College of Science and Technology

School of Architecture and Built Environment

Master of Science in Geo-Information for Environmental and Sustainable Development

Benefits and Challenges of Land Use Conversion Alongside Urban Development for Native Landowners. A Case Study of Rilima Sector, Bugesera District

Thesis submitted to the University of Rwanda: College of Science and Technology in partial fulfillment of the requirements for the Award of the Degree of Master of Science in Geo-Information for Environmental and Sustainable Development in the School of Architecture and Built Environment.

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DECLARATION

I Innocent Nshimiyimana declare that this thesis, entitled "*Benefits and Challenges of Land Use Conversion Alongside Urban Development for Native Landowners, Case Study of Rilima sector, Bugesera District* " is my original work. I assert that this research has been conducted independently, and all sources used or referred to have been duly acknowledged and cited in the text.

I confirm that this thesis has not been submitted for any other degree or qualification at any other institution. Any assistance received during the research process, whether intellectual, technical, or financial, has been duly acknowledged in the acknowledgment section of this thesis.

Date: ……./……. , 2025

APPROVAL

It is hereby confirmed that this thesis entitled "*Benefits and Challenges of Land Use Conversion Alongside Urban Development for Native Landowners, Case Study of Rilima sector, Bugesera District* " submitted by Innocent Nshimiyimana has been assessed and accepted for the award of the Degree of Master of Science in Geo-Information for Environment and Sustainable Development, in the School of Architecture and Built Environment.

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ABSTRACT

Cities contribute nearly 80% of the global Gross Domestic Product (GDP) and play a central role in driving economic transformation. However, rapid urbanization has intensified land use conversion, often leading to significant changes in land ownership and utilization patterns. This study examines the benefits and challenges of land use conversion for native landowners driven by urban expansion policies and mega-infrastructure projects, especially the Kigali International Airport relocation. A mixed-methods approach was employed, combining household surveys, key informant interviews, participatory mapping, and spatial analysis using GIS. This study investigates the benefits and challenges of land use conversion associated with urban growth in Rilima Sector, Bugesera District, a rapidly urbanizing area influenced by strategic national projects such as Kigali International Airport expansion and the National Urbanization Policy 2050. Findings indicate that benefits, including improved infrastructure access, enhanced land value, increased employment opportunities, and better service delivery. This study recommends inclusive and environmentally sustainable, coping mechanisms to be integrated into planning frameworks which promotes resilience and equitable resource use that benefit all urban dwellers.

Keywords: Land use conversion, Urban development, Native landowners, Sustainable planning, Vision 2050.

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ACRONYMS

EDPRS:	Economic Development and Poverty Reduction Strategy
EIA:	Environmental Impact Assessment
ESIA:	Environmental and Social Impact Assessment
GGCRS:	Green Growth and Climate Resilience Strategy
GIS:	Geographic Information System
GoR:	Government of Rwanda
LTRP:	Land Tenure Regularization Program
LUC:	Land Use Conversion
LUP:	Land Use Planning
MINAGRI:	Ministry of Agriculture and Animal Resources
MININFRA:	Ministry of Infrastructure
MINIRENA:	Ministry of Natural Resources (formerly)
NGO:	Non-Governmental Organization
NISR:	National Institute of Statistics of Rwanda
NLA:	National Land Authority
PPP:	Public-Private Partnership
RAP:	Resettlement Action Plan
RGB:	Rwanda Governance Board
RHA:	Rwanda Housing Authority
RNRA	Rwanda Natural Resources Authority
RRA:	Rwanda Revenue Authority
SDGs:	Sustainable Development Goals

CHAPTER ONE: GENERAL INTRODUCTION

1.1. Background information

Worldwide, cities contribute 80% of the global Gross Domestic Product(GDP), and this highlights one of the major roles played by cities in economic growth as a driver of economic transformation requires stakeholders to harmonize their strategies to increase off-farm economic activities (Adigeh & Abebe, 2023). The global population is growing in urban areas, where it is projected to rise to nearly 68% by 2050 where 90% mainly in Asia and Africa (World-Bank, 2019).

This proportion is projected to increase to 50% by 2030 and 60% by 2050 (World-Bank, 2019). The expansion of cities creates new prospects and opportunities in African cities where people are migrating to cities at a faster rate and, at the same time, cities are spatially expanding at high rate while its surface remain unchanged and cost of living is rising (Akinyemi & Nzakamwita, 2014; Yiran et al., 2020).The urbanization leads to rapid and irreversible land alteration structure, rapid urbanization and population increase, rising land costs, but with a considerable quantity of land still in of existing land use, agriculture is highly affected (Rondhi et al., 2018).

The conversion of land for urban development often results in a significant increase in land value. They benefit financially from selling or leasing their land to developers or participating in joint ventures, leading to improved economic stability and access to resources for better living conditions, education, and investments (FAO, 2017; Uwayezu & Bayisenge, 2021). According to Cotulla et al., (2020), land use conversion create efficiency where consolidation of smaller plots into larger, more productive units or the conversion of marginal agricultural lands into higher-value urban uses Urban development typically brings modern infrastructure such as roads, electricity, water supply, and sanitation systems. (Buhaug & Urdal, 2016; Smith et al., 2018).

These individuals and communities, who traditionally rely on agriculture face increasing challenges due to urbanization(Anna & Giles, 2016). As highlighted by Smith et al. (2018), rapid urban expansion often leads to land alienation, depriving native populations of essential resources and spaces they have occupied for generations (Yankson & Gough, 1999). spatial expansion turns into urban sprawl leads to various challenges such as fragmentation of agriculture land, high cost of housing which make native land owners difficult to adapt to those changes and try to move to urban fringes zones which accelerate the problems and become routine (Muchelo et al., 2024) .

In Africa, rapid urban expansion often leads to land alienation, depriving native populations of essential resources and spaces they have occupied for generations (Smith et al., 2018). Key factors driving land deprivation for native landowners is the commodification of land under modern urbanization frameworks. The economic growth often expands at the expense of social equity and justice. The rising land values and speculative investments in urban areas intensify displacement pressures, forcing native landowners to abandon their lands (Glen, 2020).

In Kigali, strict urban land use laws, has made plots more speculative and expensive. As a result, many native landowners struggle to adapt to these changes, often being forced to relocate to more inexpensive periphery areas (UN-Habitat, 2019). The urban fringes have seen densification driven by two forces: the high cost of living in downtown Kigali, which has pushed less-educated individuals to the outskirts, and rural dwellers relocating closer to the city in pursuit of economic opportunity. This inflow has converted previously rural areas into densely populated zones, increasing demand for housing and infrastructure (Nduwayezu et al., 2016; Nkurunziza & Karangwa, 2018; UN-Habitat, 2019).

In addition to this, Urban policies and land-use regulations further exacerbate this issue, as they often fail to account for the unique needs and rights of native landowners. Urban planning frameworks typically emphasize infrastructural development while neglecting the social and cultural dimensions of land use. This imbalance not only marginalizes native populations but also disrupts the socio-economic fabric of communities reliant on land-based livelihoods (Taylor, 2021).

This urbanization has led to increased construction of buildings, roads, and other infrastructure. However, this growth has come at the expense of agricultural land, which supports the livelihoods of over 70% of the population employed in the agriculture sector (FAO, 2017). While urban development brings many benefits include but not limited to increased land value, improved infrastructure, and new economic opportunities, It also presents challenges to native land owners (Nkurunziza & Karangwa, 2018; Uwayezu & de Vries, 2020). These include potential displacement, loss of traditional agricultural livelihoods, and socio-economic inequities (Habimana & Niyibizi, 2020).

This Urban expansion significantly affects land rights, often leading to the displacement of marginalized communities and exacerbating socio-economic inequalities. Rapid urbanization,

driven by population growth and economic development, increases the demand for land, often resulting in informal settlements and land tenure insecurity (Uwayezu & De Vries, 2018). Urban growth has an impact on land use patterns through Speculation and improvement processes raise land values, making it difficult for low-income populations to get inexpensive housing and protect their property rights (Adebayo & Ndinda, 2024).

It is worth that inclusive urban design techniques which involve the integration of participatory land governance approaches and create legal frameworks to protect tenure rights that help to bridge the gap between development objectives and the rights of vulnerable which emphasize on the importance of inclusivity and equity in urban development (Ahmed et al., 2022; United Nations, 2015). The Native landowners might utilize a variety of measures, including legal activism, land-use diversification, and engagement in urban planning processes. Strengthening legal literacy and participating in collective land rights campaigns can assist maintain land tenure and ensure fair remuneration (Nshimiyimana, 2023; Wehrmann & Antonio, 2015; World-Bank, 2019).

1.2. Problem statement

Kigali, Rwanda's capital city, has experienced rapid urbanization in recent decades, resulting in notable expansion onto its urban boundaries where between 2002 and 2024, the city's built-up area doubled from 83 km² to 167 km², with the majority of growth occurring in periphery zones and fringe areas (Byiringiro & Nsanzumukiza, 2023). This increase has been particularly noticeable in the core city districts of Nyarugenge, Kicukiro, and Gasabo, as well as parts of surrounding districts like as Rulindo in Runda sector, Kamonyi, Bugesera (Nduwayezu et al., 2016).

Due to its proximity to Kigali city, make Bugesera a satellite city. The government of Rwanda proposed Bugesera as satellite city along with Rwamagana, and Muhanga to minimize the primacy of Kigali City and support the development of growth poles. It is worth noting that this initiative was introduced to address the primacy of Kigali (Government of Rwanda, 2021). Bugesera District has experienced rapid urbanization, as evidenced by its growing population and expansion of built-up areas.

In Bugesera district, over the last two decades there has been a rapid increase in population. It was approximately 266,775 in 2002 and increased to 363,339 in 2012. It reached 551,103 in 2022 (NISR, 2005, 2014, 2023). This population increase is partly associated with the influx of population from different part of the country mainly from Northern and Southern province of Rwanda on the search for land (World Bank Group, 2017). Rilima sector is one of the fifteen sectors of Bugesera district. It has Corridor of International Airport which is in the development process in Karera , Kimaranzara and Ntarama cells. This airport will contribute to the enhanced air transport services to support trade and regional integration (UN-HABITAT, 2016a).

Some studies have been conducted on some issues pertaining to land acquisition and urbanization of Bugesera district. In their researches, Ntawuruhunga and Twahirwa (2024) pointed out need for equitable and transparent compensation practices in land expropriations.;Byiringiro & Nsanzumukiza (2023), highlight that Rapid urbanization in Bugesera has resulted in the loss of agricultural land.; Umamaheswari and Vidhya (2022), elaborate on the conditions influencing the success of Bugesera International Airport development project and implementation timeframes.

However, those studies do not focus on the issues related to land use conversion for urban development and any benefits or challenges for the affected native land owners. Therefore, this study intends to bridge this knowledge gap by ascertaining both positive and negative effects of land use conversion for the native land owners in Rilima sector. Given that by 2050 Rwandan annual urbanization rate is projected to reach 6.8 %, implying that 70% of the Rwandan population will be living in the urban areas (Government of Rwanda, 2021).

Studies exploring how urbanization processes promote the inclusion of the land owners in the areas under transformation into the urban fabric are needed (Republic of Rwanda, 2022). It is also worth undertaking research ascertaining whether there are challenges that may hinder their inclusion or affect their livelihoods as consequences of land use change in order to suggest the mitigation strategies (Government of Rwanda, 2020).

1.3. Motivation and Significance of the Research

Converting land usage to urban development is a critical issue in Rwanda, which has a rapidly rising population and an ambitious urbanization plan. Native landowners confront issues such as arable land loss, reduced food security, and possible displacement (Habimana & Niyibizi, 2020). At the same time, these conversions provide potential for economic development, infrastructure improvements, and job creation (United Nations, 2015).

It will add to the growing body of literature on land use change in rapidly urbanizing countries, providing evidence-based suggestions to policymakers, urban planners, and development practitioners. It will also foster equitable and that is consistent with Rwanda's Vision 2050 objectives in ensuring efficient land use and resource management where cities should be flexible enough to accommodate different landowners while ensuring efficient land use planning and integration of affected land owners into urban fabric towards meeting conviviality (Government of Rwanda, 2021).

1.4. Research Objectives

The main objective of this research was to examine the benefits and challenges that native landowners face when their land experiences conversion due to urban development and suggest possible mitigation measures to cope with these problems.

1.4.1. Specific objectives

This research was to attain the following Specific objectives:

1. To identify the benefits of land use conversion alongside urban development for native landowners in Rilima sector.
2. To examine the challenges of land use conversion alongside urban development faced by native landowners in Rilima sector
3. To assess how native land owners, cope with challenges related to land use conversion alongside urban development
4. To propose strategies for landowners to cope with the land use changes driven by land use conversion in Rilima sector.

1.4.2. Research questions

This research was guided by the following Research questions:

1. What are the benefits of a land use conversion alongside urban development for native landowners in the Rilima sector?
2. What are the challenges of land use conversion alongside urban development faced by native landowners in the Rilima sector?
3. How do native landowners cope with the challenges of land use conversion alongside urban development in the Rilima sector?
4. What coping strategies can be proposed to benefit all land owners in Rilima sector land use conversion and urban development?

1.5. Research Matrix

A research matrix is a tool used to map out the relationships between research objectives, questions, data sources, methods, and analytical techniques

Table 1:Research Matrix

Research Objectives	Research Questions	Methods and data source	Expected Results
1. To identify the benefits of land use conversion alongside urban development for native landowners in Rilima sector.	What are the benefits of land use conversion alongside urban development for native landowners in the Rilima sector?	-Literature review on urban growth on land use conversion -Field observation -Interview on native land owners	-A text explaining the benefits of land use conversion on land for urban development from Globally to Locally.
2. To examine the challenges of a land use conversion alongside urban development faced by native landowners in Rilima sector	What are the challenges of land use conversion alongside urban development faced by native landowners in the Rilima sector?	-Literature review on urban growth on land use conversion -Field observation -Interview on native land owners	-A detailed map describing the different land uses -A table that summarizes the different land uses, on a two Masterplans since 2017-2024 -
3. To assess how native land owners, cope with urban development lifestyles.	How do native landowners cope with cope with urban development lifestyles in Rilima sector?	-Field observation and Questionnaires to see how native coped with urban development Literature review on	-Graphs represent different coping mechanisms native land owners use to adapt in urban lifestyles -
4. To propose coping mechanisms that benefit all urban duelers in Rilima sector	What coping mechanisms can be proposed to benefit all urban land owners in Rilima sector?	-Compilation and clustering of collected data- -Interpreting factors of change in spatial data sharing practices	A text describing the Presentation of research findings: explaining changes in spatial data sharing practices, conclusion and recommendations

1.6. Delimitation of the study

The study only focused on benefits and challenges of land use conversion alongside urban development for native landowners who are affected with urban expansion in Rilima sector in Bugesera district; Rwanda.

CHAPTER TWO: LITERATURE REVIEW

The preceding chapter focused on the development of the research problem, set the research questions and the objectives of the study. This chapter is comprised of review of the literature and discussion of the theoretical perspectives on land use conversion for urban development on native land owners.

2.1. Definition of key concepts

To ensure conceptual clarity and a shared understanding of terms used throughout this study, it is essential to define key concepts that form the foundation of the research.

- **Land**: refers to the physical space and natural resources that make up the Earth's surface, including soil, water, air, and all natural resources contained within it. It is the foundation for human settlement, agriculture, and economic activities (FAO, 1995).
- **Land use**: refers to the way in which land is utilized or managed by humans. It includes various categories such as residential, commercial, industrial, agricultural, and recreational purposes. Land use also involve conservation or preservation for environmental protection (FAO, 2002).
- **Land Use Conversion:** It is the process of changing the primary function of land from one use to another, such as converting agricultural land to urban or industrial use (McDonald et al., 2016).
- **Native landowners:** Native landowners are indigenous individuals or communities who have traditional, ancestral, or legally recognized rights over land. Native landowners often have deep cultural and spiritual ties to the land they inhabit (Lindhjem et al., 2021).
- **Urbanization:** Urbanization is the process by which rural areas transform into urban areas through increased population density, infrastructure development, and social changes. It is characterized by the migration of people from rural to urban areas in search of better economic, social, and educational opportunities (Cohen, 2006).
- **Urban development:** This encompasses the physical, social, and economic processes through which a community or region develops urban infrastructure such as roads, buildings, and utilities, and transitions from rural to urban environments (Glaeser, 2011).
- **Coping strategies:** Coping strategies refer to the methods or actions that individuals, communities, or societies adopt in response to challenges or stresses, such as environmental changes, economic hardships, or social pressures. These strategies can be adaptive (adjusting to new conditions) or mitigation measures reducing the negative impacts (Adger, 2000).

