



**College of Science and Technology**

**School of Architecture and Built Environment**

*MSc in Geo-Information Science for Environment and Sustainable Development*

Evaluating the effectiveness of planned rural settlement sites in Rwanda: Case of Gatebe and Rwabiharamba sites in Nyagatare 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 Environment and Sustainable Development.

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**Kigali, 22 May 2024**

# DECLARATION

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I declare that this thesis is my original work and has never been submitted or examined in any university as an academic requirement for any award.

Signed:

.....

Date: **27 / 09 / 2024**

# APPROVAL

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It is hereby confirmed that this thesis entitled “**Evaluating the Effectiveness of Planned Rural Settlements in Rwanda, Case Study of Gitebe and Rwabiharamba Sites in Nyagatare District**” submitted by **Ernest Ruzindana** has been assessed and accepted by the post-graduate coordination team in the school of Architecture and Built Environment

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# DEDICATION

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This research is dedicated to:

- ✓ *My academic supervisors,*
- ✓ *My professional supervisors,*
- ✓ *My beloved mother and siblings,*
- ✓ *My classmates and colleagues.*

Thank you all for your inspiration, patience and dedication. This work belongs to you as much as it belongs to me.

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## ABSTRACT

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The evolution of rural settlements in Rwanda marked the gradual transition from scattered homesteads to planned villages present socio-economic and environmental issues. Scattered settlements have led to infrastructure limitations, land fragmentation, economic challenges, and environmental degradation. Despite government efforts, effective adaptation is needed. This study aims to assess the effectiveness of reorganizing these settlements into planned villages, particularly in Gatebe and Rwabiharamba in Nyagatare district by evaluating the implementation and outcomes of government policies and strategies. A variety of data collection methods were employed, including surveys, interviews, field observations, and GIS technologies. The sample size included 33 out of 896 households in Gatebe and 34 out of 1537 households in Rwabiharamba. Data analysis involved GIS techniques such as proximity and overlap analysis and statistical tests such as t-tests and results were visualized through maps, tables, charts, and graphs for effective comparison. The results reveal that Gatebe and Rwabiharamba have evolved from forest areas in Akagera National Park to dynamic settlements between 2005 and 2024. The significant increase in farming activities since 2010 led to a reduction in forest cover and the establishment of settlements that have continuously expanded over the years. This growth, initially marked by scattered settlement, evolved into planned villages through government initiatives, despite challenges such as the uncontrolled inflow of returnees and immigrants, improper land use planning, historical land use practices, limited oversight and inadequate infrastructure. The findings shed light on the reorganization of scattered settlements and the associated challenges for planned villages with improved infrastructure. The study provides strategies to ensure sustainable development and insights into the effectiveness of planned rural settlements and the improvement of livelihoods and infrastructure in rural areas of Rwanda. The reorganization of scattered rural settlements into planned villages in Rwanda was examined in this study on Gatebe and Rwabiharamba. The study identifies challenges and proposes strategies to overcome them. Recommendations include encouraging private investment, improving infrastructure and supporting local businesses to promote comprehensive reorganization and rural development in Rwanda.

**Keywords:** *Rural settlement, scattered settlement, settlement reorganization, planned village*

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## ABBREVIATIONS OR ACRONYMS

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<b>ADEPR</b>	: Association des Eglises de Pentecote au Rwanda
<b>AEBR</b>	: Association of Baptist Churches in Rwanda
<b>DDS</b>	: District Development Strategies
<b>DRC</b>	: Democratic Republic of Congo
<b>EAR</b>	: Anglican Church of Rwanda
<b>ECD</b>	: Early Childhood Development
<b>EDPRS</b>	: Economic Development and Poverty Reduction Strategy
<b>ENVI</b>	: Environment for Visualizing Images
<b>GEBCO</b>	: General Bathymetric Chart of the Oceans
<b>GIS</b>	: Geographic Information System
<b>GPS</b>	: Global Positioning System
<b>HRW</b>	: Human Rights Watch
<b>IDP MV</b>	: Integrated Development Plan   Model Village
<b>MINALOC</b>	: Ministry of Local Government
<b>MININFRA</b>	: Ministry of Infrastructure
<b>NGA</b>	: National Geospatial-Intelligence Agency
<b>NGO</b>	: Non-Governmental Organization
<b>NISR</b>	: National Institute of Statistics of Rwanda
<b>NLA</b>	: National Land Authority
<b>NLUDMP</b>	: National Land Use and Development Master Plan
<b>NOAA</b>	: National Oceanic and Atmospheric Administration
<b>NST</b>	: National Strategy for Transformation
<b>OSM</b>	: Open Street Map
<b>PHC</b>	: Population and Housing Census
<b>QGIS</b>	: Quantum GIS
<b>REB</b>	: Rwanda Education Board
<b>REG</b>	: Rwanda Energy Group
<b>RHA</b>	: Rwanda Housing Authority

**RSTF** : Rural Settlement Task Force  
**SDA** : Seventh Day Adventists  
**SIO** : Strategic Information Office  
**SPSS** : Statistical Package for the Social Sciences  
**UNICEF** : United Nations Children's Fund  
**WASAC** : Water And Sanitation Corporation

# 1 INTRODUCTION

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## 1.1 BACKGROUND INFORMATION

### 1.1.1 Scattered settlement in a global context

Globally, human settlements represent a dynamic and diverse landscape that reflects the remarkable range of human cultures, environments, and historical patterns (Daniele, Deborah, & Sliuzas, 2020; MININFRA, 2009). From vibrant metropolitan areas to isolated villages, nomadic tribes to indigenous communities, human settlements take many forms, shaped by geography, culture and socio-economic factors. In some places, such as New York and Tokyo, human success is embodied in high-rise buildings, while in others, such as in the heart of the Amazon rainforest, ancestral traditions and a deep connection with nature are preserved (Daniele et al., 2020).

The scattered settlements bear witness to human adaptability and the diverse ways in which communities have shaped their environment. These settlements, often characterized by low population density and individual homesteads scattered across huge landscapes, have been created through a diverse mix of historical, geographical, and cultural factors. For example, in the Scottish Highlands, the origins of crofting communities can be traced back to the clearing policies and division of formerly common land during the 18th and 19th centuries (Vercher, Barlagne, Hewitt, Nijnik, & Esparcia, 2021). Similarly, in the Australian outback, isolated cattle stations emerged in response to the immense arid terrain and the need for self-sufficiency in resource management (Stastny, 2019).

### 1.1.2 Overview of rural settlement in Africa

Taking a case of scattered settlements from a global perspective to the African context, major instances of traditional settlement patterns emerge. In sub-Saharan Africa, including countries such as Kenya, scattered settlements reflect a traditional pattern in which homesteads are dispersed over large areas rather than concentrated in villages or towns (Odingo, 1971). This settlement pattern is significantly influenced by socio-economic and environmental factors, such as the need for extensive land to support agricultural and pastoral activities (Odingo, 1971). In regions such as the Maasai Mara, the shift from dispersed homesteads to nucleated settlements has been driven by changes in land use, population growth and government policies to promote community-based

conservation and tourism. However, this transition is fraught with challenges, including land degradation, conflicts over resource use and inadequate infrastructure and services in the newly established group settlements (Fratkin, 2001).

Historically scattered settlement, particularly among the Maasai in the East African savannahs, have evolved over centuries and are characterized by a nomadic pastoralist lifestyle focused on the sustainable management of livestock and natural resources (Boles, 2017). Despite the advantages of this system, such as resilience in resource-poor environments, dispersed settlements often struggle with limited access to essential services and infrastructure (Boles, 2017).

### **1.1.3 Rural settlement evolution in Rwandan**

In Rwanda during the pre-colonial period, settlements were scattered and mainly centered on agricultural and grazing activities. Homes were scattered across the landscape, made up of the main house - inzu, the essential outdoor space - urugo, the backyard - igikali, the granaries (for wealthier families), and the reed fences delimiting the compound (Seburanga & Zhang, 2013). Farming formed the backbone of livelihoods, with each family cultivating in concentric areas around a central plot. Traditional building materials include wood, reeds, straw, clay and termite soil, with house walls made of woven plant fiber mats (Seburanga & Zhang, 2013).

