delineated in the aforementioned report. Therefore, land use patterns should be perceived as the result of political and economic structures, along with the responses of local stakeholders.

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