2.2. Overview on Land Conversion for Urban Development

Land use conversion is a process that accompanies land development (Sorensen & Consensus, 2007; Suzuki et al., 2013). It refers to the process of transforming land from one use to another, typically to accommodate changing human, economic, or environmental needs (Briassoulis, 2020). Land use conversion for urban development, as the focus of this study, is the process that often involves shifting land from its natural or agricultural state to urban use, industrial development, commercial, or infrastructure development which is driven by increasing urbanization, infrastructure expansion, and economic growth initiatives (Kocur-Bera & Pszenny, 2020).

Urbanization and urban development drive land use conversion by stimulating population growth and economic growth (Wang et al., 2018). As both increase, demand the infrastructure, including roads, industrial buildings, and housing for increased population requiring sufficient land to support this development. Since the global urbanization is increasing at high pace, land conversion occurs at a rapid pace too. For instance, in 50 years ago, only 30% of the world's population lived in urban areas; today, it exceeds 50%, and by 2050, only 30% will remain rural. Rural-to-urban migration is the primary driver of this shift (UN-HABITAT, 2020).

To accommodate urban expansion, agricultural land is repurposed, either directly by farmers or through land transactions. Key factors influencing landowners' decisions include land prices, income, size, productivity, legal status, and government policies (Saputra et al., 2022). Thus, the rate of land conversion from what was originally used for agriculture to housing and industry is unavoidable since this urbanization is inevitable.

On one hand the urbanization and urban development drive socio-economic transformation and growth, on the other hand, the conversion of agricultural land threatens the livelihoods of native landowners, often without providing alternative sources of income. However, whatever the situation, urbanization is unavoidable and the role of urban planning is eminent to allow communities to tap into opportunities offered by urbanization, to trigger social and economic transformation (Tadesse & Imana, 2017).

2.3. Drivers of the Land use conversion for urban development

Land conversion from agriculture to urban use is driven by several factors that fuel urban expansion and economic growth. Some drivers include as follow:

2.3.1. Population Growth and Urban Expansion

Rapid population growth put much pressure on cities to accommodate the increased populations, increasing the demand for housing, infrastructure, and essential services. As urban centers become overcrowded, governments and developers seek to expand into previously rural or undeveloped areas to create new residential, commercial, and industrial zones. This expansion often leads to large-scale land conversion, where agricultural lands, forests, and open spaces are repurposed for urban development (Angel, 2023).

2.3.2. Infrastructure Development

Infrastructure development, including roads, utilities, and public facilities, is important for supporting urban expansion and growing populations as it provides basic services and connectivity (ADB, 2012). However, the construction of transportation networks and public utilities often leads to large-scale land acquisitions, reducing available farmland and disrupting existing land-use patterns. While well-planned infrastructure can boost land values and stimulate economic growth, it also risks displacing farmers and low-income landowners who may struggle with rising property costs (Harewan et al., 2023; IFC, 2023).

2.3.3. Government Policies and Land-Use Planning

Governments play great role in shaping urban development by designating specific areas for expansion through zoning laws, land-use policies, and master plans (Howard, 1960). These regulatory frameworks help to determine which lands can be used for residential, commercial, industrial, or agricultural purposes, thereby influencing the pace and pattern of land conversion. Zoning laws establish land-use categories and set restrictions on development intensity, ensuring that urban growth follows a structured plan.

Land-use policies guide decision-making on how land should be utilized, balancing economic development with environmental conservation and social needs. Urban master plans provide long-term strategies for city expansion, incorporating infrastructure development, housing projects, and transportation networks (Bansal & Pandey, 2024).These policies greatly impacted the land conversion rates by either encouraging or restricting development in certain areas (Harewan et al.,

2023). For example, governments may rezone agricultural land for urban use to accommodate population growth, attracting real estate investments and boosting overall economic growth.

However, this in turn also lead to challenges, such as land speculation, where investors purchase land expecting its value to rise, making it difficult for native landowners—often farmers—to retain ownership (Swedish FAO Committee, 2010). In some cases, governments implement land expropriation, acquiring private land for public interest such as roads and utilities, sometimes offering compensation that may not reflect the true value of the land (Deininger & Castagnini, 2006).

Finally, the policy decisions determine whether landowners benefit or face disadvantages. In the sense that, a well-planned policy ensures fair compensation, provide alternative livelihoods for displaced farmers, and promote sustainable development. Conversely, poorly enforced regulations always lead to uncontrolled urban sprawl, loss of agricultural productivity, and increased inequality between developers and local communities (IFC, 2023).

3. Benefits of Land Conversion for Urban Development

3.1. Economic opportunity and Increased Land Value

One of the primary benefits of land conversion is the increase in land value. As infrastructure and services improve, native landowners can benefit financially by selling or leasing their land at higher prices (Yilmaz et al., 2015). Urbanization attracts investors, commercial enterprises, and developers, creating opportunities for landowners to capitalize on these market forces (UN-HABITAT, 2016b)

3.2. Improved Infrastructure and Public Services

Urbanization leads to the development of basic infrastructure and utilities such as roads, electricity, water supply, and sanitation systems. The provision of these services enhances the quality of life for local communities and increases the usability of their land for commercial or residential purposes (Home, 2007).

3.3. Employment and Business Opportunities

As cities develop, they generate employment opportunities in sectors such as construction, retail, and services. Native landowners can benefit from new business prospects, either by establishing

enterprises on their land or by participating in new economic activities enabled by urbanization (UN-HABITAT, 2011, 2016b)

3.4. Community Development

Urbanization promotes social integration by providing access to better education, healthcare, and social services. UN-Habitat (2016) suggests that native communities, if included in urban planning, can benefit from enhanced civic participation and improved living conditions.

4. Challenges Faced by Native Landowners

4.1. Displacement and Loss of Cultural Identity

A major challenge of urbanization and urban development for native landowners is displacement. As urban areas develop, many landowners are forcibly relocated, disrupting their traditional ways of life and cultural practices (Payne et al., 2009). This disturbance often leads to a loss of cultural identity and a deep sense of disconnection from their lands.

4.2. Legal and Bureaucratic Complexities

The native landowners face the challenges related to Legal and Bureaucratic Complexities, particularly in cases where landownership is informal or lacks clear documentation (Krismantoro, 2024). Governments and private developers may acquire land through expropriation, sometimes offering inadequate compensation to landowners (Hong, 2007)

4.3. Unequal Distribution of Benefits

While some landowners benefit economically, others may not receive fair compensation for their land. Speculative land markets and corruption can further disadvantage native communities. Wealthier landowners often have more negotiating power, leaving poorer landowners vulnerable to unfavorable agreements (FAO, 2008).

4.4. Social Inequality and Marginalization

Marginalization of native landowners can occur when they are excluded from decision-making processes. Participation in urban planning is essential for ensuring that landowners have a voice in how their land is utilized (Caldeira & Holston, 2015). However, many urban projects prioritize investors and government interests over community needs (Anthony Jr, 2024; Marcelo et al., 2016).

5. Social Equity and Participation in Urban Development

This section explores the role of social equity and participation in urban land development, particularly in the context of agricultural land conversion alongside urban development. It provides a framework for ensuring that urban plans prioritize fairness and inclusivity while developing the urban areas. By examining key dimensions of social equity—distributional, recognitional, and procedural—this section highlights the need for policies that protect native landowners from displacement, economic marginalization, and loss of cultural identity with the aim of balancing urban development with the preservation of livelihoods, economic opportunities while safeguarding the rights of existing/ native landowners.

5.1. Framing Social Equity of Land Use Conversion Alongside Urban Development

The equity concept originates from social science and represents one of the core contents of urban sustainable development (Jiang et al., 2010). In the context of land use conversion and urban development, social equity focuses on ensuring fairness and justice in the distribution of resources, benefits, and opportunities, recognizing that different groups may have varying needs and circumstances, and aiming for equitable outcomes for all (Tyler, 2015).

To understand equity, it is important to distinguish it from equality. Equality implies that each individual or unit should receive the same (Tyler, 2015). Within this framework, it is worthy differentiating two aspects: (1) horizontal equity (equality), which is ensuring that all stakeholders, including farmers, landowners, and developers, receive equal access public services, and economic opportunities (2) Vertical Equity, which is addressing the needs of vulnerable groups, such as small-scale farmers, who may require additional support to transition into new economic opportunities after land conversion (Boone et al., 2009).

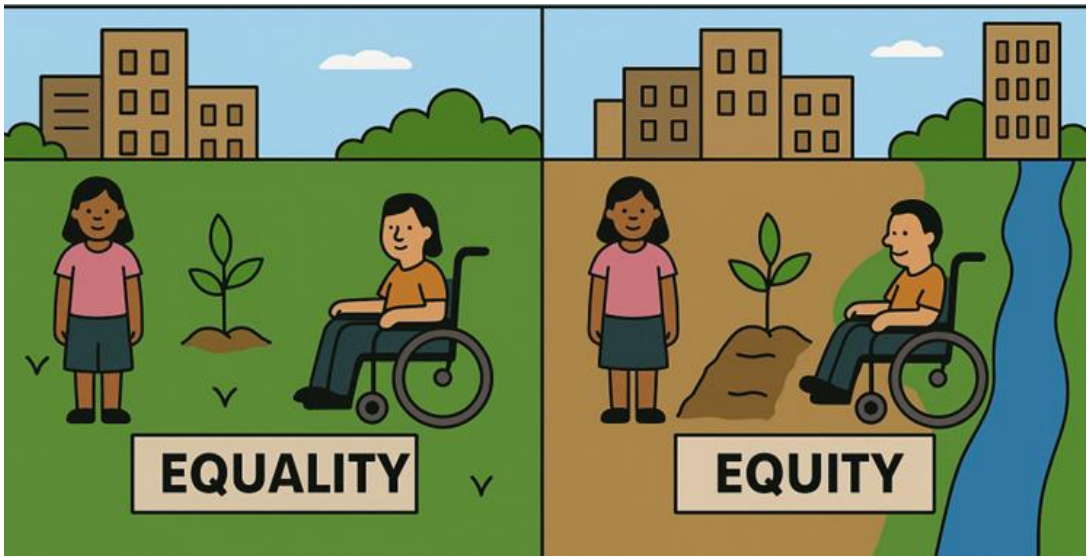


Figure 1: Illustration of Equity versus Equality

Source: (Yuan et al., 2017)

This illustration effectively captures the contrast between equality and equity. On the left, under "Equality," each person is given the same piece of land or opportunity without consideration for their specific circumstances. This approach overlooks structural and physical barriers, making access to resources and benefits unequal in practice. On the right, under "Equity," adjustments are made to accommodate individual needs: the person in the wheelchair has a clear path to access the land, and the woman is positioned based on her context.

This side illustrates a more just approach to land use planning and recognizing that fair outcomes require tailored solutions, not just uniform treatment. In urban development, this means policies must go beyond surface-level fairness to actively dismantle obstacles and empower all communities, especially those historically marginalized, to benefit from land use changes.

The concept of social equity has evolved over time, expanding beyond its initial emphasis on distributional equity to encompass procedural and recognition equity as well. In line with this progression and drawing from widely recognized frameworks on social equity dimensions (Bulkeley, 2013; Bulkeley et al., 2014; Schlosberg, 2004), This research prioritizes distributional, recognition, and procedural equity in alignment with its objectives as demonstrated in the following graph :

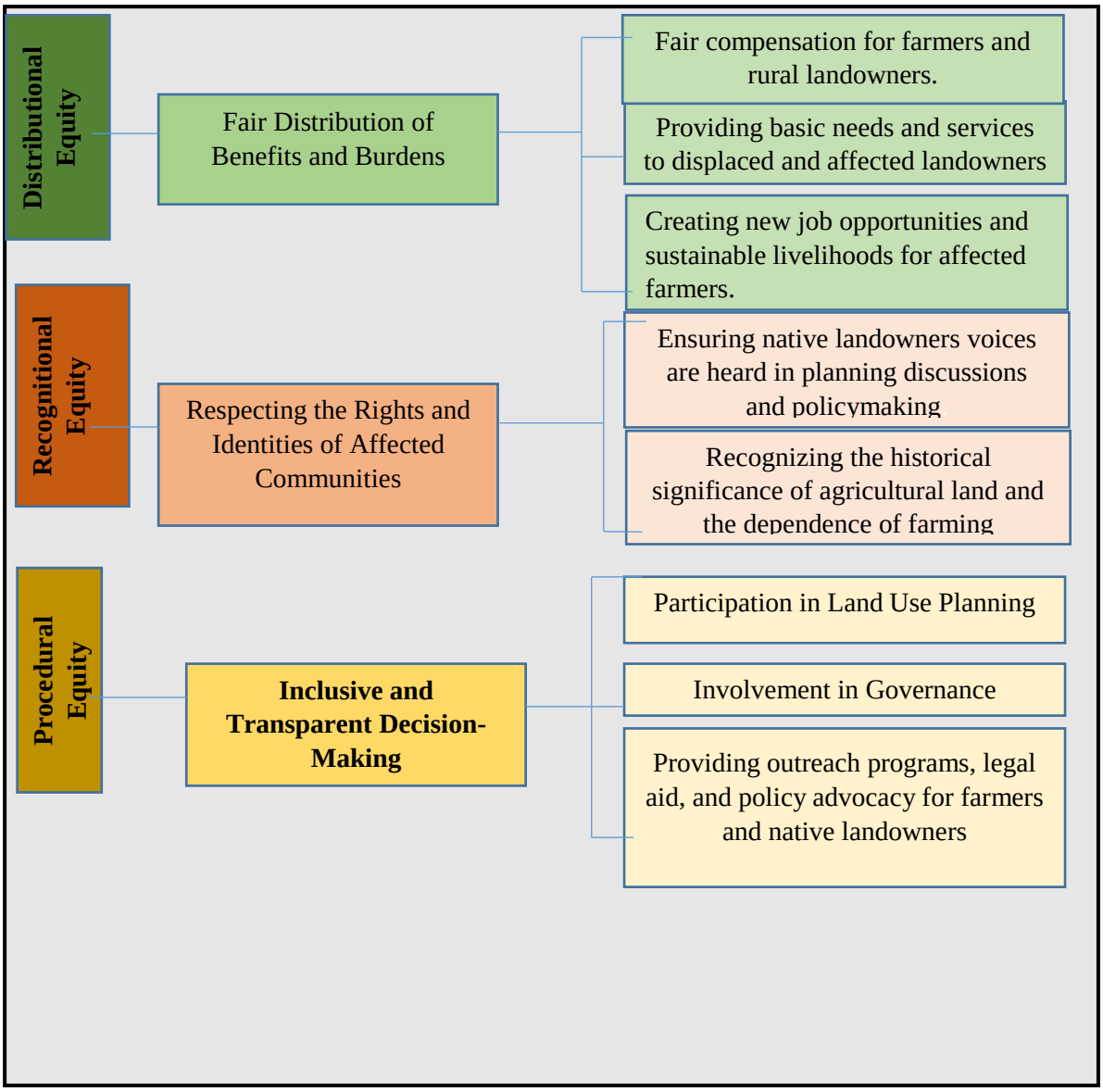


Figure 2: Conceptualizing social equity in land use conversion for urban development

Source: Meerow et al.,(2019)

According to the figure above the component of social are explained in details as follows:

Distributional Equity

Agricultural land conversion alongside urban development must ensure distributional equity by fairly allocating both the benefits and cost of land development. Land value and compensation should be assessed transparently to guarantee that farmers and native landowners receive fair payments for their land.