During colonial period, administrative centers such as Kigali and Butare were introduced, which encouraged urbanization and trade. Such growth extended to smaller business centers such as Ruhango and Rwamagana, while rural areas outside these centers remained dependent on traditional culture and faced limited access to services and infrastructure (Havugimana, 2009). In response to these challenges and population growth, the colonial administration introduced the paysannat policy, inspired by its successful implementation in the DRC and western Burundi, aimed at consolidating the population in one location with a view to managing the land and boosting agricultural production (Havugimana, 2009).

The Paysannat system in Rwanda aimed to boost agriculture and infrastructure development, including road networks and housing along these roads. This system linked markets to agricultural production and contributed to the development of rural settlements, as witnessed by Gashora, Sake and Rango villages (Hilhorst & Leeuwen, 2000; MININFRA, 2009). However, these attempts to group villages together in 1978 failed due to inadequate supervision, housing and infrastructure

and these efforts had limited success. Then, in the 1980s and 1990s, the rapid population growth, making scattered settlements even more common (Hilhorst & Leeuwen, 2000; MININFRA, 2009).

Later, after the Genocide against Tutsis, the government started to plan settlements in new places, like national parks and hunting lands in eastern Rwanda. Some groups, like NGOs, also built houses in different spots instead of just where the government oriented (Golooba-Mutebi, 2013). In December 1996, the Ministry of Public Works introduced “imidugudu” instructions aimed at improving living conditions by transforming scattered settlements into well-planned communities and restructuring rural centers into urban areas, addressing challenges like land scarcity and poverty (MININFRA, 2009; Uwimbabazi & Lawrence, 2011).

In 2004, the government introduced the National Human Settlements Policy, aimed at improving rural settlements. As part of EDPRS 2, the government focused on grouped “imidugudu” settlements in rural areas. In 2008, the objective was to increase the number of villages planned to accommodate the rural population from 22% to 70% by Vision 2020 (MININFRA, 2009). In line with this target, RHA identified 4,812 sites across the country between 2015 and 2018, which were subsequently reduced to about 3,000 in collaboration with NLA and districts, in accordance with National Land Use and Development Master Plan (NLUDMP) recommendations.

According to the NLUDMP, the projected population of 6.6 million people (30%) in 2050 was spread over around 3,000 settlement areas. Depending on the topography of the area, an average of 1 or 2 settlement sites per cell was required. Where the topography is not favorable, the proposed sites can be relocated to other nearby cells that meet the conditions. This calls for districts to rank all the best settlement sites per district and select them based on the NLUDMP parameters and criteria. The total gross settlement area in rural areas should not exceed 1241 km<sup>2</sup> by 2050, up from around 1500 km<sup>2</sup> in 2019. These efforts reflect a move towards planned and harmonized rural settlements, aimed at addressing infrastructure, housing and community welfare issues, and ultimately promoting more sustainable development of the country.

## 1.2 PROBLEM STATEMENT

Rural settlement in Rwanda has evolved through distinct historical eras. In the pre-colonial era, agro-pastoral activities dominated, led by feudal land tenure systems under royal protection and promoting scattered settlements. Colonial influence introduced new settlement patterns and building materials. Post-colonial Rwanda witnessed urbanization and rural migration, leading to housing shortages and environmental degradation (Ngoga, 2015).

Over the past few decades, the rural landscape of Rwanda has been characterized by scattered homesteads set in rolling hills, underlining the central role of agriculture. These self-sufficient communities, despite their isolation, reflected cultural richness and environmental awareness. However, this settlement pattern has posed challenges such as the limitation of infrastructure and services, land fragmentation, economic challenges, and environmental degradation, including deforestation and soil erosion (HRW, 2001, 2003).

Following the 1994 genocide against the Tutsi, the government intensified efforts to provide housing, particularly through regrouped settlements known as imidugudu, aiming to improve livelihoods for vulnerable populations. The government has embarked on a series of strategies and policies to harmonize rural settlements and promote sustainable development. These policies include the adoption of the National Settlement Policy in 1996 with its subsequent amendments, the adoption of the Law Governing Human Settlements on June 21, 2011, providing solutions to the aforementioned challenges related to dispersed settlements, and the Vision 2020 plan, which envisages that 70% of the rural population would be living in planned villages or “imidugudu” by 2020 (MININFRA, 2009).

In 2008, the government set up a programme to accelerate planned human settlement in these villages (Heidger, 2018). At district level, District Development strategies (DDS) have been developed to meet specific local needs, which often include the development of planned rural settlements. With regard to the long term, Vision 2050 presents a picture of reorganizing rural scattered settlement into dynamic planned settlement with improved infrastructure, services and economic opportunities (Gatete, 2016). The National Land Use and Development Master Plan (NLUDMP) serves as an overarching guide, focusing on the creation of planned rural settlement sites, reflecting the government's desire to accommodate a growing population and encourage sustainable land use practices and addressing the issue of settlements in scattered and high risk

zones (Heidger, 2018). Collectively, these policies highlight the government's proactive role in harmonizing rural settlements and improving the wellbeing of residents obliged to live in planned settlements where all basic infrastructure and services will be provided. According to the 5th Rwandan Population and Housing Census in 2022, efforts to date have been fruitful, with 74.9% of the rural population now living in Imidugudu (planned rural settlements). However, there remains a gap, as 25.1% of the rural population still resides in scattered settlements and high-risk zones (NISR, 2022).

Despite the progress made, a critical problem persists where there is limited documentation on the successful implementation of government policies aimed at reorganizing scattered rural settlements into planned villages. While these policies are well-documented, there is a significant gap in understanding whether they have been effectively implemented and what impact they have had on the population compared to unplanned settlements. A significant gap is that it is not clear where these policies have been implemented and where planned settlements have been established. Most recent studies only highlight the problem of scattered settlements in rural areas and the associated challenges and discuss the procedures and methods to address the issue. However, there is no study that points to the successful implementation of these policies towards planned rural settlements.

For instance, the RHA was tasked with harmonizing rural settlements, focusing mainly on turning scattered settlements into planned settlements. It has undertaken the planning of these villages, and in some cases has initiated the development of Integrated Development Programme (IDP) model villages, with the view of having at least one per district and later scale up to one per sector nationwide (Dale, 2021). However, these attempts seem to be mainly focused on housing for vulnerable communities in need of accommodation. Despite these initiatives, there is a significant lack of reports confirming the implementation of planned villages for people moving from scattered areas to these well-structured settlements, as had been envisaged (Dale, 2021). This gap raises concerns about the effectiveness of the initiatives and highlights the need for comprehensive research and evaluation to assess the progress and impact of these efforts in harmonizing rural settlements in Rwanda.

At present, there are no studies conducted on Gatebe and Rwabiharamba settlement sites in Nyagatare district, which were planned and implemented by the commission to resettle the people

scattered from the farmlands. This study intended to evaluate the implementation of these policies, focusing on the reorganization of rural settlements into planned villages in Gatebe and Rwabiharamba areas. In undertaking this research, it was based on the lack of comprehensive studies evaluating the implementation of planned rural settlements in Rwanda. It sets out to fill this gap by assessing the effectiveness of planned rural settlements, highlighting their outcomes relative to unplanned counterparts.

### **1.3 RESEARCH OBJECTIVE**

#### **1.3.1 Main objective**

The primary objective of this study is to comprehensively assess the effectiveness of reorganizing of scattered rural settlements to planned villages in Rwanda.

#### **1.3.2 Specific objectives**

For comprehensively assess the effectiveness of moving from scattered rural settlements into planned villages in Rwanda we will need to:

- a. Evaluate the current status of implementing the government policies guiding the reorganization of scattered settlements into planned villages in Gatebe and Rwabiharamba.
- b. Assess the outcomes of implementing those policies in Gatebe and Rwabiharamba.
- c. Identify any persistent challenges faced during the implementation of those policies in Gatebe and Rwabiharamba.
- d. Suggest strategies and mechanisms to address those challenges for effective reorganization of scattered settlements into planned villages in Gatebe and Rwabiharamba.