In addition to this, urban development should prioritize infrastructure and services by improving roads, utilities, healthcare, and education access for affected communities, ensuring they are not left behind in the development process. Finally, as farmland transitions into urban spaces, it is essential to create employment and economic opportunities for displaced farmers, offering alternative livelihoods, job training programs, and investment in agribusiness or other alternative.

Recognitional Equity

Recognitional equity in agricultural land conversion emphasizes the importance of acknowledging and respecting the rights and identities affected native landowners. Agricultural land is not just an economic asset but holds deep historical and cultural significance for farmers and indigenous groups who have depended on it for generations. Understanding the historical connection between rural livelihoods and land use is important in ensuring that development does not erase or undermine traditional ways of life. Respecting cultural and traditional land use practices means recognizing indigenous and rural land tenure systems, as well as the customs and sustainable farming methods that have long shaped agricultural landscapes. Furthermore, ensuring community respect and inclusion in land-use decision-making is essential to achieving fair and just urban development. This involves actively engaging native landowner's voices in planning discussions, policy frameworks, and governance structures, allowing them to have a say in the future of their land.

Procedural Equity

Ensuring procedural equity in agricultural land conversion requires inclusive and transparent decision-making processes that actively involve affected communities. Participation in land use planning is crucial, as farmers, landowners, and rural communities must be engaged in discussions regarding urban expansion and zoning regulations. Their insights and concerns should shape policies that balance urban growth with the preservation of agricultural livelihoods. Additionally, involvement in governance is essential to guarantee that rural stakeholders have a voice in policymaking bodies responsible for land development. Representation in decision-making processes allows for more equitable outcomes, ensuring that landowners and farming communities are not sidelined in favor of large-scale developers.

Furthermore, support for marginalized farmers is necessary to address power imbalances and socio-economic disparities. Outreach programs, legal aid, and policy advocacy can empower small-scale farmers by providing them with the knowledge and resources to protect their interests and navigate land conversion policies

5.2. Social Equity Frames alongside Land Conversion for Urban Development

To ensure that native landowners benefit from land conversion requires a balanced approach that safeguards their rights, acknowledges their attachment to the land, and equitably distributes both the benefits and costs of urban expansion (UN-HABITAT, 2016a). Achieving this balance requires an inclusive and participatory approach, where native landowners are actively involved in decision-making processes rather than being passive recipients of top-down urban policies.

Participation goes beyond consultation; it ensures that landowners have a voice in shaping the future of their land and livelihoods. This involves assessing existing land use patterns, exploring alternative development pathways, and negotiating for fair compensation or benefit-sharing mechanisms (Uwayezu & Bayisenge, 2021). Without such inclusion, land use conversion can lead to socio-economic marginalization, reinforcing disparities between those who profit from urban development and those who bear its costs (Caldeira & Holston, 2015).

According to Arnstein (1969), Measuring the extent of participation in land use conversion can be analyzed using frameworks which highlights varying degrees of involvement, from Nonparticipation (no power) to Degrees of Tokenism (counterfeit power) and eventually up to Degrees of Citizen Power (actual power) as shown on the below figure:

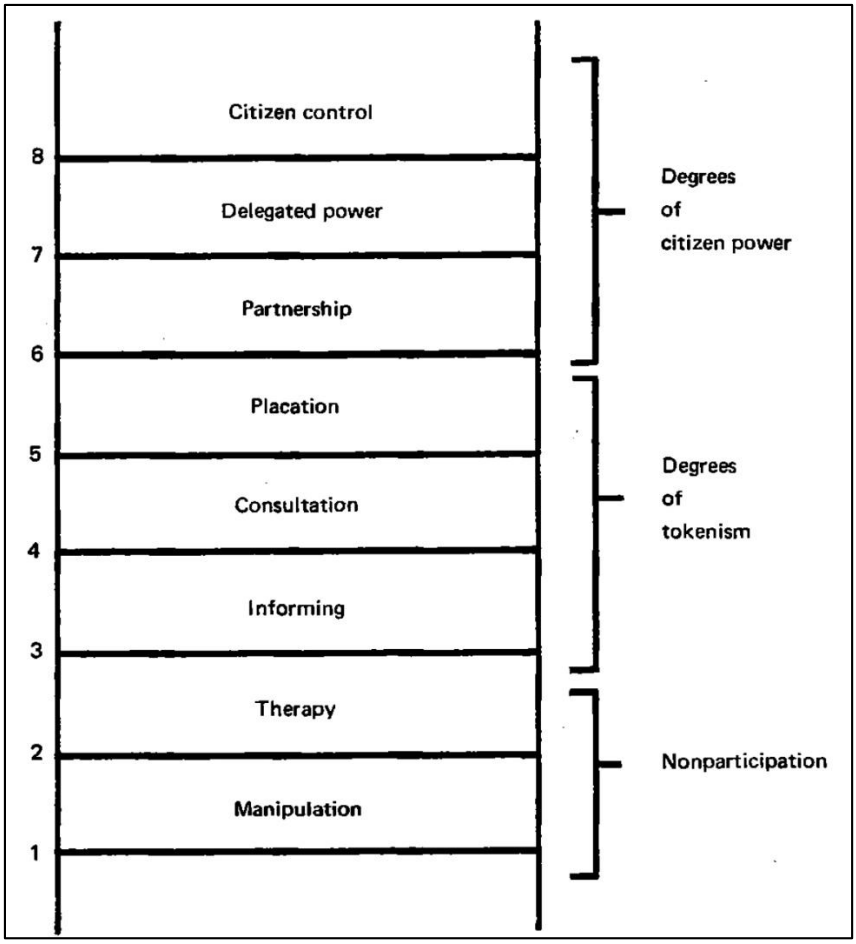


Figure 3: Steps of citizen participation

Source: Arnstein (1969) and Ringholm (2018).

1. Manipulation

This first step represents the minimal degree of citizen involvement and is essentially a form of non-participation. It typically takes place in environments like citizen advisory committee meetings, where officials influence public opinions rather than allowing community input to guide decision-making

2. Therapy

This second step of therapy involves assigning responsibilities to citizens to drive change independently, rather than fully involving them in the decision-making process.

3. Informing

The public is notified in advance, as early awareness of projects and plans is essential for effective participation and impact.

4. Consultation

This level is characterized by gathering public feedback, engaging them in the decision-making or planning process through consultation

5. Placation

At this level, citizens begin to exert some influence, although the circumstances are often less than ideal.

6. Partnership

At this level, power is distributed through negotiations between citizens and stakeholders.

7. Delegated power

At this level, the public has primary decision-making authority over a plan. This scenario is uncommon and usually involves a group of highly committed citizens.

8. Citizen control

This level represents the highest level of authority citizens can attain, where they have complete control over a plan and can set the terms for any external modifications.

6. Case Studies

This section explores different case studies where native landowners have experienced both the benefits and challenges of land conversion due to urban development. The case studies highlight diverse global examples, ranging from successful land development projects to cases of forced displacement and inadequate compensation. Each case study provides valuable lessons on how policies and planning strategies can either support or undermine native landowners.

6.1. Land Readjustment as a Win-Win Strategy: Case of Japan

Japan has effectively utilized land readjustment (LR) as a strategy for urban development, ensuring that native landowners retain ownership and benefit from urban development. Unlike traditional expropriation, where landowners may lose their property or receive inadequate compensation, Japan's LR approach allows them to actively participate in the (re)development process. Under this strategy, landowners contribute a portion of their land for infrastructure development and/ or development, such as roads, parks, and public services, and in return, they receive smaller but more valuable plots in a well-planned urban setting.

The process of land readjustment begins with the pooling land from multiple owners within a designated area. A portion of the collected land is then allocated for basic infrastructure, including roads, green spaces, and public utilities. Once these developments are made, the remaining land is reallocated to the original owners in a more organized and serviced form, enhancing both usability and land value. This method not only ensures that landowners maintain a stake in the urban site but also mitigates the risks of displacement and economic loss.

The outcomes of land readjustment in Japan have been overwhelmingly positive. Landowners benefit from significant increases in property value due to improved infrastructure and urban amenities. Additionally, cities experience better planning, enhanced public services, and more efficient land use, contributing to overall economic growth. Japan's success with land readjustment has positioned it as a global model for equitable land conversion. With over 30% of its urban land developed using LR techniques (Hayashi, 2000; Sorensen, 2000), the country demonstrates how strategic planning can balance urban expansion with the rights and interests of existing landowners. This approach provides a sustainable and mutually beneficial framework for urbanization, ensuring long-term economic and social stability.

6.2. Land Acquisition for Industrial Corridors: Case of India

India has witnessed several conflicts over land acquisition, where native landowners have been displaced without fair compensation. A notable example is the Narmada Valley Development Project, along with massive land acquisitions for industrial corridors in Maharashtra and Gujarat. this project, aimed at fostering economic growth and infrastructure development, have often come at the expense of local communities, raising concerns over displacement, inadequate compensation, and social justice.

One of the key issues in this project is the forced displacement of landowners, many of whom received compensation far below the market value of their land. This has led to widespread dissatisfaction, as the financial settlements failed to provide affected families with the means to rebuild their lives. Hence when legal battles and prolonged protests have emerged due to the absence of transparent and fair consultation processes. Many communities felt excluded from decision-making, with land acquisition proceedings often favoring government agencies and private developers over native landowners.

Furthermore, displacement has had severe socioeconomic consequences, particularly for farmers who lost their primary means of livelihood. Many struggled to adapt to urban settings, facing difficulties in securing stable employment and housing. The shift from agricultural life to uncertain urban labor often resulted in economic insecurity and social alienation.

Despite India's rapid economic expansion, these cases underscore the risks of land conversion when policy frameworks fail to prioritize the rights and well-being of native landowners. The lack of proper safeguards and equitable compensation mechanisms not only disrupts traditional communities but also fuels long-term resistance and instability in affected regions.

6.3. Gentrification and Socio-Economic Exclusion: Case of São Paulo

In São Paulo, large-scale urban renewal projects have significantly contributed to gentrification, particularly in historically working-class neighborhoods. One such example is the Jardim São Francisco project, which aimed to modernize the urban landscape but ultimately led to widespread displacement of low-income families. As property values rose, rent and living costs sharply increased, forcing many long-term residents out of their communities. Native landowners, many of whom lacked economic stability, faced social exclusion as they could no longer afford to remain

in their ancestral homes. This case exemplifies how urban development, while beneficial to investors and high-income groups, often marginalizes long-standing residents who lack the financial resources to adapt to these changes. The rising cost of living, coupled with the privatization of public spaces, has further deepened economic inequalities, limiting access to basic services and opportunities for affected communities.

6.4. Strategies for native land owners to cope with challenges driven by land use conversion alongside the urban development: Theoretical frames

Urban expansion often disrupts traditional land use and ownership patterns, posing significant challenges for native landowners. To address these impacts, various theoretical frameworks support the development of coping measures that promote equity and sustainability. These theories guide policy and planning to ensure that landowners can adapt, benefit, and participate meaningfully in the urbanization process. Key among them are theories of land tenure security, sustainable development, and participatory planning. Understanding these frameworks is essential for creating inclusive and resilient urban environments.

6.4.1. Adaptation Theory

The adaptation theory provides a framework to understand how individuals, groups, and ecosystems respond to changing environmental, social, and economic conditions. Central to this theory is the concept of resilience, which emphasizes the ability to adjust and prosper despite external pressures (Seto et al., 2012) .

Land use conversion and urban development create economic opportunities for native landowners through land sales, leases, or partnerships in development projects. These financial gains enhance adaptive capacity by providing resources for education, healthcare, and improved living standards However, effective mechanisms are needed to ensure that these benefits are equitably distributed among native populations (Uwayezu & Bayisenge, 2021).

When native landowners lose their land due to urban expansion, they face landlessness, a critical driver of poverty and vulnerability. Adaptation theory suggests that displaced populations require targeted interventions to rebuild livelihoods and adapt to new circumstances (Sietchiping, 2019). To ensure sustainable and equitable development, urban planning and agricultural conversion must prioritize adaptation strategies. These include participatory governance, secure land rights, and environmentally sustainable practice

6.4.2. Livelihood Theory

In urbanization environments, native landowners frequently shift considerable alterations in their livelihood strategies due to land use conversion from agricultural or community property to commercial, residential, or industrial uses (Chambers & Conway, 1992).

For native landowners, urban expansion presents both opportunities and challenge land conversion can provide economic benefits through land sales or rental income and it can disrupt traditional ways of life and marginalize those who lack formal land tenure security (Scoones, 1998).

The access to credit, legal recognition of land rights, and inclusion in urban planning processes are crucial factors in determining whether native landowners benefit from urban expansion in adopting multiple sources of income, such as engaging in business, formal employment (Ellis, 2000). Sustainable urban policy should prioritize securing land tenure, supporting inclusive decision-making, and offering alternative livelihoods to displaced landowners (Rakodi & Lloyd, 2002).

7. Over view of Urbanization in Rwanda

Urbanization in Rwanda has accelerated over the past two decades, driven by rapid population growth, economic transformation, and national policies promoting planned urban development. The country's Vision 2050 and National Urbanization Policy aim to achieve balanced regional growth through the development of secondary cities and improved infrastructure. This process has transformed rural landscapes into emerging urban centers, reshaping land use patterns and livelihoods.

Law No. 10/2012 of 02/05/2012, which regulates urban planning and building in Rwanda, classifies urban settlements into three categories based on population size. According to this regulation, urban areas with at least 200,000 inhabitants are designated as cities; those with populations between 30,000 and 200,000 are municipalities; and settlements with populations ranging from 10,000 to 30,000 are classified as agglomerations (Republic of Rwanda, 2012).

Based on this framework, the Urban Planning Code (UPC) of 2015 further refines these definitions: Kigali is identified as the capital city, serving as the national urban center with functions, services, and facilities of national and international importance. Secondary cities are

defined as sub-national centers located within secondary city districts, providing services and facilities that influence both the district and surrounding areas.

District towns refer to the main urban centers in districts not designated as secondary cities, acting as urban functions and public services for the entire district. Trading centers are described as supplementary centers to the main urban areas within a district (Republic of Rwanda, 2015b).

Table 2:Classification of Urban Areas as per the National Land Use Development Master Plan

Urban Category	**Population (1000'S)**	**Density Pop/Km²**	**Gross boundary Size Km²**
Kigali City	3- 3.8 M	9000- 10,000	220- 380
Satellite Cities	650 - 1000	8,000 - 9000	65 - 100
Secondary Cities	250- 650	7,000- 8,000	40 - 65
District Towns	100- 250	6000- 7,000	10-40
Rurban Settlements	20- 100	<6000	< 10
Umudugudu	<2,200	<4000	<1

Source: (Government of Rwanda, 2021)

Rwanda's urban system is dominated by Kigali, both demographically and economically. City of Kigali is the only major urban centre (primary city) in Rwanda, and consequently faces increasing pressures. Kigali is Rwanda's main urban centre that has been economically and politically polarized. It is accounting for more than 70% of industrial activities; about 50% of the wholesale businesses and 70% of the banking services, ministries, and others. This makes Kigali the ultimate destination for the majority of immigrants where it is believed to host 48% of Rwanda urban dwellers outstripping the capacity of city planners resulting in more than 70% of urban population to live in unplanned areas (Hitayezu et al., 2018).

Kigali faces inadequate availability of housing and increasing basic infrastructure backlog. It alone cannot absorb all the rural-urban demographic migration. As the primary city of Rwanda's urban hierarchy Kigali must be carefully integrated into the national urban system socially, economically and spatially.

To address this imbalance and reduce primacy of Kigali, the government has prioritized the development of six secondary cities likeHuye, Muhanga, Rusizi, Nyagatare, Rubavu, and Musanze as regional growth and investment centers. Looking ahead, urbanization prospects include the development of satellite cities such as Muhanga, Bugesera, and Rwamagana, which are projected to reach populations between 800,000 and 1 million. These cities are intended to support growth poles and ease pressure on Kigali.

8. Legal and policy framework of LR in Rwanda

Rwanda's legal and policy framework for land reform is designed to ensure equitable access, secure tenure, and sustainable land management.

8.1. National Constitution

The Constitution of Rwanda 2003, as amended in (2015) provides a strong foundation for safeguarding the rights of native landowners. Articles 6, 11, 34, 35, and 48 guarantee every citizen the right to own, acquire, transfer, and use land. These provisions emphasize not only the protection of property/ land rights but also the active participation of citizens in shaping the development on their land. Importantly, the Constitution promotes homegrown solutions tailored to local needs, ensuring that development initiatives respect and address the concerns of native communities (Republic of Rwanda, 2015a)

8.2. Rwanda's Vision 2050

Vision 2050 sets an ambitious goal for Rwanda, aiming for 70% of the population to live in urban areas by 2050. For native landowners, this vision offers significant opportunities, as it seeks to expand access to affordable and decent housing, modern infrastructure, and quality services. Vision 2050 prioritizes urbanization that leverages agglomeration effects to stimulate economic growth while preserving local interests. It focuses on smart and green cities, improved mobility, and sustainable energy supply by fostering inclusive urban growth, Vision 2050 ensures that native communities are not marginalized but instead become key beneficiaries of Rwanda's urban development(Government of Rwanda, 2020).

8.3. National Strategy for Transformation (NST2)

The National Strategy for Transformation (NST2) outlines Rwanda's plan to raise urbanization levels from 18.4% in 2017 to 35% by 2024, while prioritizing the inclusion of native landowners in urban growth. NST2 calls for updated Master Plans that integrate citizen participation and

partnerships, ensuring that local communities are engaged in development decisions affecting their land. It also promotes the use of locally produced construction materials under the "Made in Rwanda" initiative, creating economic opportunities for landowners (MINECOFINE, 2024)

8.4. National Urbanization Policy (NUP) 2025

The National Urbanization Policy (NUP) seeks to promote sustainable urban development that supports economic growth while improving the quality of life for all citizens, including native landowners. It addresses key urbanization challenges such as land-use disorder, uncontrolled urban sprawl, environmental degradation, and informal settlements.

The NUP is structured around four pillars coordination, densification, conviviality, and economic growth each providing a framework for managing urban development. Particular relevance to native landowners, Pillar 2 encourages sustainable land use through efficient land subdivision and re-plotting, promoting land readjustment to maximize land value while retaining ownership. Pillar 3 focuses on social inclusion, advocating urban upgrading projects to improve living conditions of every citizen. These measures empower native landowners by integrating them into formal urban development processes while safeguarding their land rights (MININFRA, 2025)

8.5. National Housing Policy (NHP)

The National Housing Policy supports pro-poor and inclusive housing initiatives that directly benefit native landowners. It promotes incremental in-situ upgrading, where landowners improve their properties gradually, and densification, which increases land value while optimizing space. The policy recognizes self-construction as a cost-effective way for landowners to develop affordable housing, and it provides for government support through infrastructure provision, financing schemes, and technical assistance. Furthermore, it encourages mixed-use urban design and environmentally friendly layouts to enhance property value and livability. A critical tool within this policy is land readjustment, which enables native landowners to voluntarily pool their land with others or work with developers to overcome challenges posed by small plots, thus facilitating sustainable urban growth without displacing landholders (MININFRA, 2008)

8.6. Land readjustment as the case of Rwanda

Land readjustment in Rwanda has emerged as a strategic tool to address challenges of rapid urbanization, fragmented land parcels, and unplanned settlements National Land Authority (2021). these guidelines play a key role in facilitating equitable urban land development in Kigali by encouraging collaboration between landowners, planners, and local authorities with increasing demand for land in cities such as Kigali and secondary urban centers, the government has recognized the need to reorganize and consolidate land for orderly development (Uwayezu & Bayisenge, 2021).

The approach involves pooling small and irregular parcels of land, servicing them with infrastructure, and redistributing them in a more planned and equitable manner while maintaining the rights of original landowners emphasizes that the guideline strengthens participatory approaches in urban planning, thereby protecting landowners' rights and enhancing tenure security (Twagirayezu, 2022).Land readjustment has been applied to promote affordable housing projects, improve road networks, and allocate land for public services, while also ensuring that private owners retain a share of redeveloped plots. This mechanism has proven useful in overcoming the resistance often faced in compulsory land acquisition by ensuring landowners benefit from the increased value of reorganized land.

Those guideline supports land value capture mechanisms and affordable housing initiatives in rapidly urbanizing areas. Together, these studies demonstrate that the Land Readjustment Guideline has become a cornerstone for sustainable urban development and effective land governance in Rwanda. support sustainable urban development, land value capture, and affordable housing and is shaping orderly planning and participatory urban expansion.

8.7. Analytical frameworks

According to Seto et al., (2012), the conceptual framework for understanding the benefits and problems of agricultural land use conversion in the context of urban growth for native landowners takes into account a variety of factors that influence land ownership, usage, and adaptation to urbanization. The framework integrates major elements of land rights, socioeconomic repercussions, environmental changes, and policy influences, underpinned by theories of adaptation and sustainable development (Liu et al.**,** 2010**).**

The following graph describes the analytical framework that will be used in this study. It shows that this study will rely on key concepts namely: land use conversion, Urban development, Benefits and Challenges of land conversion along urban development. The agricultural land conversion along urban development going through different process namely: developable land is converted into the residential use, after this conversion, the Land plotting and provision of the basic infrastructure and services followed (Uwayezu & Bayisenge, 2021; Zhang et al., 2023).

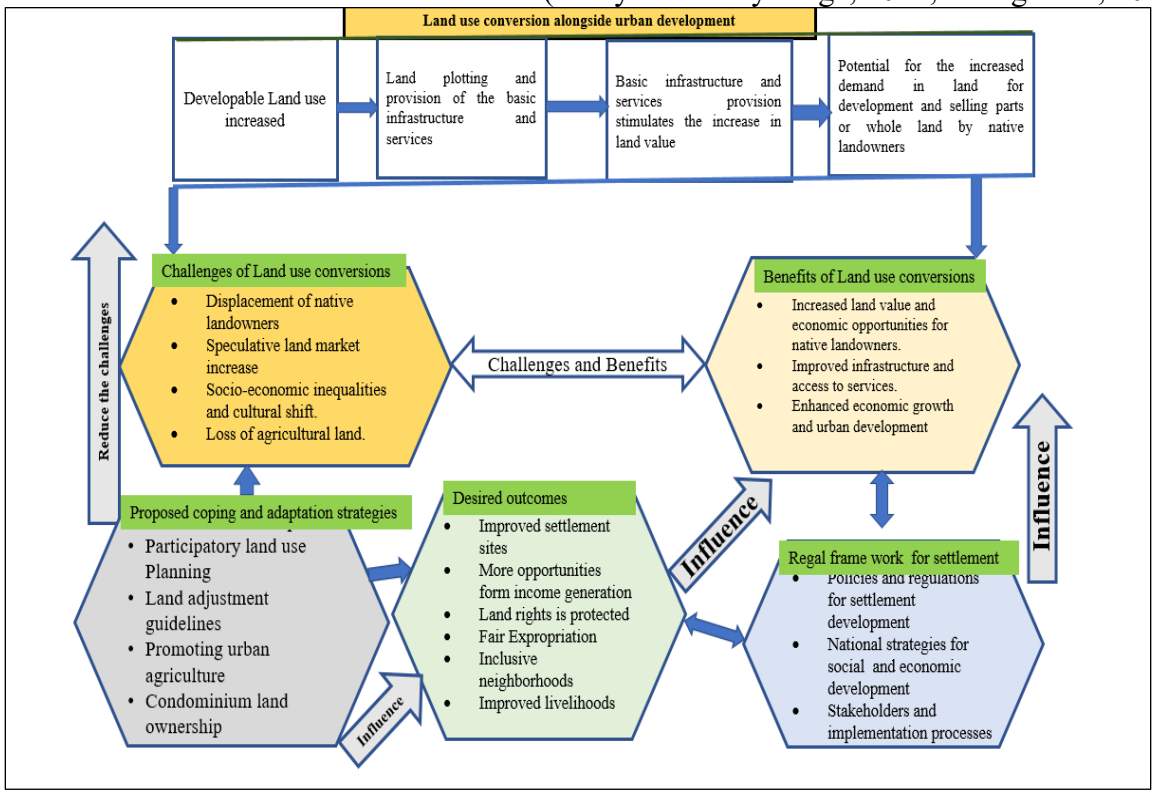


Figure 4: Analytical Frame work for land use conversion alongside urban development

Source: Adapted from: Government of Rwanda, (2021); MININFRA, (2025); United Nations, (2015); Uwayezu & Bayisenge, (2021).

The demand for development make some native landowners opt to sell part or whole of their land due to high price of land or unable to comply with new zoning regulations as mentioned in the previous section of introduction and problem statement. The framework is comprised of five components: Drivers include factors such as population growth, economic development, and urbanization that influence land use change; Pressures are direct consequences such as deforestation, agricultural land conversion, and urban sprawl; and State represents the current state of land resources, such as declining soil fertility or loss of natural habitat (Gessesew, 2017).

Rapid urbanization in Rwanda puts pressure on native landowners, causing them to migrate or change their land usage, potentially disrupting livelihoods which environmental such as soil erosion and water scarcity frequently accompany land degradation, demanding appropriate mitigating measures (Nkurunziza & Karangwa, 2018). This framework can help policymakers can identify priority areas for intervention and implement adaptive strategies to promote equitable land use conversion while protecting native landowners' rights (REMA, 2021)

CHAPTER THREE: MATERIALS AND METHODS

3.1. Introduction

This chapter provides a detailed description of the study area and outlines the various methods that were employed to collect and analyze data in alignment with the research objectives. It offers insight into the specific approaches and techniques used to address the objectives presented in Chapter One. Therefore, it discusses the data collection methods and identifies the sources from which both primary and secondary data were obtained.

3.2. Research design

This research relied on an evaluative framework with measurable indicators to systematically guide the study and address the research objectives. To apply this framework, data was collected from diverse sources, including scholarly articles, government policy documents, reports, master plans, and other relevant materials. A mixed-methods approach was employed, integrating both quantitative and qualitative techniques to collect and analyze data. The quantitative data were collected from native landowners residing in Rilima Sector with responses recorded numerically

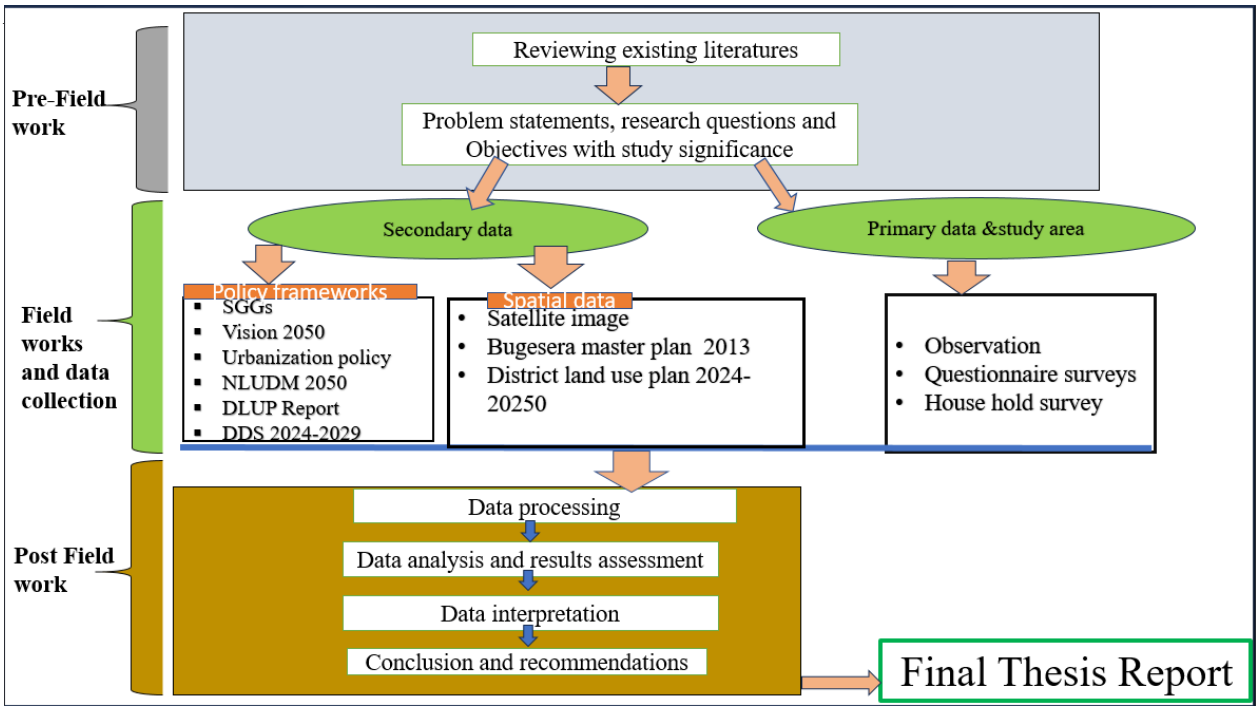


Figure 5:Research design

Quantitative data included variables such as land value changes, displacement rates, and access to urban infrastructure. To complement these findings, the study will also employ qualitative

methods, including semi-structured interviews with local leaders at cell and land manager at sector level and members of the One-Stop Center at district level.

Data analysis was based on transcribing all interview recordings, followed by coding for qualitative data and statistical summarization for quantitative responses. Spatial data analysis and visualization of land use changes between 2017 and 2025 were conducted using ArcGIS, offering geospatial insights into the patterns and extent of land use conversion in the Rilima Sector.

3.3. Study area description

This study was conducted in Rilima Sector which is one of the 15 sectors of Bugesera district. It is located in 02°09'35.0"S, 30°13'31.0"E (Latitude: -2.159722; Longitude:30.225278) with 81.48 sqm size and altitude of 1,394. It is composed of five cells namely: Kabeza, Karera, Kimaranzara, Ntarama and Nyabagendwa (NISR, 2015). The study area is geographically defined within Rwanda's administrative boundaries and is visually illustrated in the map below:

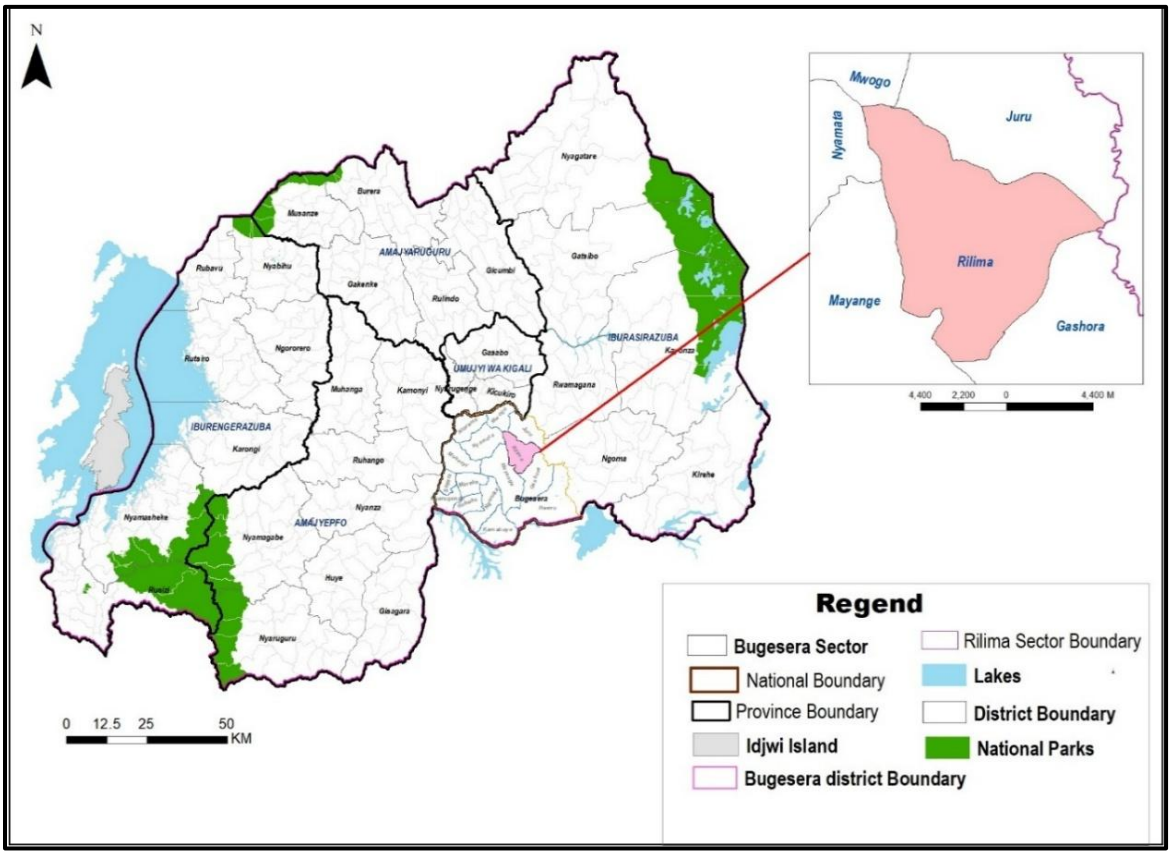


Figure 6: Spatial Location of Rilima sector

Data source: NISR,2022

3.3. Sampling, data collection and analysis methods

Sampling, data collection, and analysis methods form the backbone of any scientific research process. These methods determine how data is selected, gathered, and interpreted to answer research questions and test hypotheses. A well-structured approach ensures the reliability, validity, and credibility of the findings. The choice of methods depends on the study objectives, nature of the data, and the target population. In this section, the research outlines the sampling techniques, data collection tools, and analytical procedures employed.