### **1.4 RESEARCH QUESTIONS**

- a. *Evaluate the current status of implementing the government policies and strategies guiding the reorganization of scattered settlements into planned villages in Gatebe and Rwabiharamba.*
  1. What was the effectiveness of the implementation of government policies and strategies in reorganizing scattered settlements to planned villages in Gatebe and Rwabiharamba?

*b. Assess the outcomes of implementing those policies and strategies in Gatebe and Rwabiharamba.*

1. What are the socio-economic impacts on residents resulting from the implementation of policies and strategies to reorganize scattered settlements into planned villages in Gatebe and Rwabiharamba?
2. How has infrastructure development been influenced by the implementation of these policies and strategies in Gatebe and Rwabiharamba?

*c. Identify any persistent challenges faced during the implementation of those policies and strategies in Gatebe and Rwabiharamba.*

1. What are the main obstacles hindering the successful implementation of the policies and strategies to reorganize settlements in Gatebe and Rwabiharamba to planned villages?
2. What factors contribute to the persistence challenges during implementation of the policies and strategies in reorganizing settlements in Gatebe and Rwabiharamba to planned villages?

*d. Suggest strategies and mechanisms to address those challenges for effective reorganization of scattered settlements into planned villages in Gatebe and Rwabiharamba.*

1. What strategies and interventions can effectively address ongoing challenges, and how do community perceptions and involvement impact the reorganization from scattered settlements to planned villages in Gatebe and Rwabiharamba?
2. How can community engagement and stakeholder collaboration enhance the effectiveness of strategies and mechanisms to overcome persistent challenges in reorganizing from scattered settlements to planned villages in Gatebe and Rwabiharamba?

## **1.5 SIGNIFICANCE OF THE STUDY**

The importance of evaluating the effectiveness of planned rural settlements in Rwanda, particularly the sites of Gatebe and Rwabiharamba in Nyagatare District, derives from their potential to support fact-based policy decisions and sustainable development initiatives. This could

serve as crucial input for revising existing policies or developing new strategies aimed at improving rural settlement initiatives nationwide. By systematically assessing the implementation, outcomes, impacts, and persistent challenges of the development process, policymakers gain valuable insights into what works and what doesn't in rural development efforts (Mwapachu, 1976). By tackling the key objectives and research questions, this study contributes to understanding the implementation challenges, socio-economic impacts and persistent barriers associated with transforming scattered settlements into planned villages. The findings of this study can help policy makers, government agencies and stakeholders to identify successful strategies, address shortcomings and strengthen community engagement and participatory approaches in rural development interventions which leads to the integration of bottom-up perspectives into policy formulation and implementation. Ultimately, this study has the potential to improve the livelihoods, infrastructure, and overall well-being of rural residents, contributing to the broader goals of poverty reduction, sustainable development, and inclusive growth in Rwanda.

## **1.6 RESEARCH SCOPE**

The scope of this study includes a comprehensive review of the factors that influence the success or limitations of the development of planned rural settlements in Rwanda. The study focuses on assessing the effectiveness and impact of government policies, socio-economic outcomes, infrastructure development, persistent challenges and community perceptions of rural settlement development, building on theoretical frameworks such as Community Development Theory. Specifically, development of settlements in the study areas of Gatebe and Rwabiharamba in Nyagatare district is examined to find out how these areas have evolved into planned settlements over the years.

The study covers the time period from 2005 to 2024, with data being gathered at five-year intervals. This time frame allows for a detailed analysis of changes and trends in settlement patterns and their impact on the community. The intention of the study is to assess the impact of these developments on the community, particularly in terms of infrastructure improvements and socio-economic changes that contribute to sustainable development. By focusing on these case studies, the study was intended to provide valuable insights into the effectiveness of planned rural settlements and provide recommendations for improving rural development policy and practice in Rwanda.

## 1.7 LIMITATION OF THE STUDY

This study for assessing the effectiveness of planned rural settlements in Rwanda, which focused on Gatebe and Rwabiharamba sites in Nyagatare district, encountered several limitations. These limitations may affect the scope, broad applicability, and depth of the research findings. Among these, the most challenging was the geographical extent, as the two sites were located in different sectors of the district, making data collection difficult in terms of logistics. The considerable distance between the sites required extensive travel, which was made further complicated through the limitations of the field researcher's availability. With only two visits per site, it was a challenge to collect comprehensive data and cover the entire perspective from the study areas.

Moreover, the distance between Kigali and Nyagatare district posed another hardship that limited the frequency of visits. These time and travel constraints resulted in the absence of some respondents, especially those who were not available during the morning visits. Their absence likely impacted the comprehensiveness and reliability of the data collected and affected the smooth running of the study overall. In addition, financial constraints also limited the time that could be spent on site. This study also faced the problem of data availability and quality. Having poor sentinel imagery hindered the ability to accurately analyze the evolution of the study areas over time. While Google Earth data was used to fill this gap, it did not provide the expected support for image classification, which hampered the analysis.

Beyond this, previously locations of residents in Gatebe and Rwabiharamba were found to be difficult to map. Respondents only provided general information about their former places of residence, making it impossible to provide the relative spatial distribution map in detail. Given that the relocated population came from different parts of the country, the lack of specific data hindered the ability to effectively analyze the demographic changes.

Despite these limitations, the study seeks to provide valuable insights into the complexities and sophistications of rural development. By acknowledging and addressing these limitations, the study attempts to improve the validity and confidence of its findings and contribute to informed policy making and sustainable rural settlement development.

## 2 LITERATURE REVIEW

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This chapter encompasses the inventory of literature for the study and focuses on the key concepts relevant to the study. It provides an overview of settlements, the importance of settlements in human society and the types of settlements with a focus on rural areas. The chapter then looks at the reorganization of rural settlements in Rwanda, government interventions in rural settlement development and the ongoing challenges associated with settlement development. It further explores the impacts of rural settlement development in Rwanda. Ultimately, the chapter discusses the strategies and mechanisms for the shift from scattered settlements to planned villages in Rwanda, with a focus on Gatebe and Rwabiharamba areas.

### 2.1 OVERVIEW OF SETTLEMENT

A settlement is a designated area where people live, work and interact with each other. Settlements can range from small villages to large cities and are generally identified by their infrastructure, land use and population density. Settlements can take different forms and vary in size, density and characteristics (Knox & McCarthy, 2005). They are influenced by various factors such as economic, political, cultural and environmental factors. Settlement, in its broadest sense, refers to the establishment of communities and human habitats in specific geographical locations (Knox & McCarthy, 2005). This process involves the construction of housing, infrastructure, and institutions necessary for sustaining human life and activities. While settlement patterns have historically been shaped by factors such as environmental conditions, social organization, and economic activities, recent studies emphasize the significant influence of technology and globalization on modern settlement dynamics (Liu, Lin, & Meng, 2024). In contemporary times, settlement patterns are heavily influenced by modern factors such as digital connectivity and global migration patterns. These factors have reshaped traditional forms of settlement and have given rise to new urban and peri-urban developments (Liu et al., 2024). Settlement in Africa is undergoing profound transformations influenced by modern factors such as digital connectivity and global migration patterns, with peri-urban areas playing a significant role in this evolution (Steyn & Roodt, 2003). One notable example is Nairobi, Kenya, where the proliferation of digital technologies has led to the emergence of tech hubs and co-working spaces, attracting a young, educated workforce. Areas like Kilimani and Westlands have seen a surge in residential developments catering to this

demographic, reflecting the integration of digital connectivity into urban settlement patterns (Rosenberg et al, 2020). Human settlements can be classified into two main categories: rural and urban. Rural settlements are generally focused on agriculture and natural resource-based economies, while urban settlements are centers of economic growth, manufacturing and infrastructure. Understanding the different types and patterns of settlements is essential for studying the social, economic and cultural dynamics of a given area or region (Dent, Dubois, & Dalal-Clayton, 2013; Greed, 2004; Heidger, 2018).

## **2.2 IMPORTANCE OF THE SETTLEMENT IN HUMAN SOCIETY**

Human settlements are fundamental to human society as they provide the framework for social, economic and cultural activities. Settlements - from small villages to large cities - provide essential services such as housing, health care, education and employment opportunities, creating a favorable environment for human development and well-being. They also promote social interactions and community cohesion, which are central to the sense of collective identity and cultural continuity of populations. The infrastructure and organization of human settlements facilitate the efficient distribution of resources, support economic activities and enable governance and administration, thus contributing to the overall stability and growth of societies (Knox & McCarthy, 2005).