3.3.1. Sampling techniques

The study employed a mixed sampling approach. Purposive sampling used to select key informants, specifically Land Manager at the sector level and members of the One-Stop Center at the district level. These individuals chosen due to their expertise and direct involvement in land use conversion processes. The information obtained from these key informants focused on aspects such as compensation procedures, the displacement of native landowners from their original parcels and their relocation, as well as the protective measures implemented to protect native landowners from the challenges associated with land use conversion as aligned with the indicators in table 2 of evaluative framework.

In parallel, stratified random sampling was applied for the household surveys to capture the diverse experiences of native landowners. Stratification will ensure the inclusion of two distinct groups: (1) native landowners who have retained their agricultural land and (2) those who have converted their land for urban purposes. This approach will help reflect the varied impacts of land use conversion within the study population. Rilima Sector, has **7317** households (NISR, 2022). Study area was clustered into 3 categories namely highly urbanized (Nyabagendwa), Medium (Kabeza Cell) and low urbanized Kimaranzara Cell marked the total population of **2608** in order to collect data with meaningful purposes.

The following formula, which was created for choosing samples from a limited population, will be used to determine the sample size for this study (Cochran, 1963).

$$n = \frac{z2 * p(1-p)/e2}{1 + (z2 * p(1-p))/z2 * N}$$

Where:

Z is the being the value assigned for the confidence level of 95%, with 1.96 as a confidence level score;
p = the desired proportion for the sample size n, which is 0.5;
e = the marginal error (10% in this study);
N = population size of 2608 (for the whole study area).
Therefore, the sample size for this research study will be 300 households and will be distributed in the study area using the following calculation:

$$\text{Sample for each cell} = \left(\frac{\text{Households in Cell}}{\text{Total Households}}\right) \times \text{Total Sample Size}$$

Table 3:Sample distribution in the study area

Cell Name	Villages	Total Households	Sample Size
Kabeza	Gako	121	14
	Gitega	243	28
	Kagarama	191	22
	Subtotal	**555**	**64**
Kimaranzara	Amizero	222	26
	Buhoro	246	28
	Subtotal	**468**	**54**
Nyabagendwa	Mataba	370	43
	Mubuga	133	15
	Mukoma	297	34
	Murambi	404	46
	Nyabagendwa	381	44
	Subtotal	**1585**	**182**
Total	**Grand total**	**2608**	**300**

***Source**: NISR, 2022*

In addition to purposive and stratified random sampling, snowball sampling was applied to reach to displaced landowners who were difficult to identify through conventional means. This non-probability sampling technique involves initial participants referring the researcher to other individuals who fit the study criteria. It was particularly effective in locating landowners who had relocated from Rilima due to land conversion but were still relevant to the study.

Snowball sampling allowed the researcher to access hidden or hard-to-reach populations, including those who might have experienced displacement, unfair compensation, or marginalization during the urban expansion process.

The snowball sampling method was employed, beginning with the identification of an initial native landowner who agrees to participate in the survey. This first participant was then provided contact information for other native landowners they know. The process was started by interviewing the initial landowner, after which additional participants were approached based on the referrals provided. This referral chain continued until sufficient and relevant information has been collected for the study. To ensure diversity and representation among participants, the referrals was regularly reviewed and analyzed to detect any emerging patterns or biases.

3.4. Data collection

This study employed a mixed-methods approach to investigate the barriers and benefits of land use conversion and urban development for native landowners.

3.4.1. Secondary data collection

This data was collected through different sources including: government publications, land use policies, and academia contextualize findings within broader historical and policy frameworks. Satellite imagery of Rilima sector land use and land cover change datasets were used to determine trends and quantify the extent of land use conversion from 2013-2024 hence used to Geographic Information Systems (GIS) and evaluate patterns of land use change over time between Bugesera master plan 2013 and District Land Use Plan 2024 (Government of Rwanda, 2021), This provided visual evidence of urban expansion and quantify the land use changed and help to inform decision makers.

3.4.2. Spatial Data Collection

Geospatial data is used to map land use changes, identify patterns visualize areas impacted by urban expansion. ArcGIS and Google Earth Pro are used to analyze satellite imagery and overlay land use layers and apply different spatial query.

3.4.3. Primary data collection

3.4.3.1. Household surveys

Household surveys were conducted using structured questionnaires administered to a sample of 380 native landowners selected through stratified random sampling (see section 3.3 sampling technics) across the five cells of Rilima Sector: Kabeza, Karera, Kimaranzara, Nyabagendwa, and Ntarama. The questionnaires collected quantitative data on several variables (as detailed in table 2 of analytical framework), including changes in land value before and after conversion, access to newly developed infrastructures and services, shifts in employment from agriculture to off-farm activities, experiences of displacement or resettlement, and perceptions regarding the fairness of land development regulations.

Surveys were conducted through face-to-face interviews to ensure comprehension, especially assisting respondents with low literacy levels. It is expected that the survey results provided statistical insights, including the percentage of landowners who experienced land value appreciation, the proportion displaced versus those who remained, levels of access to new infrastructures, and patterns of employment transitions among native landowners.

Interview also was done with the displaced landowners. Focused interviews with these displaced landowners to explore their experiences with compensation, their post-displacement living conditions, and the challenges they have faced since relocation. The expected results include first-hand insights into the long-term socioeconomic effects of displacement, including both negative experiences and success stories of adaptation and recovery

3.4.3.2. Key Informant Interviews(KIIs)

This method was carried out using semi-structured interview guides with selected officials using purposive. Interviews was targeted the Land Manager at Rilima Sector and staff members of the One-Stop Center at Bugesera District. The interviews focused on institutional practices about compensation, expropriation, and the protection measures in place for native landowners. The expected outcomes from KIIs include rich, descriptive narratives that reveal institutional challenges, gaps in policy effectiveness, and the transparency of urban development processes. Furthermore, these interviews are anticipated to uncover both systemic strengths and weaknesses within the management of land use conversion.

3.4.3.3. Field observation and Measurements

Field observations and measurement was undertaken to systematically document and measure visible physical and within Rilima. This method focused on identifying new infrastructure developments and the physical condition of converted lands. Tools such as GPS devices will be used to georeferenced key features, while cameras will capture photographic evidence, supplemented by field notes.

3.5. Data analysis and interpretation

Data analysis for this study followed a systematic and integrated approach, combining both quantitative and qualitative methods. The analysis was organized around the evaluative framework indicators and the DPSIR (Drivers-Pressures-State-Impact-Response) model to capture the environmental and socio-economic dynamics involved. For the quantitative analysis, responses from the 380 household surveys will be entered into Microsoft Excel for cleaning, coding, and organization. Descriptive statistics, including frequencies and percentages was used to summarize key variables such as land value appreciation, displacement rates, employment transitions, and access to urban infrastructure.

Spatial data on land use and land cover changes between 2017 and 2024 were analyzed using ArcGIS software. The analysis involved satellite imagery and land use classifications to quantify land conversion rates and produce thematic maps illustrating patterns of urban expansion. For the qualitative analysis, semi-structured interviews with key informants (sector land manager and district one-stop center officials) and narratives from displaced landowners will be transcribed and manually coded. This transcription will be based on themes such as compensation fairness, land tenure security, socio-economic impacts of relocation, and regulatory challenges.

Furthermore, GIS-based spatial analysis was integrated with survey and interview results to map land use changes against the experiences of native landowners, identifying specific zones where positive or negative impacts are concentrated. The DPSIR model were also be systematically applied to interpret the findings, identifying key drivers of change (e.g., population growth), pressures (e.g., land commodification), changes in the state (e.g., loss of agricultural land), impacts (e.g., displacement), and potential policy responses.

CHAPERT FOUR: RESULTS AND DISCUSSION

4.0. Introduction

This section presents and critically discusses the research findings in relation to the specific objectives of the study. The objectives were designed to examine both the benefits and challenges experienced by native landowners as a result of land use conversion alongside urban development in Rilima Sector. The findings provide empirical evidence and insights that illuminate how urban expansion affects land tenure, livelihoods, and socio-economic opportunities for local communities

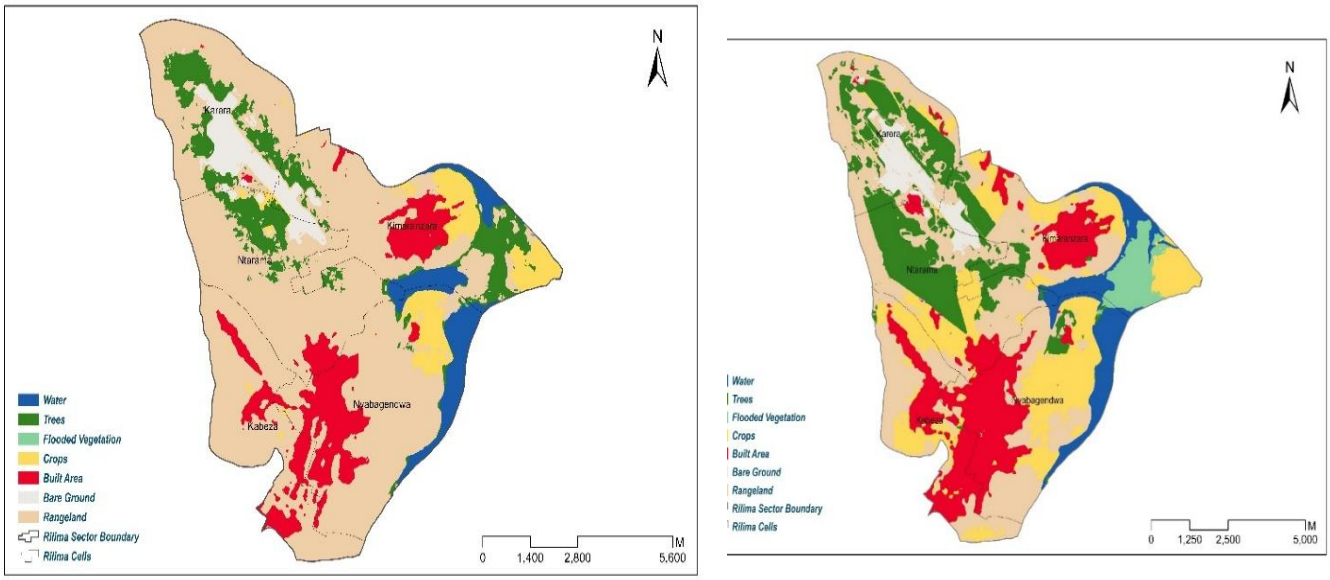
Table 4: Indicators applied in evaluating the likelihood for land owners to comply with land use conversion

Variables	Evaluative indicators	Recorded percentage
Participation	Consultation and consent from native landowners in spatial planning	80.1%
	Housing standards are established based on inputs provided by the local community	82.3%
Access to economic opportunities	% increase in households engaging in non-farming income activities	28.8%
Displacement and resettlement	% of landowners displaced by selling after the land use conversion	23.8%
	% of landowners who remained in the same site after the land use conversion	76.2%
	% displaced households experience improvement in living conditions	71.4%
	% displaced households experience deterioration in living conditions	28.6%
Access to infrastructures	% of landowners with access to infrastructure and social amenities	87.4%

Source: Field survey, May 2025

The findings presented in Table 3 indicate that land use conversion, driven by Rilima's urban development, has brought certain benefits, including improved access to infrastructure, increased land value, and a rise in the number of households engaged in non-farming activities. However, the findings also reveal that some native landowners were unable to adapt to the changes in the converted areas, leading them to sell their land and relocate to other places. Thus, they cannot enjoy the benefits brought by urban development.

A comparison between the LULC map of 2017 and 2024 reveals that the proportion of built-up land in Rilima rose sharply from 10% to 16.6% of the total sector area. This spatial development has been most undertaken in the cells of Kabeza, Nyabagendwa, and Kimaranzara, which have experienced the highest levels of built-up area expansion, portraying the rapid pace of land use conversion for urban development as the figure 4.1 below shows:



a) Land Use Land Cover in 2017 b) Land Use Land Cover in 2024

Figure 7: Land use land cover of Rilima sector

Data Source :[*https://earthexplorer.usgs.gov/*](https://earthexplorer.usgs.gov/)

In addition to the population and built-up area expansion criteria, interviews with One Stop Center staff provided further insight, confirming that urban development in Rilima has started in 2017. A deeper analysis reveals this Rilima's urban growth is closely linked with the national vision to transform Bugesera District into a logistics and airport hub which Strategically positioned at the eastern gateway of Kigali, Rwanda's capital, Bugesera District.

4.1. Benefits of Land Use Conversion for Native Landowners

Land use conversion in Rilima Sector, Bugesera District, has introduced significant transformations in how native landowners utilize and benefit from their land. The shift from predominantly agricultural or vacant land to residential, commercial, and institutional uses has brought both opportunities and adjustments to the local population.

Analysis of field data and interviews conducted with native landowners reveals that the conversion process has generated multiple socio-economic benefits. These include an increase in land value, improved access to infrastructure, new employment opportunities, legal land tenure security, and enhanced living standards. The following sections discuss these findings in detail, beginning with the impact on land value and wealth creation.

4.1.1. Increase in Land Value and Wealth Creation

Land use conversion in Rilima has significantly increased land value for native landowners, especially in areas reclassified for residential and commercial purposes. Many have sold portions of their land at high prices, enabling them to invest in other economic activities.