Settlements are particularly important in urban areas as they act as hubs for economic activity and innovation. Cities attract diverse populations and industries and foster a dynamic environment that encourages entrepreneurship and cultural exchange. Urban settlements offer extensive infrastructure and services, including advanced healthcare, education and transportation systems that improve quality of life and promote economic productivity. The concentration of resources and talent in urban areas also drives technological progress and cultural developments, making cities a central factor in shaping the future of human society (Pacione, 2009). Urbanization, despite its challenges such as traffic congestion and pollution, remains a significant driving factor for economic growth and modernization, highlighting the important contribution of urban settlements to social progress.

In rural areas, human settlements make a substantial contribution to sustaining agricultural production and preserving natural landscapes. Rural settlements provide livelihoods for the

population engaged in agriculture, fishing and other primary economic activities, which is essential for food security and resource management. Traditional practices and cultural heritage are often maintained in these settlements, contributing to the diversity and richness of human culture. Rural settlements also play an important role in environmental protection, as they tend to be more integrated with natural ecosystems and practice sustainable land use. Improving infrastructure and services in rural areas can improve living standards and reduce migratory pressure on urban centers, promoting balanced regional development and ensuring the sustainability of both rural and urban communities (Citaristi, 2022; Un-Habitat, 2008).

### **2.3 DIFFERENT TYPES OF SETTLEMENTS**

There are several types of settlement, each with its own characteristics and functions. The two main categories are rural and urban settlements. Rural settlements are in rural areas and are generally smaller than urban settlements (Newman, Birrell, Spessa, & Tait, 1996). In the Rwandan context, rural settlements are fundamental components of the country's socio-economic fabric, characterized by small, dispersed communities predominantly engaged in agriculture and subsistence farming. These settlements typically feature traditional housing structures, such as mud-brick houses with thatched roofs, and are often organized around centralized marketplaces or administrative centers. The rural landscape of Rwanda is diverse, ranging from fertile valleys to hilly terrains, each influencing settlement patterns and agricultural practices. Rural communities in Rwanda maintain strong ties to the land, with farming serving as the primary source of livelihood and cultural identity (Golooba-Mutebi, 2013). They can be classified into three categories: dispersed settlements, clustered settlements, and linear settlements. Scattered settlements are characterized by scattered dwellings separated by significant distances. Clustered settlements consist of a group of buildings close to each other, while linear settlements are located along a communication route such as a road or a river. Urban settlements, on the other hand, are in urban areas and are characterized by a higher population density and larger size than rural settlements. They can be classified into three categories: compact settlements, dispersed settlements, and linear settlements. Compact settlements are characterized by a high density of dwellings and commercial buildings, while dispersed settlements are composed of isolated buildings spread over a large area. Linear settlements are found along communication routes such as motorways or railways (Hamerow, 1991; Voda, Svačinová, Smolková, & Balík, 2017).

## **2.4 RURAL SETTLEMENT**

A rural settlement is a community or village in a rural area, usually characterized by low population density and dependence on agriculture or other primary industries. Evaluating the effectiveness of these planned rural settlement sites involves an assessment of the extent to which they have been successful in achieving their objectives. This may involve examining factors such as the availability of clean water, access to health services, the availability of educational opportunities and the overall quality of life of the residents of these settlements. Assessing the effectiveness of planned rural settlement sites is an important step in ensuring that these communities can thrive and that their residents can enjoy a healthy quality of life (Dent et al., 2013; Huang, Song, & Song, 2020).

### **2.4.1 Classification of rural settlement according to their pattern**

There are five types of settlements classified according to their structure: isolated, dispersed, nucleated, linear and gridded (Cloke, 2013b; Mandal, 1989).

#### ***2.4.1.1 Isolated settlements***

Isolated settlements are rural communities that are physically and socially isolated from other settlements. These communities are often located in remote areas, with limited access to transport infrastructure, and may be small in size. Isolated settlements can be found in a variety of settings, including remote areas, mountainous regions and islands. The isolation of these settlements can lead to a range of problems, including limited access to basic services such as health care and education, limited economic opportunities and social isolation. These difficulties can be compounded by factors such as harsh climatic conditions, rugged terrain and lack of infrastructure (Cloke, 2013b; Li, Li, Zhang, & Yang, 2017).

In some cases, isolated settlements may be intentionally created as part of a government policy or program to encourage the settlement of remote or sparsely populated areas. For example, some countries have programs in place to encourage the settlement of rural or remote areas in order to promote economic development and national security. In other cases, isolated settlements may have developed over time due to historical, geographical or cultural factors (Li et al., 2017).

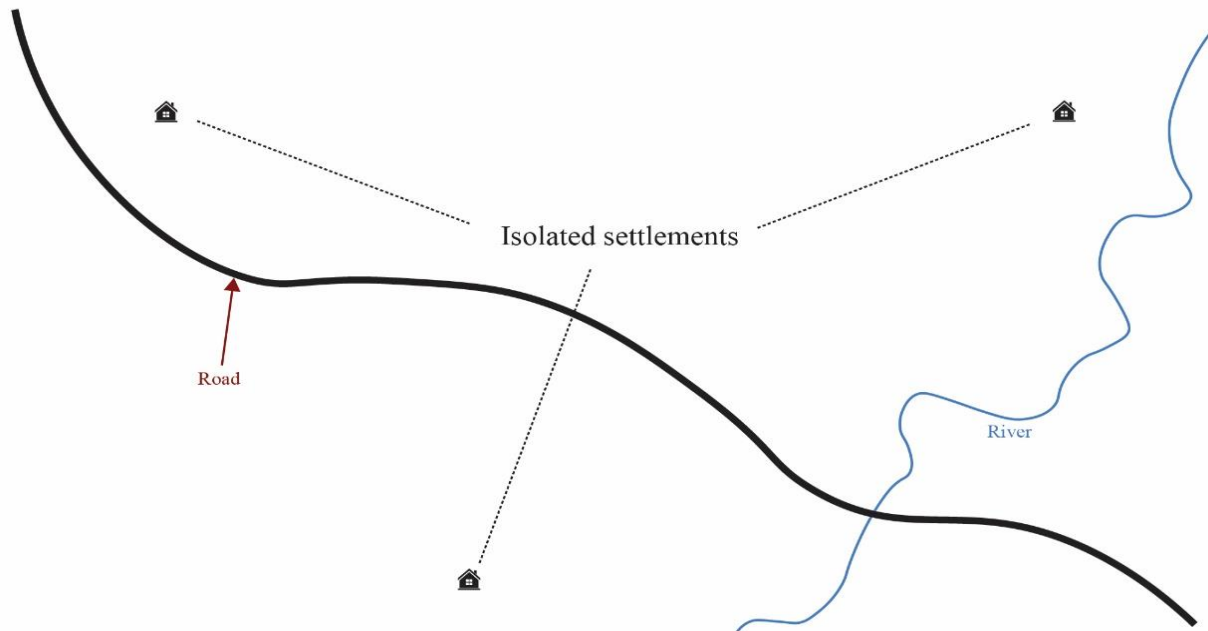
In Rwanda, isolated settlements are commonly found in upland areas or on the fringes of forests, where households establish their dwellings and farmsteads due to factors such as land availability or cultural preferences.

Adapting isolated settlements to modern challenges like demographic shifts or economic changes requires innovative approaches that leverage technology and infrastructure development. One way these settlements can adapt is through the use of modern agricultural practices and technologies. For example, the introduction of high-yield crop varieties, drip irrigation systems, and mechanized farming equipment can help improve agricultural productivity and income generation for isolated communities (Nkurunziza et al,2022). Additionally, initiatives focused on value-added processing and marketing can enhance the economic viability of agriculture in these areas, enabling residents to access wider markets and increase their income potential.

Furthermore, investing in infrastructure development is crucial for transforming isolated settlements. Improving road networks and transportation links can facilitate access to markets, healthcare facilities, and educational institutions, reducing isolation and promoting socio-economic integration. Access to reliable electricity and telecommunications infrastructure is also essential for enabling connectivity and fostering economic opportunities, including online entrepreneurship and remote work opportunities. Additionally, the provision of basic services such as clean water and sanitation facilities can improve living standards and enhance the resilience of isolated communities to environmental and health challenges.

Technology plays a pivotal role in transforming isolated settlements by enabling access to information, communication, and essential services. Mobile technology, for instance, can provide residents with access to agricultural extension services, weather forecasts, and market information, empowering them to make informed decisions and optimize resource utilization. Moreover, digital platforms and e-commerce solutions can facilitate trade and commerce, enabling isolated communities to engage in business activities beyond their immediate surroundings.

Figure 1: Isolated rural settlement patterns



Source Chen, Li, & Liu, 2017.

#### **2.4.1.2 Dispersed settlements**

Dispersed settlement is a rural community spread over a large area, with buildings and houses scattered across the landscape. This settlement, also known as scattered settlement, is a type of rural settlement pattern where dwellings are spread out over an extensive area rather than clustered together. This pattern often occurs in regions with abundant agricultural land or where environmental factors such as topography or access to resources influence settlement patterns. Unlike clustered settlements, where buildings are grouped together in a small area, dispersed settlements are characterized by buildings and houses located at some distance from each other. Scattered settlements are found in a variety of contexts, including rural areas, agricultural regions and areas with natural resources. They can be established on the basis of factors such as land ownership, resource availability and traditional settlement patterns (Cloke, 2013b; Li et al., 2017).

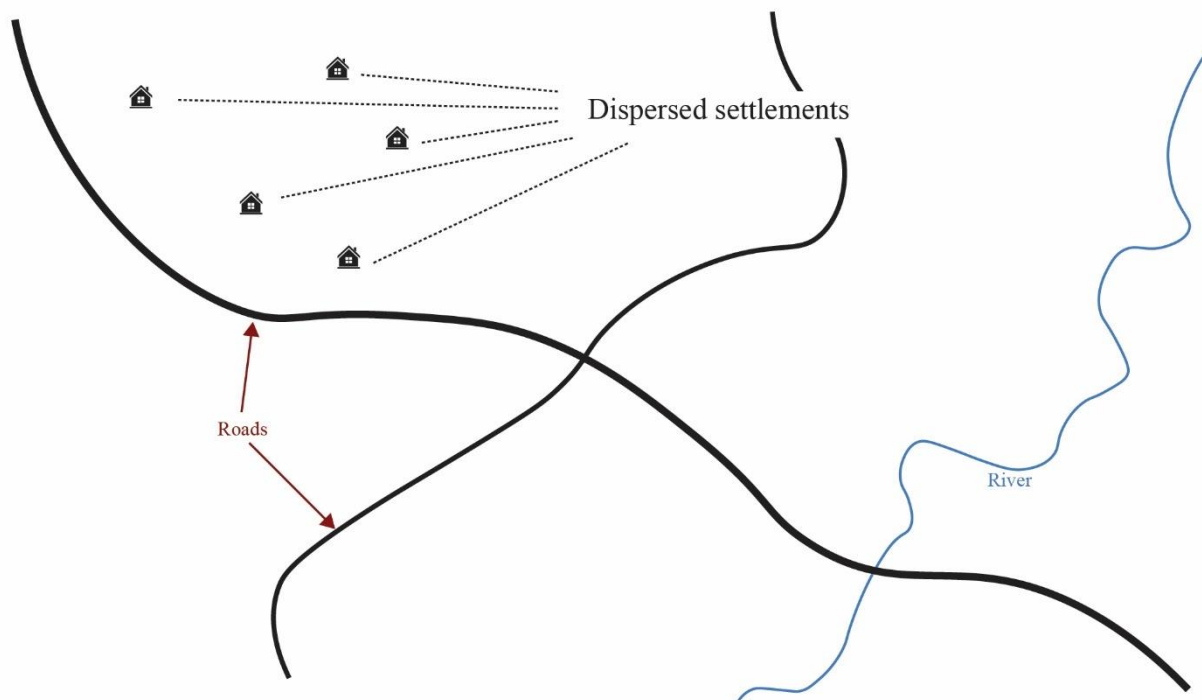
In many cases, dispersed settlements are associated with agricultural practices, where individual farms are located on or near cultivated land. They may also be associated with extractive industries, such as mining or logging, where workers are dispersed over a large area. Dispersed settlements

can present unique challenges for service delivery, such as access to health care, education and other basic services, as well as transport infrastructure. However, they can also offer advantages such as greater privacy and a sense of independence for residents (Li et al., 2017).

In the face of modern challenges such as demographic shifts or economic changes, dispersed settlements possess certain adaptive capacities. Dispersed settlements can adapt to demographic shifts through flexible land use and housing arrangements. For instance, as populations age and household sizes change, dispersed settlements can accommodate varying needs by allowing for the construction of additional housing units or the repurposing of existing structures. Furthermore, dispersed settlements may offer opportunities for intergenerational living arrangements, allowing older adults to remain within their communities while receiving support from family members (Teleshi et al 2021). This settlement also can adapt to economic changes by diversifying livelihoods and promoting local entrepreneurship. With advancements in communication technology and transportation infrastructure, remote work and e-commerce have become increasingly viable options for rural residents. Dispersed settlements can leverage these opportunities by providing conducive environments for home-based businesses and telecommuting. Additionally, community-led initiatives such as farmers' markets or artisanal cooperatives can stimulate local economies and create employment opportunities within dispersed settlements (Woods, 2019).

Technology and infrastructure development also plays crucial in reorganizing dispersed rural settlements through advancements in communication technology, particularly broadband internet access and mobile connectivity, have changed dispersed rural settlements by reducing isolation through online education, telemedicine, and virtual employment opportunities. Additionally, precision agriculture technologies enable farmers to optimize resource use and increase productivity, fostering economic sustainability (Green, 2016) and also Investment in infrastructure, such as roads, transportation networks, and renewable energy systems, further enhances connectivity and livability, which facilitates market access and promoting energy independence and environmental sustainability within these communities.

Figure 2: Dispersed settlements pattern



Source: Chen et al., 2017

### 2.4.1.3 Nucleated or compact settlements

Nucleated or compact settlements are rural communities where buildings and houses are clustered in a small area. They are characterized by a dense concentration of buildings, with a clearly defined central area surrounded by agricultural or natural landscapes. This type of settlement is characterized by a group of buildings and structures located around a central point, which is usually a market, religious or administrative center. Scattered settlements are common in areas with a long history of settlement and where the landscape and settlement patterns have been shaped by historical, social and economic factors. These settlements are often associated with agricultural practices, with farmers living close to their fields and other agricultural resources (Cloke, 2013b).

Nucleated settlements can offer benefits such as efficient land use, shared infrastructure and a sense of community. They also facilitate the provision of services such as health care, education and transport infrastructure. However, dispersed settlements can also present problems related to population density, such as increased traffic and noise levels. They can also be vulnerable to natural