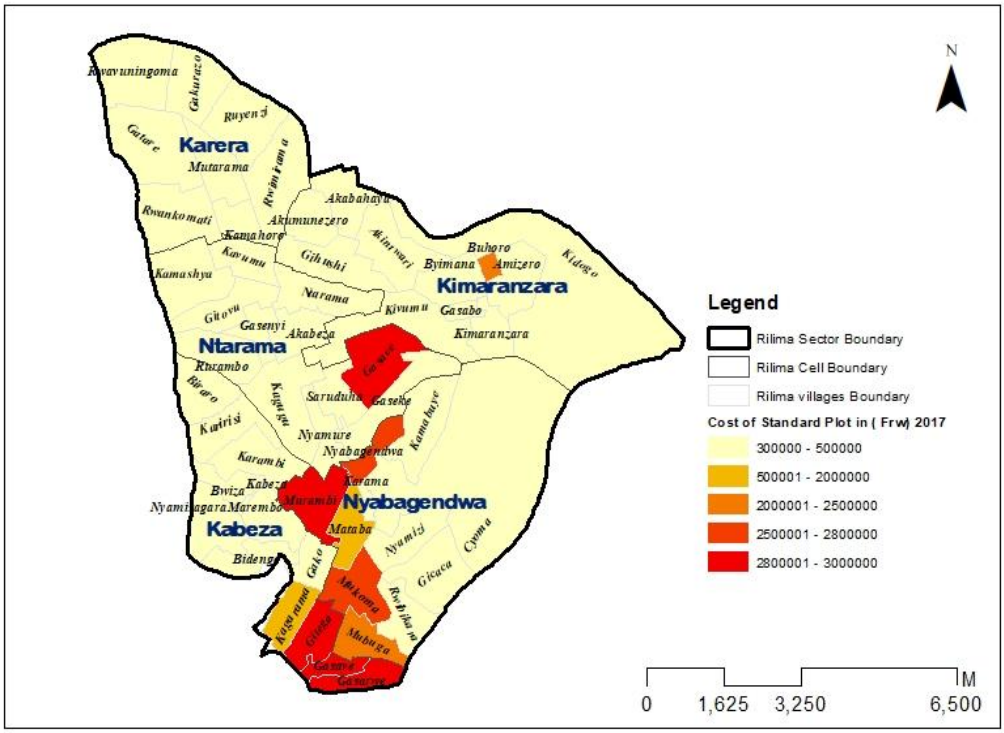


Figure 8: Land value in price in Rilima in 2017

Data source: Field survey, May 2025

The comparison shows a significant increase in land values in the Rilima Sector between 2017 was at low value, and The graph illustrates the variation in land prices across different cells in Rilima Sector in 2017. It shows that areas like Gasave, Gasarwe, and Nyabagendwa had significantly higher land prices, with values ranging above 3 million Rwandan francs, while most other areas maintained relatively low prices. This disparity reflects the influence of location, accessibility, and proximity to infrastructure or development zones.

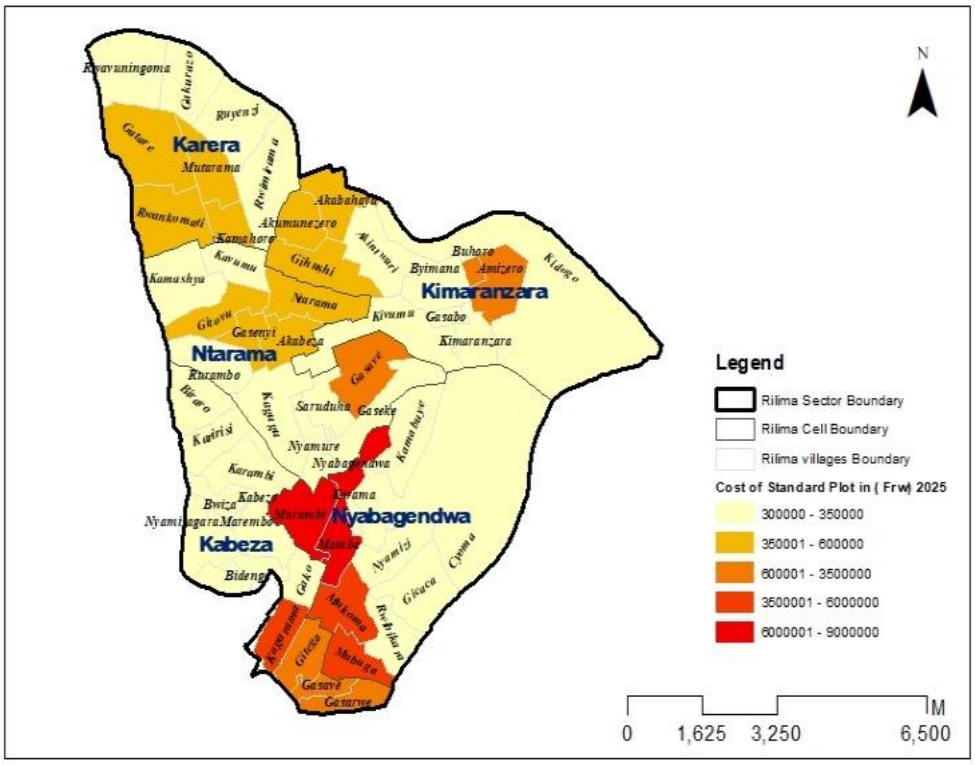


Figure 9: Land value in price in Rilima in 2025

Data source: Field survey, May 2025

This rising land values indicate increasing demand and urban expansion, offering native landowners the opportunity to benefit economically through land sales, lease agreements, or investment in real estate. Such appreciation in land value can enhance household income, stimulate local economic activity, and support long-term development goals aligned with Rwanda's Vision 2050.

Land use conversion in Rilima has significantly increased land value for native landowners, especially in areas reclassified for residential and commercial purposes. Many have sold portions of their land at high prices, enabling them to invest in better livelihoods. For example, one landowner in Gako village stated:

"I sold a small part of my land for RWF 1 million. I used the money to renew my house which was very old.

Figure 10: House constructed of Native landowners in Rilima sector

Source: *Field visit, May 2025*

4.1.2. Access to Finance Services

According to information obtained from key informants, the high land value has provided significant financial benefits to native landowners. Some native landowners revealed that land use conversion has brought access to financial services The surge in land value enabled many households to use proceeds from land sales or leases as collateral, thereby qualifying for loans from banks and microfinance institutions. This financial empowerment facilitated investments in housing, small-scale businesses, and education.

One native land owner in Nyabagendwa village remarked *''Before the airport project and all these changes, we had land but no money. Banks never accepted our land as collateral, and traveling to the district bank was costly. We only relied on small savings groups to handle emergencies like sickness''*

There was observed in the diversification of financial behavior among landowners. Those who previously relied on informal savings groups (ibimina) increasingly opened bank accounts, accessed mobile banking platforms, and engaged with savings and credit cooperatives (SACCOs). Informants reported that households with better financial literacy were able to leverage these services for entrepreneurial ventures, particularly in transport, retail trade, and small-scale manufacturing.

Figure 11:Timber processing Rilima Sector

Source: Field visit, May 2025

This timber processing and storage site in Rilima Sector, reflecting a shift toward off-farm economic activities triggered by land use conversion and urban expansion. This enterprise benefits from rising demand for construction materials linked to Bugesera International Airport and surrounding urban area in Juru, Gashora and Mwogo sectors. Landowners who sold or leased their farmland have reinvested proceeds into such projects, diversifying income and reducing dependence on agriculture. The timber trade also generates employment opportunities for local youth, especially in processing, transportation, and sales.

The emerging of Trading centers such as Riziyeri, Nyabagendwa, Samuduha and Kimaranzara has been attracting financial service providers to the sector, reducing the previous dependence on distant banking facilities located in district headquarters. The findings align with broader studies in Rwanda that highlight the transformative impact of land value appreciation on financial inclusion. Nabahungu and Visser (2014) , witnessed that compensation from land conversion around Kigali improved household access to credit, enabling diversification into non-agricultural livelihoods.

Mukamana & Nyirahabimana (2019), found that increased financial capital among Bugesera households facilitated entry into small enterprises and enhanced resilience against shocks. These outcomes are in line with the objectives of the National Urbanization Policy and Vision 2050, which promote urban growth as a means of stimulating rural transformation and financial empowerment (Government of Rwanda, 2020; MININFRA, 2025).

4.1.3. Improved Access to Infrastructure and Services

The land use and land cover changes observed in Rilima Sector, particularly the expansion of built-up areas, reflect a broader trend toward urbanization and infrastructural development. The spatial transformation from predominantly rangeland and bare ground into built environments suggests significant improvements in access to infrastructure such as roads, electricity, water, and public services like schools and health centers. These developments are in line with Rwanda's National Strategy for Transformation (NST2 2024–2029), which emphasizes infrastructure development as a foundation for inclusive growth and urban resilience (MININFRA, 2020).

The shift from rural to mixed-use development has led to improved infrastructure such as paved roads, piped water, and health centers. For example, several households in Kimaranzara cell reported that since the area was targeted for development, their access to clean water and schools improved intensely. A Native land owner who live in Nyabagendwa explained: *"Before, we walked over an hour to reach the health center, but now the road has been upgraded and a new health post is nearby. We even get clean water through public taps"*.

Improved infrastructure has enhanced connectivity between Rilima and major urban centers, enabling better mobility, trade, and access to markets for local producers. Additionally, access to essential services has a direct impact on social wellbeing reducing travel time to clinics and schools, improving public health outcomes, and promoting education. This aligns with Rwanda's

Vision 2050, which aspires to transform the country into a high-income nation through people-centered development and smart urbanization (GoR, 2020).

This infrastructure-driven land conversion contributes not only to economic development but also improves the living standards of residents in rapidly transforming rural–urban transition zones like Rilima.

Table 5: Access to basic amenities in Rilima sector

Indicators	**sub-indicators**	**Percent/Distance**
% of households (HHs) in the neighborhood have access to basic facilities and services	Percentage of HHs whose houses/plots have access to the road network	87%
	Percentage of HHs who have access to water supply networks in their premises or near their homes	89%
	The percentage of HHs who are connected to power grid in their premise	92%
	Distance to nearby nursery school and Early Childhood Development (ECD)	1000m-2000m
	Distance to a nearby primary school	1000m-3000m
	Distance to nearby health facility (private clinic)	1000m-3000m
	Distance to the nearby market and shops	1000m-2500m

Source: Field Visit, May 2025

Before land use change, Rilima was primarily rural, dominated by smallholder subsistence farming and informal land tenure systems. Settlements were scattered, with limited infrastructure and basic services (NISR, 2015). Land values were low, and planned urban development was largely absent prior to urbanization policies.

The above table presents the percentage of landowners with access to basic urban amenities and services, either directly on their premises or within proximity to their area. It also illustrates how the location of their plots and houses enhances their access to these amenities and services.

Aligned with the national urban planning framework, urban development in Rilima has prioritized the construction of new roads and the expansion of existing road infrastructure to enhance access to residential areas and plots. As a result, 87% of households now have direct access to the road network. Additionally, 89% of households have access to the water supply network, either within their premises or nearby.

These developments have made the area more accessible and livable, promoting local economic activity and attracting investment. Improved road connectivity, in particular, has facilitated easier transportation of goods and services, linking Rilima more effectively with other parts of Bugesera District and Kigali City.

Figure 12: Infrastructure availability in Rilima Sector

Source: Field Survey: May, 2025

To further improve water availability, the Bugesera District and its development partners have replaced the old water supply systems. Access to electricity has also significantly improved, with 92% of households currently connected to the grid. While this falls short of the 100% target set in the National Strategy for Transformation (NST2) by 2029, which guided the development of Rilima Sector.

The increase in land value depends on the plot's location within the area closer to infrastructure and services tend to have higher prices, as said by our respondents. Another factor influencing the price increase of the plots is related to the plot topography as most people prefer to buy plots with a moderate slope that are easy to access and develop.

4.1.4. Employment Opportunities

The land use and land cover changes in Rilima Sector, specifically the expansion of built-up areas, basic infrastructure provision, and reduction in bare and undeveloped land which reflect increasing urbanization, has been closely tied to the creation of employment and development of the income-generating activities. The development of basic infrastructure and facilities, including roads, markets, and health centers, alongside private investments in housing and commercial facilities, has driven the creation of both formal and informal job opportunities. A respondent from Mataba village shared: "*My sons used to depend on farming alone, but now they are working with construction companies and earning a regular salary".*

Figure 13: People participating in construction of house earning income

Data source: Field survey, May 2025

This has impacted positively on urban agriculture, land transactions, and rental income provide alternative sources of livelihood for native landowners. (helping to diversify rural incomes and reduce poverty. Furthermore, the Rwanda National Strategy for Transformation (NST2) identifies job creation as a key pillar for national development, aiming to create 1.5 million decent and productive jobs by 2024. Rilima's ongoing transformation is aligned with this strategy, as land conversion facilitates economic transition for native population for inclusive development.

4.1.5. Social Transformation and Improved Living Standards

Land use and urban expansion in Rilima Sector have contributed significantly to social transformation and improved living standards among residents. The introduction of public services such as improved road networks, electrification, water supply, education, and health facilities has reduced the rural-urban divide. Settlements in formerly isolated areas like Gasarwe, Nyabagendwa, and Kabeza have become more integrated into the regional economy, leading to better access to social services, employment, and housing.

In addition, landowners who benefited from compensation or sold land at higher market rates have used proceeds to improve their homes, invest in businesses, and afford better healthcare and education for their families.

One respondent argued "*Now I live in a modern house with electricity and nearby shops. My children go to school without walking long distances because are located within 500 meters.*

Social transformation in peri-urban and rural zones like Rilima is often catalyzed by urban-led development. Improved physical infrastructure fosters community cohesion, mobility, and service accessibility, which are key indicators of well-being. According to the World Bank (2019), urbanization in Rwanda has the potential to reduce poverty and boost shared prosperity if managed inclusively.

Moreover, the Rwanda Social Protection Strategy (2018-2024) emphasizes the role of spatial development in enhancing equity, particularly for vulnerable households. Urban expansion into rural sectors has provided new opportunities for social inclusion, especially where government and NGO programs support infrastructure delivery and local capacity building.

4.2. Challenges of Land Use Conversion for Native Landowners in Rilima Sector

Land use conversion in Rilima Sector has brought various socio-economic benefits, it has also introduced a range of challenges for native landowners, particularly those with limited financial resources or strong ancestral ties to the land. The transition from rural to urban or mixed-use zones has often disrupted traditional land use patterns, led to forced displacement, and placed new regulatory and financial pressures on landholders. Data collected through field interviews, focus group discussions, and analysis of previous studies in Rwanda reveal that many native landowners face difficulties adjusting to new zoning laws, affording modern housing requirements. The subsections below outline the most significant challenges experienced by affected communities in Rilima.

4.2.1. Speculative Land Market

Respondents reported that urban expansion in Rilima Sector had caused speculative land pricing, making it difficult for native landowners to retain or repurchase land once sold. One participant explained, "*Before our region was rural and land was primary agriculture, our land had no buyers; now, even a small piece is priced beyond what we can afford, and outsiders are the ones buying*". Another landowner stated, "We sold land cheaply thinking prices would not change, but now the value has tripled, and we cannot buy it back for farming or housing".

Such testimonies indicate that speculation has disproportionately benefitted wealthier investors while marginalizing original landholders he findings reveal that speculative pricing results from increased demand linked to large-scale infrastructure projects such as Bugesera International Airport. Similar dynamics were observed by Uwayezu and de Vries (2020), where land speculation led to inflated property values, excluding low-income households from urban land markets.

This aligns with Glen (2020), who emphasizes that commodification of land under modern urban frameworks often prioritizes market forces over social equity. Speculation also contributes to rapid land value escalation without corresponding improvements in local livelihoods. While landowners may gain immediate cash benefits from sales, long-term consequences include loss of agricultural income, inability to reinvest in land, and forced relocation to urban peripheries. that land speculation accelerates socio-spatial inequalities, especially where planning frameworks lack mechanisms to regulate price surges

The situation in Rilima reflects broader patterns seen across emerging African cities, where anticipated urban development creates “land grabs” by investors who capitalize on future infrastructure projects (Yiran et al., 2020). Without adequate policy controls such as land value capture or equitable compensation schemes—native populations remain vulnerable to dispossession and economic exclusion

4.2.2. Displacement and Loss of Ancestral Land

Field data from affected households in the Rilima Sector indicate that displacement and loss of ancestral land are among the most emotionally and socio-culturally disruptive challenges caused by urban expansion. Respondents reported having lost access to their inherited land, which they regarded not only as a source of livelihood but also as a core part of their identity, history, and community tie. This aligns with findings in Rilima, where dislocated families experienced increased social fragmentation and identity erosions.

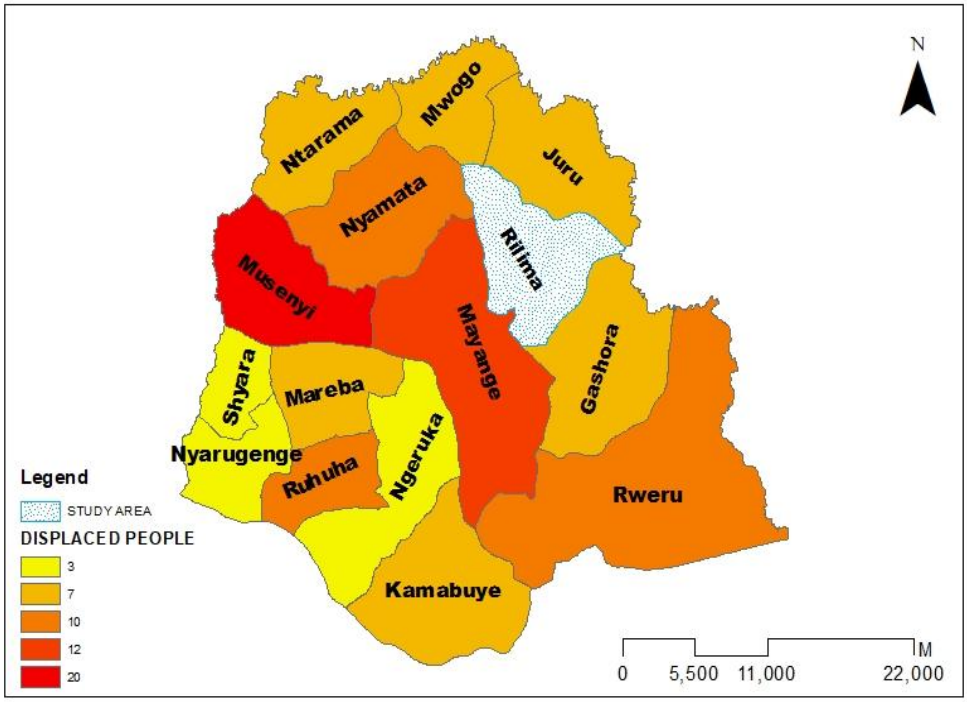


Figure 14: Number of displaced Households

Data source: ***Field Survey, May 2025***

The results reveals that Musenyi Sector experiences more displaced people compared to remaining sectors parts, possibly linked to urban development pressures and infrastructure expansion. The study area (Rilima), falling in the medium displacement category, indicates an active transition zone influenced by both urbanizations. patial inequalities and poor land governance pose significant barriers to achieving sustainable development. When resources and services are unevenly distributed, marginalized communities face limited access to opportunities and basic infrastructure. Weak governance often results in unclear land rights, disputes, and inefficient land use planning. This exacerbates poverty, encourages informal settlements, and fuels social tension

According to Musahara & Huggins (2015), displacement not only causes economic disruption but also threatens cultural identity and social networks, especially in rural Rwanda where land is a vital cultural and economic resource. The National Land Use and Development Master Plan (2020–2050) prioritizes urban and agricultural zones but may manage localized needs, triggering resistance or non-compliance in affected communities (Nsengimana et al., 2017).

Another factor that has positively affected the security of tenure in the study area is the combination of household income and land sale for new housing development. Still, 57% of landowners are poor and low-income people who cannot develop the introduced low-cost houses. Poverty is the main factor for non-compliance with the master plan. It perpetuates the displacement of poor and low-income urban landowners from their properties, which exhibits the pattern of tenure insecurity (UN-Habitat, 2021b).

4.2.3. Challenges in Complying with Zoning Regulations

Significant challenge in complying with zoning regulations in the Rilima sector, as demonstrated by the number of displaced individuals who were unable to adapt to relocation requirements. According to the chart, a total of 8 individuals across the three areas (Nyabagendwa, Kabeza, and Kimaranzara) failed to adapt after displacement. This figure reflects structural or systemic difficulties that hinder full compliance with zoning policies, particularly in Nyabagendwa, where 6 out of the 8 cases occurred. The data indicates that despite efforts to enforce zoning laws, not all affected populations have the resources or capacity to successfully adjust to new zones or regulations.

These are further reinforced by key legal instruments, including the Land Law (2021), the Prime Minister order of 2015 determining procedures for elaboration, approval and review of local development plan; the Ministerial order of 2015 determining the categorization of building and conditions and the procedure for demand granting building permit; the Prime minister order of 2015 determining the conditions for authorization to carry out real estate development operations; the Ministerial order of 2019 determining urban planning and building regulations in Rwanda.

In addition to these regulatory tools, several national policy documents provide strategic direction for urban development. These include the National Housing Policies of (2008), National urbanization Policy (2015), the National Land Policy (2019), the National Strategy for Transformation (NST1, 2017–2024), and Rwanda's Vision 2050. Abiding by this law has resulted in no collaborative land use planning, especially the establishment of the local land use development plans which are not aligned with landowners' land development capacities.

This was proved by the survey, even though 80% reported having participated and been consulted during land use planning. However, their participation was largely limited to attending informational meetings organized after the local development plans had already been designed. During these meetings, urban planners merely presented the designed and approved plans to the public and called upon landowners to comply with the plans. During the survey, some native landowners stated that:

‘*'These land use plans are theoretically flexible and adaptable by landowners during implementation, that is why the behavior of landowners toward these plans reflects resistance in implementation or non-compliance with land use plans"*

Regarding the theoretical involvement of the local community in the planning process, urban planners and decision-makers shared a similar perspective. They noted that the proposed land use plans were made accessible and disseminated through various channels, including displaying posters at sector and cell offices and sharing information during inteko z'abaturage (community meetings). They further mentioned that the limited planning knowledge and skills among the local community hinder their ability to challenge the proposed land use plans. The local community generally lacks a clear understanding of the planning processes, their different levels, and the implications of various land uses, making it difficult for them to predict the potential impacts.

At this point, survey findings reveal that 23.8% of landowners were displaced due to non-compliance with the urban development plans. These landowners expressed concern that the urban development process contributed to their displacement, particularly as rising land values pressured them to sell their plots. They further noticed that as urban development continues, many native landowners have expressed intentions to eventually sell their residential plots and move elsewhere in favour of the middle and high-income groups who can develop the bought land through modern housing construction (Coulibaly & Li, 2020).

4.2.4. Challenges of Complying with Housing Development Standards for Low-Income People

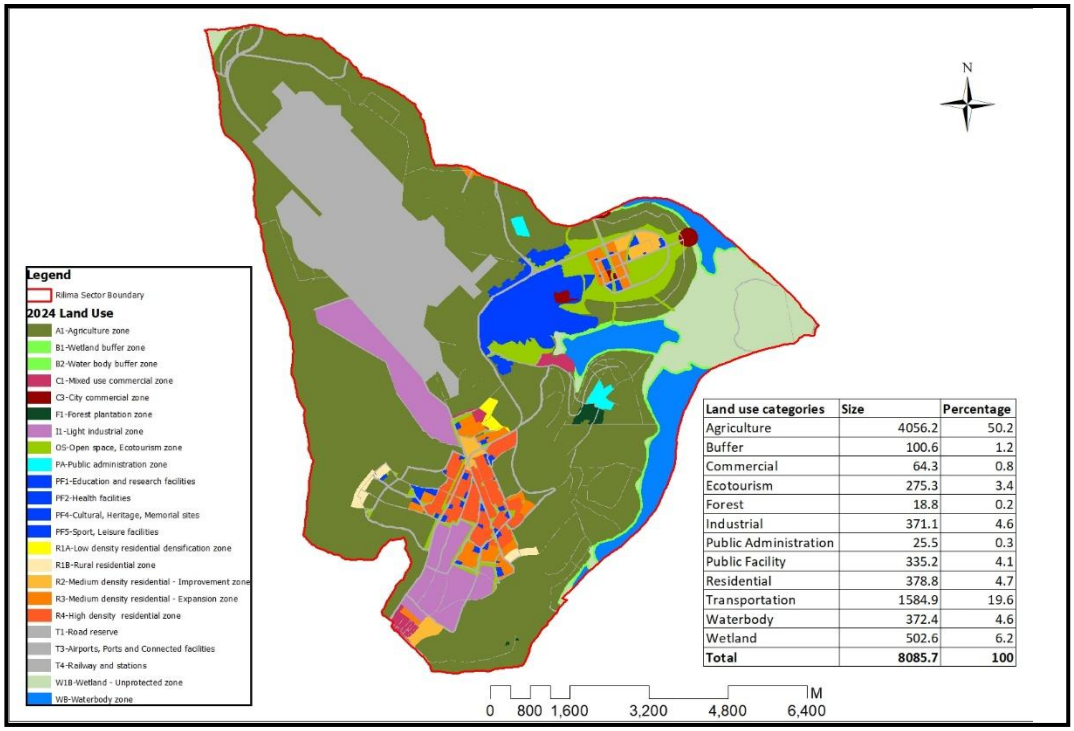
Housing development regulations in the areas under urban development require landowners to abide by the new housing standards. The 2022 zoning regulations encourage integrated and mixed-use development within all zones to create higher density, compact and vibrant places for people from all group categories and neighborhoods (Republic of Rwanda, 2022). By abiding this regulation, Rilima zoning plan, included all categories of housing unit in master plan. The following table shows the ration of residential zones for each residential unity.

Table 6: Ratio of residential zoning as per Rilima sector masterplan

Zone	Description of the zone	Share (%) in the master plan
R1A: Low density residential densification zone	a residential zone for semidetached houses, single family townhouses, multifamily Houses, and low-rise developments	17.8%
R1B: Rural residential zone	low rise housing as part of the farming community (sustainable and compact residential settlement in the rural settlement sites and the rural areas of the city, limiting encroachment towards the fertile agricultural land)	20.5%
R2: Medium-density residential improvement zone	upgradation of unplanned settlements or redevelopment of urban renewal areas	18.1%
R3: Medium-density residential expansion zone	Single family and row-houses, low-rise apartments, and multifamily houses in the peri-urban area which involves the conversion of the agriculture land into residential use	34%
R4: High-density residential zone	High-density medium-rise housing and residential apartments	9.6%
Total		**100%**

Source: Adapted from Bugesera Zoning Report, (2024)

However, the housing units permitted for development in zones such as R1A, R2, R3, and R4 are not affordable for very low-income and low-income households, which represent 40% and 25% of all households, respectively. In order to obtain data on the monthly income of households in Rilima sector, a quick survey was done on 300 Households, 64 households from Kabeza; 54 households from Kimaranzara and 182 from Nyabagendwa. Survey shows that a big number was composed of households whose monthly income is less than 150,000 Rwf.



Land use categories	Size	Percentage
Agriculture	4056.2	50.2
Buffer	100.6	1.2
Commercial	64.3	0.8
Ecotourism	275.3	3.4
Forest	18.8	0.2
Industrial	371.1	4.6
Public Administration	25.5	0.3
Public Facility	335.2	4.1
Residential	378.8	4.7
Transportation	1584.9	19.6
Waterbody	372.4	4.6
Wetland	502.6	6.2
Total	**8085.7**	**100**

Figure: Land use plan of Rilima sector

Source: Data Source: NLA, (2024); NISR,(2022)

Those findings indicate that Rilima's land use conversion aligns closely with Rwanda's National Urbanization Policy (2015), which advocates for compact cities and sustainable land management (MININFRA, 2015). The gradual reduction of agricultural zones, while significant, balances food security concerns with urban development needs, a trend similarly noted by Habiyaremye et al. (2020) in studies of secondary cities. The integration of wetlands and ecotourism areas into zoning demonstrates an ecological approach to planning, consistent with Vision 2050 goals of resilience and green growth.

Table 7: : Household incomes

Income category	Income of household/month	Number of respondents	% age	categ.
Very low income	Under 10,000 RWF	34	11.33%	40%
	10,001-30,000 RWF	23	7.67%	
	30,001-50,000 RWF	31	10.33%	
	50,001-70,000 RFW	16	5.33%	
	70,001-90,000 RWF	17	5.67%	
Low income	90,001-110,000 RWF	29	9.67%	25%
	110,001-130,000 RWF	18	6.00%	
	130,001-150,000 RWF	28	9.33%	
Medium income	150,001-200,000 RWF	17	5.67%	21%
	200,001-250,000 RWF	24	8.00%	
	250,000-300,000 RWF	14	4.67%	
	300,001-350,000 RWF	7	2.33%	
High income	350,001-400,000 RWF	14	4.67%	14%
	400,001-500,000 RWF	9	3.00%	
	Above 500,000 RWF	19	6.33%	
		300	100%	

Source: Field survey, May 2025

Based on the affordability analysis, the residential zoning distribution in Rilima's master plan presents a clear affordability challenge when viewed alongside the income structure of households, where 65% of households fall into the very low and low-income categories, earning less than 150,000 RWF per month. The largest portion of residential land, 34%, is allocated to the R3 Medium-Density Residential Expansion Zone, which typically attracts middle- and high-income earners due to the costs associated with developing single-family homes, row houses, and low-rise apartments, potentially excluding the majority low-income population.

The cost for developing such houses is around 71,500,000 Rwf (Table 4.6). While the R1A (17.8%) and R2 (18.1%) zones offer opportunities for low-density development and the upgrading of unplanned settlements, they may remain unaffordable without targeted subsidies or affordable housing programs. The R1B Rural Residential Zone, which makes up 20.5% of the residential area, is the most compatible with the housing needs and financial capacity of very low-income and low-income households. The cost of developing a low-cost housing unit in the R1B zone is

approximately 3,150,000 RWF (Table 4.6)—an amount that can be attainable for some households earning between 10,000 RWF and 150,000 RWF per month.

While some households within these income categories may afford housing in the R1B zone, its limited coverage on master plan is insufficient to meet the housing needs of the 65% of residents classified as very low and low-income group. Additionally, the R4 High-Density Residential Zone, which typically provides the most affordable housing through space-efficient designs, covers only 9.6% of the master plan, further limiting low-cost housing options.

Table 8: Estimated construction per housing typology

Typology	**Avg. Size (sqm)**	**Avg. Cost per sqm (Rwf)**	**Avg. Cost per Unit (Rwf)**
Mud or Cement Blocks, Metal Roofing (rural)	35	90,000	3,150,000
Low-Cost Brick Row Housing (rural)	35	180,000	6,300,000
Medium Quality Bungalow	60	300,000	18,000,000
Bungalow/single family villa	130	650,000	84,500,000
Avg. Quality - Medium/ Low Rise Apartment	130	550,000	71,500,000
Medium-High-Quality High-Rise Apartment	110	700,000	77,000,000

Source: Field Visit, May 2025

Thus, although some native landowners own land parcels, they often face significant barriers to developing these plots in compliance with spatial development regulations. The high costs associated with meeting zoning requirements exceed their financial capacity, particularly for these very low- and low-income groups, leaving many landowners unable to convert their land into adequate, regulation-compliant homes

4.3. Coping Strategies of Native Landowners with Urban Development Lifestyles

The rapid speed of urban development in Rwanda, particularly in strategic growth areas such as Rilima Sector, has forced native landowners to adopt new coping strategies to manage the profound lifestyle changes. Those are accompanying land conversion associated infrastructure projects has accelerated land value appreciation by more than 200% between 2015 and 2022, prompting landowners to engage in adaptive strategies such as leasing parcels, investing in small businesses, or migrating for alternative employment.

4.3.1. Leasing Parcels for Income Generation

Findings indicate that a significant proportion of native landowners, especially those with residual land near urban centers, The dominance of land leased to private investors (46%) reflects a growing trend of prioritizing large-scale infrastructural and commercial projects, such as airport expansions, which often require substantial land acquisition (World-Bank, 2021)This aligns with Rwanda's Vision 2050 strategy, which emphasizes attracting private investment to drive economic transformation and urban development (Government of Rwanda, 2020).