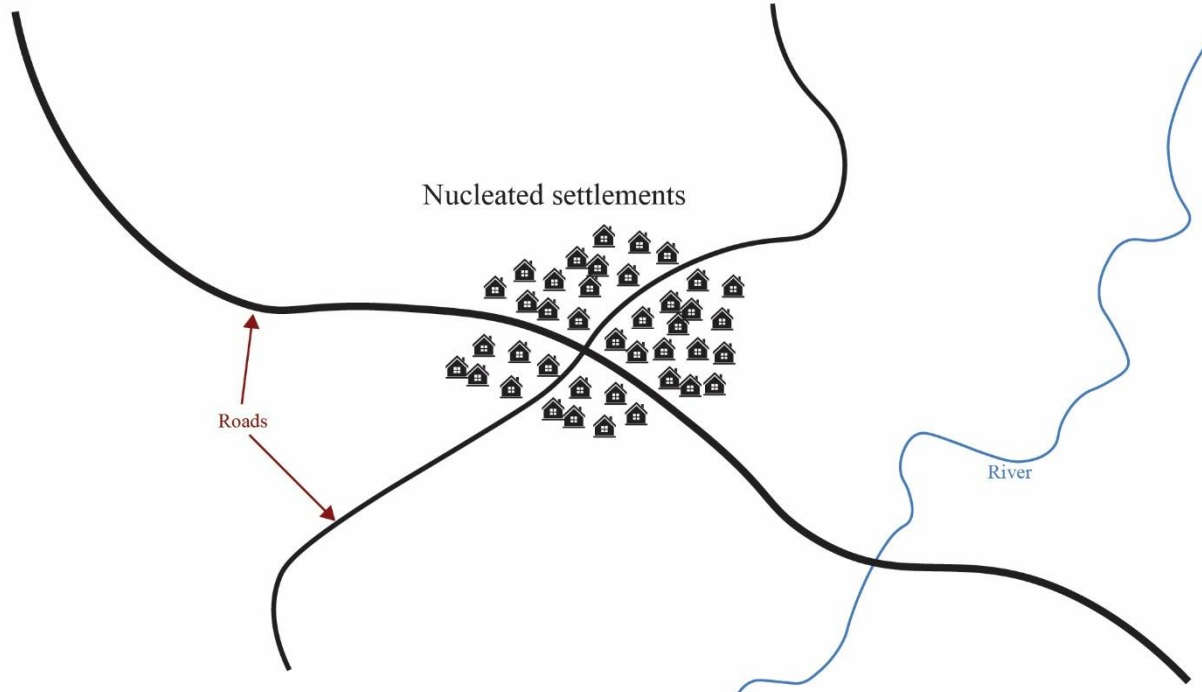
disasters such as floods or forest fires, as the concentration of buildings and infrastructure can exacerbate the impact of these events (Li et al., 2017).

These settlements have unique adaptive capacities to modern challenges like demographic shifts or economic changes.

Nucleated settlements can adapt to demographic shifts through flexible land use and housing arrangements. As populations age or household sizes change, these settlements can accommodate shifting needs by repurposing existing structures or constructing additional housing units within the compact footprint. Moreover, the close-knit nature of nucleated settlements fosters community support networks, which can provide assistance to vulnerable populations such as the elderly or families in need. Nucleated settlements can also adapt to economic changes by leveraging their centralized infrastructure for economic activities. The proximity of businesses, services, and amenities encourages collaboration and innovation, fostering local entrepreneurship and job creation. Additionally, compact settlements often have well-defined commercial centers, which can serve as hubs for tourism or cultural activities, contributing to economic resilience and diversification.

Technology and infrastructure development plays a pivotal in transforming nucleated rural settlements. Technology plays a crucial role in enhancing connectivity and access to services within nucleated settlements. High-speed internet, mobile connectivity, and digital platforms facilitate communication, e-commerce, and remote work opportunities, reducing barriers to economic participation and knowledge exchange. Furthermore, advancements in healthcare technology, such as telemedicine, enable residents to access quality healthcare services without leaving their communities, addressing healthcare disparities often experienced in rural areas (Machado et al, 2017). Infrastructure Development: Investment in infrastructure is essential for supporting the growth and sustainability of nucleated settlements. Well-maintained roads, public transportation networks, and utilities ensure efficient movement of goods and people, facilitating economic integration and access to markets. Moreover, investments in cultural and recreational infrastructure, such as parks, community centers, and heritage sites, enhance the quality of life and attract visitors, bolstering local economies. Sustainable infrastructure development, including renewable energy systems and green spaces, promotes environmental stewardship and resilience to climate change impacts.

Figure 3: Nucleated settlement pattern



Source: Chen et al., 2017.

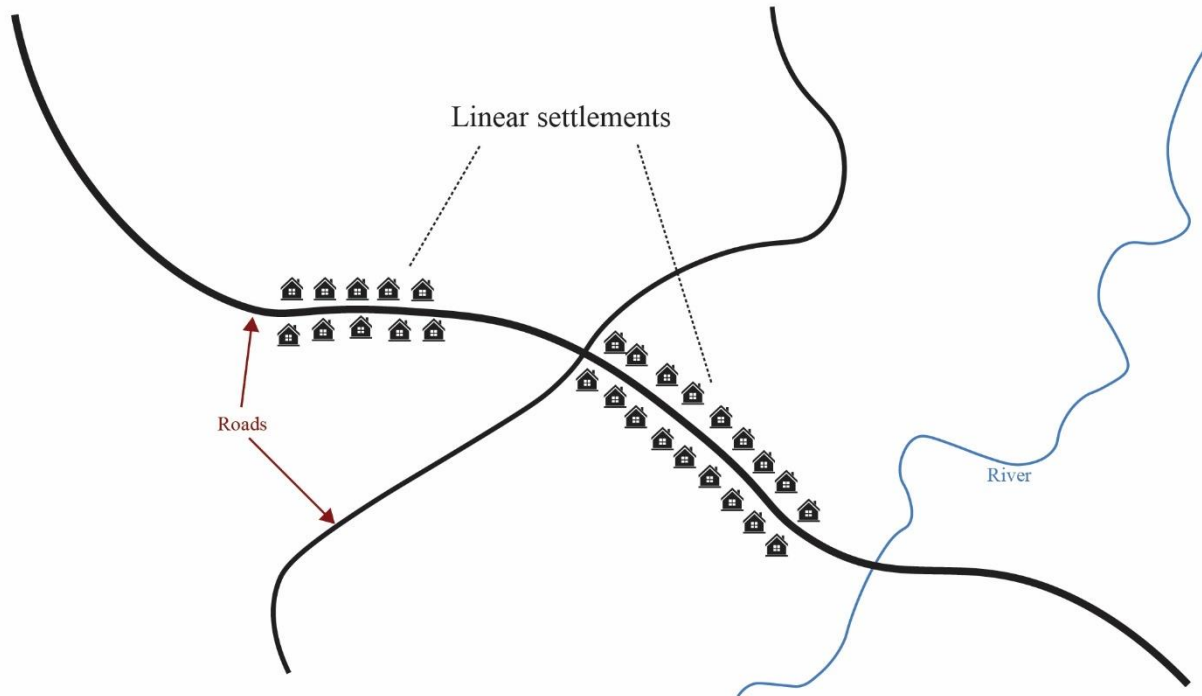
#### **2.4.1.4 Linear or elongated settlements**

Linear or elongated settlements are settlement patterns built along a linear feature such as a road, river or coastline. They are characterized by buildings and houses arranged in a linear or elongated pattern, often following the natural features of the landscape. Linear settlements can be found in a variety of contexts, for example along major transportation routes or in areas where the landscape presents difficulties for settlement, such as steep hills or narrow valleys. In some cases, linear settlements may be associated with specific economic activities such as fishing or forestry(Cloke, 2013b).

Linear settlements have advantages such as easy access to communication routes, shared infrastructure and a sense of community along the linear feature. However, they can also present challenges related to service provision, such as access to health care and education, as well as vulnerability to natural disasters such as flooding or landslides. Linear settlements can take a variety of forms, including roadside settlements, ribbon settlements and clustered linear

settlements. In all cases, the linear or elongated development pattern is a defining characteristic of the settlement type (Li et al., 2017).

Figure 4: Linear or elongated settlements



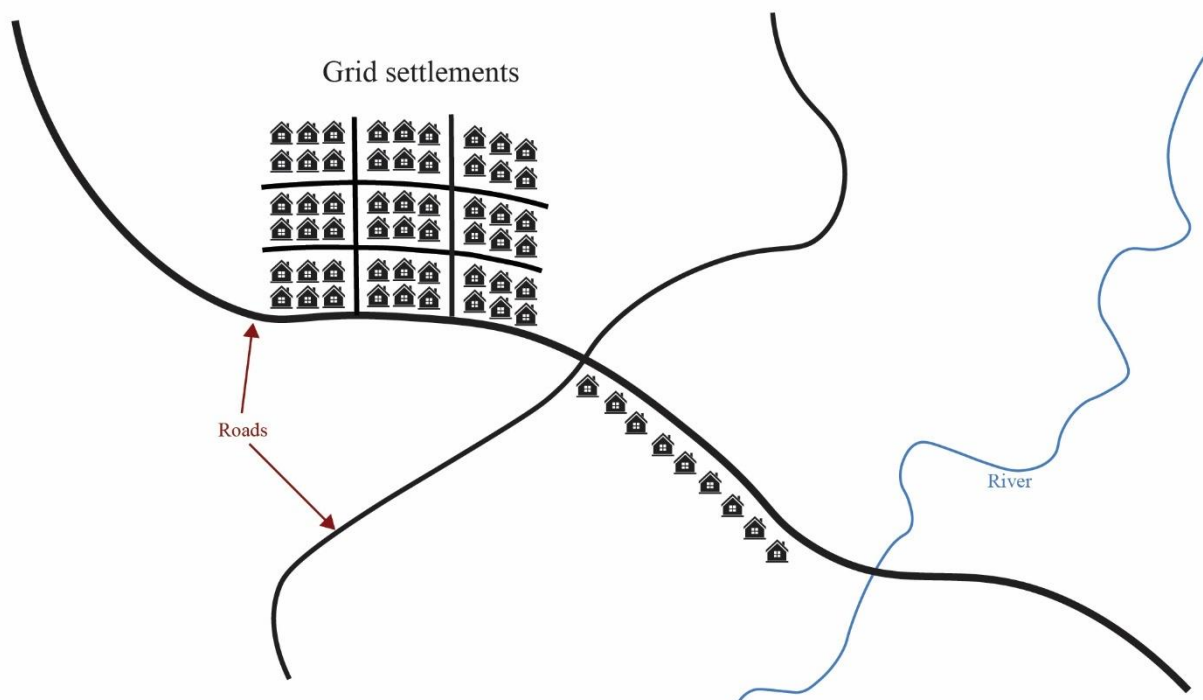
Source: Chen et al., 2017.

#### 2.4.1.5 Grid Settlements

Grid settlements are rural communities characterized by a regular network of streets and blocks. This type of settlement is often associated with planned urban or suburban development but can also be found in rural areas where settlements have been created or expanded through deliberate planning efforts. Grid developments are often designed to be efficient and orderly, with a clear hierarchy of streets and blocks that facilitate movement and access throughout the development. This can also facilitate the provision of infrastructure and services such as water, sanitation and electricity. Grid settlements are often associated with agricultural areas that have been subdivided for settlement or with new towns or settlements that have been established through planned development efforts (Cloke, 2013b).

Grid settlements can have advantages such as efficient land use, ease of navigation and good organisation of infrastructure and services. However, they can also present challenges related to a lack of diversity in building and street patterns, and a potential lack of community character or identity. Grid developments can take a variety of forms, including rectilinear grids, curvilinear grids and hybrid grids that incorporate elements of both types of grids. The specific form of the grid will depend on various factors such as local topography, land use patterns and planning objectives (Li et al., 2017).

Figure 5: Grid settlements



Source: Chen et al., 2017.

## 2.4.2 Classification of rural settlements according to their size

Rural settlements can be subdivided into four categories according to their size, namely single homestead, farmstead, hamlets, and villages (Krozer, 2017; Mandal, 1989).

### 2.4.2.1 A single homestead

A single homestead is a rural settlement consisting of a single dwelling, usually occupied by a family or small group of people and may be located several kilometers from the next dwelling.

This type of settlement is characterized by low population density, as the homestead is often located on a large parcel of land used for farming or other rural activities. Single homesteads are usually located in remote areas, away from major settlements or urban centers. They may be established for a variety of reasons, such as the pursuit of a particular agricultural or subsistence activity, the maintenance of a traditional lifestyle, or the search for solitude and privacy (Krozer, 2017).

Single homesteads offer advantages such as independence and self-sufficiency, as well as a closer connection to the natural environment. However, they can also present difficulties related to lack of access to infrastructure and services such as health care, education and transport. Single homesteads can take a variety of forms, ranging from simple traditional dwellings to more modern or elaborate structures. The specific form of the homestead depends on various factors such as local building traditions, available materials, and the needs and preferences of the occupants (Mandal, 1989).

#### **2.4.2.2 *A farmstead***

A farmstead is a rural settlement consisting of one or more dwellings and associated structures, such as barns, sheds and storage facilities, which are used for agricultural purposes. A farm is made up of two or more homesteads, usually dispersed in an agricultural area and occupied by about fifty people. This type of settlement is characterized by the emphasis on farming and livestock production, with the farm often located on a large parcel of land used for agricultural production. Farms can range in size from small family farms to large farms and can be run by a single family or by several families or workers. They can be located in isolated rural areas or in more densely populated areas, depending on local land use and farming practices (Mandal, 1989).

Farms offer benefits such as the opportunity to produce food and other agricultural products, as well as a closer connection to the natural environment and a sense of belonging to the rural community. However, they can also present challenges related to economic and environmental sustainability, as well as a potential lack of access to infrastructure and services such as health care, education and transport.

The specific form of a farm depends on various factors, such as the type of agriculture practiced, local building traditions, and the needs and preferences of the occupants. Farms may include a

variety of structures, such as housing for farm workers, storage facilities for crops and livestock, and processing facilities for agricultural products (Krozer, 2017).

#### **2.4.2.3 *A hamlet***

A hamlet is a small settlement, usually in a rural area, that is smaller than a village and consists of several scattered, nucleated or linear homesteads, usually with shops, schools or other service centers and occupied by a few hundred people engaged in primary activities such as farming, hunting and fishing. Hamlets are usually characterized by a small number of dwellings and may be centered around a crossroads, church, common area or other community gathering place (Mandal, 1989).

Hamlets offer advantages such as a sense of community and social support, as well as access to basic services such as schools, shops and health care facilities. However, they can also present challenges related to lack of economic opportunities and limited access to infrastructure and services compared to urban centers. The specific form of a hamlet depends on various factors, such as local geography, history and culture. Hamlets can include a variety of structures, such as houses, barns, shops and other small-scale commercial and service establishments (Krozer, 2017).

#### **2.4.2.4 *A village***

A village is a type of human settlement, usually located in a rural area, which is larger than a hamlet but smaller than a town or a city. A village, like a hamlet, can be dispersed, nucleated or both nucleated and linear, but the village has more homesteads, and its population can reach several thousands. The inhabitants are engaged in primary activities, but there may also be craft enterprises and service centers such as schools, post offices, health centers and markets (Krozer, 2017).

Villages are often characterized by a strong sense of community, with residents working together to meet common needs and maintain social links. The specific characteristics of a village can vary considerably depending on the geography, culture and history of the area. Typically, villages include a central gathering place, such as a marketplace, church or community center, and a mix of residential, commercial and industrial structures. Villages may also be surrounded by farmland, forests or other natural resources that play an important role in the local economy (Mandal, 1989).

Villages offer many benefits, including a sense of community, access to basic services such as schools and health care facilities, and opportunities for social and economic interaction. However,

they can also face challenges related to limited access to infrastructure and resources compared to larger urban centers, as well as social and economic inequality.

### **2.4.3 Types and Characteristics of Rural Settlement in Rwanda**

According to the Rwanda Education Board, rural settlements in Rwanda are categorized into isolated settlements, scattered settlements, linear settlements, nucleated settlements, grouped settlements and planned settlements. These settlement types were discussed further in section 2.4.1 of this study and reflect the global definitions.

Grouped settlement, also known as Umudugudu, consists of 100 to 200 mud-brick houses in an area. This cost-effective housing system is organized in centers of development equipped with basic infrastructure and services. This system promotes non-agricultural, income-generating activities and profitable agriculture through land reclamation. The main objective of Imidugudu is to improve the quality of life by providing jobs, adequate housing, access to water and energy, a clean environment, markets, health services and ensuring security and governance. Several grouped settlements form rural settlement scheme (REB, 2020).

In Rwanda, nucleated settlements are formed around central points such as road junctions or resource extraction areas. These can be either permanent or temporary and are usually connected by roads or footpaths, as is common in the districts of Muhanga and Rulindo. Respectively, linear rural settlements in Rwanda formed along natural features such as rivers, coastlines or roads and maintain their pattern even as the population grows. This type of settlement is common across the country, especially in Eastern Province, where houses are built along roads for ease of access, and in other regions due to topographical constraints. Isolated settlements are characterized by houses that are far apart from each other, where the land is individually owned, and each family lives on its own plot. These are common in areas with low agricultural productivity and low population density, as well as in regions with little or no rainfall, such as many parts of Kayonza and Nyagatare districts (REB, 2020).