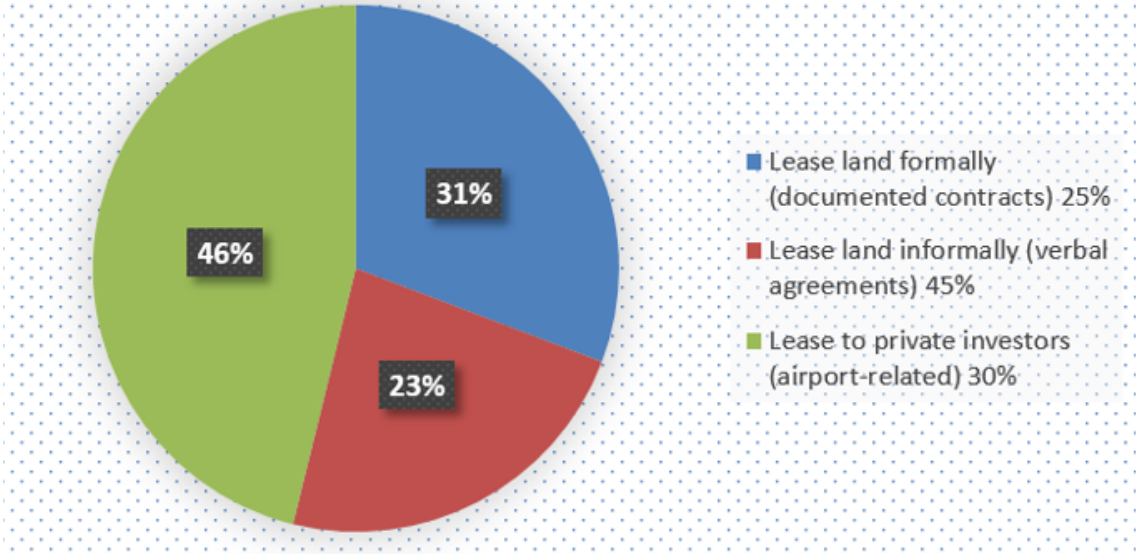


Figure 15: Leasing the agriculture land for income generation

Data Source: *Field Survey, May 2025*

The pie chart illustrates the average parcel size leased by different modes of agreement. The largest proportion (46%) of parcels is leased to private investors, primarily for airport-related

developments. Informal leasing through verbal agreements accounts for 23%, while formal leasing through documented contracts represents 31%. This distribution highlights a significant reliance on private investment for land development, with fewer parcels managed under legally binding arrangements especially for the land that are near proximity to the land and wetlands.

The respondent from Kimaranzara Cell, Amahoro village revealed: '*''I cannot rely only on farming because land is small now; leasing some of it helps me pay school fees for my children''*

However, the relatively lower proportion of formal leasing (31%) compared to informal arrangements (23%) raises concerns about tenure security and potential disputes among landowners and developers. Strengthening formal land agreements could ensure fair compensation, transparency, and sustainable land management practices, which are critical for balancing urban expansion with community welfare.

4.3.2. Diversification of Income Sources

The diversification of income sources indicate that a significant proportion of native landowners have adopted multiple livelihood strategies following urban expansion. The findings reveal that retail shops (30%) are the dominant form of economic diversification among landowners affected by urban expansion, followed by handcraft and arts (20%), mechanics and tailoring (18%), transport (17%), and modern agriculture (15%) as shwn in the following illustration.

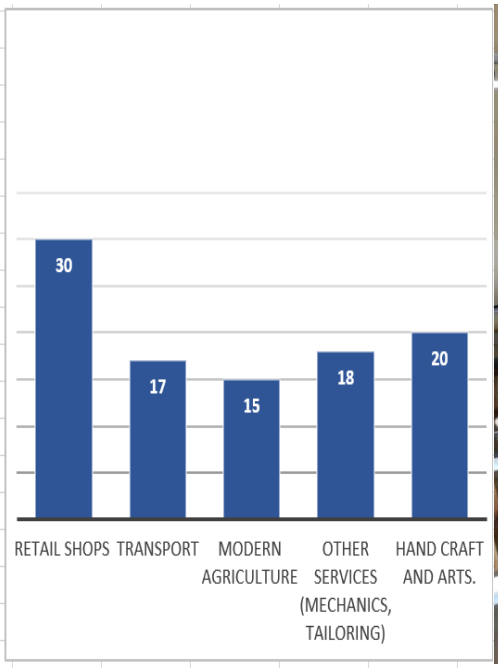


Figure 16:Main activities for income generation

***Data Source**: Field visit May, 2025*

''I started a small tree nursery after part of my farmland was taken for the airport project. Even with less land, the nursery helps me earn income from selling seedlings, and many neighbors buy trees for planting on their new plots." (A respondent from Kabeza Cell, Nyamizi Village).

Figure 17: Tree nursery for generating income

Data source: Field visit, May 2025

Recent studies in Rwanda have presented similar trends where small businesses and service-oriented livelihoods are increasingly replacing farming as primary income sources in peri-urban regions (Ntirenganya et al., 2019; MININFRA, 2021). This aligns with findings by Musahara and Huggins (2015), who observed that land-scarce households often diversify into petty trade and transport to cope with declining agricultural viability. The rise in handcraft and arts (20%) is also consistent with cultural entrepreneurship initiatives supported by Rwanda's Vision 2050 and NST2, which encourage creative industries and local crafts as part of sustainable economic development strategies (GoR, 2020).

4.3.3. Optimizing Land Value

The study findings indicate that land value in Rilima Sector has significantly appreciated following major infrastructure developments, most notably the construction of Bugesera International Airport. Respondents reported that parcels which previously sold for 300–500 RWF per m² before 2015 are now valued at 1,500–2,000 RWF per m² in 2024. This represents a three- to four-fold increase in less than a decade, with the highest gains observed in areas closest to main access roads and service corridors.

One respondent from Kabeza Cell remarked "*I sold part of my land at a much higher price than years ago and used the money to build rental houses. Now I earn monthly income instead of depending on farming*." (Respondent 8, Nyamizi Village, Kabeza Cell).

Land value appreciation has emerged as one of the most significant benefits for native landowners in areas undergoing rapid urban expansion, such as Rilima Sector. The establishment of major infrastructure projects, including the Bugesera International Airport, has triggered a substantial increase in land prices, creating opportunities for landowners to capitalize on their assets through leasing, selling, or using land as collateral for business ventures. This appreciation not only enhances household wealth but also facilitates socio-economic mobility, enabling investments in housing, education, and small enterprises.

Figure 18: Improvement of the Existing houses

Source: Field survey, May 2025

In the Rwandan context, the National Land Policy (2019) and NST2 acknowledge land as a key driver for socio-economic transformation, emphasizing its potential to generate capital for households and stimulate private sector investment (MINECOFIN, 2020). Recent studies, such as Ntirenganya et al. (2019), clarified that peri-urban communities around Kigali and secondary growth poles like Bugesera have recorded land value increases of 150–300% over the last decade, directly linked to urban expansion and improved infrastructure.

4.4. Coping Mechanisms for Urban Dwellers in Rilima Sector

Rapid urban expansion in Rilima Sector, driven by strategic infrastructure projects such as Bugesera International Airport, has transformed local livelihoods, land use patterns, and socio-economic dynamics. While land value appreciation and diversified income opportunities have benefited some households, the transition has also generated vulnerabilities, including land scarcity, displacement risks, and unequal access to emerging markets.

To ensure that urban development is inclusive and environmentally sustainable, coping mechanisms must be integrated into planning frameworks and guided by the Green Growth and Climate Resilience Strategy (GGCRS), which promotes resilience and equitable resource use. The mechanisms below reflect field findings and best practices consistent with these national and international policy frameworks including:

4.4.1. Strengthening Formal Land Leasing and Ownership Frameworks

Formalizing land transactions through notarized contracts and accessible land registration aligns with Vision 2050's emphasis on transparent land markets and NST2's goal of strengthening governance and citizen rights (GoR, 2020; MINECOFIN, 2020). By providing legal aid services and community sensitization programs, vulnerable landowners particularly displaced farmers who can better protect their interests and negotiate fair compensation. This mechanism builds institutional trust and ensures equitable participation in urban land markets, fostering sustainable urban growth in line with national governance priorities. Formal tenure security has been proven to enhance investment confidence and reduce disputes (Musahara & Huggins, 2015).

4.4.2. Community-Based Livelihood Diversification Program

Promoting cooperatives for retail trade, transport, handcrafts, and service provision supports NST2's economic transformation pillar, which encourages entrepreneurship and off-farm employment. Training programs in green jobs such as tree nurseries and eco-friendly handcrafts also resonate with the GGCRS, emphasizing low-carbon livelihoods and environmental stewardship (UN-Habitat, 2020). Field results show that such collective initiatives enhance household resilience and reduce dependency on shrinking agricultural land (Ntirenganya et al., 2019). Community-driven diversification fosters inclusive growth while advancing Rwanda's green economy agenda envisioned under Vision 2050.

4.4.3. Optimizing Land Value Gains

The appreciation of land values due to strategic infrastructure creates opportunities for asset-based wealth creation. Encouraging households to reinvest proceeds into affordable rental housing, transport enterprises, or modernized agriculture is consistent with NST2's objective to increase private sector-led investment and Vision 2050's vision of a knowledge-based economy. Embedding financial literacy and investment advisory programs ensures equitable participation and prevents speculative losses, (World Bank ,2018). Transforming land value gains into productive projects bridges socio-economic disparities and supports the sustainable urban transition anticipated in Rwanda's long-term strategies.

4.4.4. Integrating Social Safety Nets and Affordable Housing Schemes

Providing targeted subsidies, mixed-income housing, and safety nets addresses social inequalities heightened by rapid urbanization. These measures correspond to Vision 2050's human development pillar and NST2's commitment to social inclusion, ensuring vulnerable households retain access to essential services (GoR, 2020). Furthermore, affordable housing initiatives designed with green building standards align with the GGCRS, reducing environmental impacts while promoting livable urban spaces.

Integrating social protection into urban planning guarantees that all residents regardless of income level have to benefit from Rilima's transformation, fulfilling Rwanda's inclusive and sustainable development vision.

CONCLUSION AND RECOMMENDATIONS

This study examined the socio-economic transformations occurring in Rilima Sector as a result of rapid urbanization driven by strategic infrastructure development, particularly Bugesera International Airport. Findings revealed significant land value appreciation, with parcel prices rising three to fourfold between 2015 and 2024, enabling some native landowners to leverage this asset for investments in housing, retail trade, and transport services. Concurrently, livelihood diversification emerged as a dominant coping strategy, with shifts toward non-agricultural activities such as retail, handcraft, and service-based enterprises. These adaptive responses demonstrate community resilience but also expose inequalities; households with limited financial literacy or assets remain vulnerable to speculative pressures and livelihood disruptions

Various methodologies and tools were employed to address the research questions, including Geographic Information Systems (GIS) for analyzing satellite and aerial imageries (GPG), specifically focusing on UN Sustainable Development Goal (SDG) indicator 11.3.1, which measures Highlights displacement risks and rising housing costs affecting native landowners. These methodologies, combined with advanced tools, facilitated a comprehensive analysis of the research questions.

The results revealed that while urban expansion aligns with national aspirations under Vision 2050 and NST2, equitable benefit distribution requires deliberate policy interventions. Challenges including tenure insecurity, displacement risks, and limited access to green and affordable housing highlight the need for inclusive governance frameworks and targeted social protection measures. Integrating these strategies within the Green Growth and Climate Resilience Strategy can ensure that Rilima's transformation fosters not only economic growth but also social equity and environmental sustainability.

This research also recommends to:

- Provide incentives such as tax breaks for high-density developments, provision of basic urban services (water, electricity, roads) in designated growth areas, and enforcement of minimum lot size should be introduced to manage land efficiently.
- Create a dedicated land management unit within the district to oversee formal land leasing, valuation, and dispute resolution.
- Support vocational training centers in Rilima to equip youth and displaced farmers with skills in retail, transport, tailoring, handcraft, and green jobs (tree nurseries, eco-construction)
- Provide financial literacy programs at sector and cell levels to guide households on safe reinvestment of land sale proceeds into productive ventures (e.g., rental housing, mechanized agriculture
- Rwanda Housing Authority has to implement mixed-income housing projects in Rilima, prioritizing low-income families to Prevent the land deprivation for native land owners
- Implementing these measures at the district level ensures equitable benefit distribution from urban expansion, minimizes social disruption, and supports Bugesera's role as a national economic growth pole while meeting Vision 2050 and NST2 targets.

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Repubulika y'u Rwanda
Intara y'Ibirasirazuba
Akarere ka Bugesera

Bugesera, 19/05/2025

Mr NSHIMIYIMANA Innocent

REF: Authorization to conduct a research project

Reference is made to the letter dated 19th of May 2025, requesting for Permission to conduct a research for your Master's Degree;

I am honoured to inform you that you have been authorized to conduct a research project in Bugesera District, entitled **'' Benefits and Challenges of Land Use Conversion Alongside Urban Development for Native Landowners: A case of Bugesera District, Rilima Sector''**

However, you are requested to share with District your research findings.

I wish you success.

AKARERE KA BUGESERA

Joseph NKURANGA
District Executive Secretary

NSHIMIYIMANA Innocent (221027610)

University of Rwanda

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Master of Science in Geo-Information for Environment and Sustainable

nshimiyinnocent20@gmail.com

0786530666

19/05/2025

To: The Mayor of Bugesera District

Subject: Request for Authorization to Conduct Field Data Collection

Dear Sir/Madam,

I hope this letter finds you well.

I am a Master's student in Geo-Information for Environmental and Sustainable Development at the University of Rwanda. I am currently conducting research as part of my academic requirements, under the topic: "Benefits and Challenges of Land Use Conversion Alongside Urban Development for Native Landowners: A Case Study of Rilima Sector, Bugesera District."

The objective of this research is to identify the benefits of land use conversion alongside urban development for native landowners in Rilima sector; to examine the challenges of land use conversion alongside urban development faced by native landowners; to assess how native land owners, cope with challenges related to land use conversion alongside urban development and to propose strategies for landowners to cope with the land use changes driven by land use conversion.

I kindly request permission from your esteemed office to conduct field data collection in Rilima Sector. The research will involve interviews, questionnaires, and spatial data analysis, and will be conducted with the full consent and cooperation of all participants. Attached to this letter is recommendation letter from The university. I would be grateful for your support and authorization to carry out this important work.

Thank you very much for your attention and kind consideration.

Yours sincerely.

NSHIMIYIMANA Innocent

UNIVERSITY of RWANDA

COLLEGE OF SCIENCE AND TECHNOLOGY

SCHOOL OF ARCHITECTURE AND BUILT ENVIRONMENT

OFFICE OF THE DEAN

Kigali, 06 May 2025

TO WHOM IT MAY CONCERN

Dear Sir,

Dear Madam,

Data Collection for the MSc Dissertation by NSHIMIYIMANA Innocent

Through this letter, we would like to confirm that **NSHIMIYIMANA Innocent** is a final year student in the MSc of Geo-Information Science for Environment and sustainable Development (GI-ESD) under the School of Architecture and Built Environment (SABE), College of Science and Technology (CST), at the University of Rwanda (UR). He is currently working on the MSc dissertation, with the topic " ***Benefits and challenges of land use conversion alongside urban development for native landowners"*** under the supervision of **Dr. UWAYEZU Ernest**.

From May up to June 2025, he will be collecting data which are relevant to that topic in the sector Rilima, Bugesera District. Data collection will include the household surveys and interviews with local leaders, and various government officials. In addition, He will need access to various spatial datasets and documents that are held by both public and private organizations. We would therefore like to request for your support so that he can get access to those data and documents. For any question related to his research, do not hesitate to contact any of us on the tel. or email below.

We do appreciate your support to that UR Student in his academic journey.

Sincerely yours.

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