Planned rural settlements in Rwanda date back to the National Human Settlement Policy adopted in December 1996, which focuses on urban planning, the reorganization of unplanned residential areas and the regrouping of the rural population. These settlements were established to

accommodate Rwandans resettled from high-risk zones, historically marginalized groups, displaced persons from Tanzania and refugees from Mugombwa camp. The aim of these settlements is to ensure access to water, roads, electricity and infrastructure, and settlements have already been established in Huye and Gisagara. These settlements are primarily aimed at improving rural and urban planning, providing decent housing, improving land use and protecting the environment (REB, 2020).

#### 2.4.4 Synthesis for rural settlement classification from Global to Rwandan Context

This section presents an overview of the synthesis of types of rural settlements both in the general context and specifically in Rwanda. By looking at common characteristics, comparison is made with the Rwandan context and reference is made to examples of places where these types of settlements are found. The table below illustrates the similarities and differences while highlighting the unique aspects of rural settlements in Rwanda to ultimately provide an assessment of the effectiveness of planned rural settlements in Rwanda. This comparison helps to understand how planned rural settlements in Rwanda respond to local needs and contribute to the overall development of the region.

Table 1: Synthesis for rural settlement classification from Global to Rwandan Context

Settlement Type	General Characteristic	Rwandan Context
Isolated Settlements	Houses located far away from each other, with individual land ownership. Often in remote areas with limited access to services and infrastructure.	They are typically found in mountainous regions or on the fringes of forests, where households establish homes and farms based on land availability and cultural preferences (Karongi, and or Nyamagabe closer to Nyungwe forest). They also found in low-density, low-productivity areas like Kayonza and Nyagatare, these settlements often face limited effectiveness due to inadequate access to infrastructure and services.
Dispersed Settlements	Settlements spread over a large area, with buildings and houses scattered across the landscape. Often associated with farming practices.	Commonly found in areas influenced by land availability and in almost all parts of the country such as Ngororero, Gakenke, all parts of Southern Province and Eastern Province
Nucleated Settlements	Settlements whose buildings are grouped together in a small area,	They are found around central points such as road junctions or resource extraction

	often around a market or religious center.	areas, for example in Muhanga, Gakenke, Ngororero and Rulindo. These settlements may be permanent or temporary and are often connected by roads or footpaths.
Linear Settlements	These settlements are established along a linear feature such as a road, river or coastline. Buildings are arranged in a linear or elongated pattern.	Common along natural features such as roads. This pattern is generally predominant in the Eastern Province, along roads, but is also prevalent in the Western and Northern Provinces, where settlements are established on elongated mountain tops, close to roads.
Grouped Settlements	Clustered settlements equipped with infrastructure and services	Known as <b>UMUDUGUDU</b> , consisting of 100 to 200 mud-brick houses in an area. Organized in centers of development equipped with basic infrastructure and services. Promotes non-agricultural activities and profitable agriculture. Aim to improve quality of life by providing jobs, adequate housing, access to water and energy, a clean environment, markets, health services, and ensuring security and governance.
Planned Settlements	Settlements established through deliberate planning efforts to meet specific needs such as resettlement or development.	Established to accommodate resettled people, including those from high-risk areas, displaced persons from scattered settlements and refugees. The focus is on improving land use planning, providing adequate housing, and protecting the environment. Examples include the settlements in Nyagatare, Huye and Gisagara.

Source: MININFRA, 2009 and REB, 2020

#### 2.4.5 The problems experienced in rural settlements in Rwanda

Rural settlements in Rwanda experience several critical problems that affect the quality of life and economic stability of residents. Primarily, there is a significant lack of basic social amenities such as healthcare, education and clean water, which affects the well-being and development of the rural population. Secondly, rural migration exacerbates labor shortages in agriculture as younger and more capable people move to the cities in search of better opportunities, leaving behind an aging workforce that struggles to maintain agricultural productivity (REB, 2020).

Another important problem is the deterioration of soil fertility, which is mainly due to poor agricultural practices. This deterioration in soil health has led to lower agricultural yields and threatens the food security and livelihoods of farmers whose income depends on their crops. In addition, encroachment into forested areas has led to a reduction in forest cover, disrupting local ecosystems and further increasing environmental degradation. This deforestation not only impacts biodiversity, but also affects the availability of natural resources that rural communities depend on. In addition, the limited availability of income-generating activities in rural areas has led to an increase in poverty. With few opportunities for economic diversification, many rural dwellers are trapped in a vicious cycle of poverty and are unable to improve their living conditions or invest in better agricultural practices (REB, 2020). Addressing these issues requires comprehensive strategies that include the reorganization of rural settlements in Rwanda while improving social infrastructure, promoting sustainable agricultural practices, protecting forest areas and creating diverse economic opportunities to lift rural communities out of poverty.

#### ***2.4.5.1 Insufficient coverage of Imidugudu***

This inadequate coverage of imidugudu settlements, which affected less than 20% of the rural population after the 1994 genocide, poses a major challenge to the development of rural settlements in Rwanda (MININFRA, 2009). Although the government recognized the regrouping of settlements as a solution to population pressure and poor land management, the limited implementation of imidugudu was primarily due to poverty at both government and household levels (MININFRA, 2009).

As post-1994 Genocide against the Tutsi, settlement activities were heavily dependent on external aid, the decline in funding from foreign donors and NGOs negatively impacted resettlement and relocation programs (MININFRA, 2009). Beyond this, challenges such as expropriation, limited construction materials and insufficiently qualified human resources hindered the expansion of resettlement efforts throughout the country (MININFRA, 2009). These factors collectively hinder the effective implementation and expansion of Imidugudu settlements and restrict efforts to address rural development challenges in Rwanda.

#### ***2.4.5.2 Inadequate planning and management of human settlements***

A challenge for the rural settlement development in Rwanda is the inadequate planning and management. In the absence of adequate regulation or control, settlements have been scattered,

often far from basic infrastructure and services. This lack of planning is due to the absence of an appropriate institutional framework and tools to effectively manage land in rural areas (MININFRA, 2009). As a result, rural communities struggle to access essential services and amenities, hindering their overall well-being and development. Besides, the inefficiency of firms and research consultants in developing appropriate models for rural settlement fuels the problem and hampers efforts to improve settlement conditions in Rwanda. Addressing these challenges required the establishment of specific frameworks for rural settlement management and the strengthening of research and extension efforts to develop effective and sustainable models for rural development (MININFRA, 2009).

#### ***2.4.5.3 Insufficient infrastructure in regrouping sites***

Among the challenges in the development of rural settlements in Rwanda is the inadequate land improvement in shifting sites - Imidugudu villages. Despite efforts to establish these villages to address the lack of access to basic services and amenities, inequalities in infrastructure and social services for residents persist. One notable problem is the lack of proper access development of the land in these sites, leading to difficulties in accessing essential resources such as water, electricity and so on (MININFRA, 2009). The distance between houses and water supply points remains a major problem. Many households are located beyond the recommended distance of 200 meters to water sources. As a result, a large proportion of the rural population still does not have access to adequate drinking water, highlighting the ongoing challenges in land improvement and infrastructure development in rural settlement sites (MININFRA, 2009). To address this problem, targeted measures are needed to improve land infrastructure and ensure equal access to basic services for all rural dwellers.

#### ***2.4.5.4 High demand for housing***

Indeed, one of the issues in the development of rural settlements in Rwanda is the high demand for housing, especially among vulnerable households. MININFRA sector planning forecasts show that there is a significant need for adequate housing, with more than 135,000 vulnerable households in need of adequate housing (MININFRA, 2009). These households, who mainly lived in rural areas, often lived in unstable conditions, e.g. in fragile constructions made of plastic sheeting or banana leaves. Vulnerable groups, including widows, orphans, people with disabilities and the elderly, have difficulty finding suitable accommodation. The gradual return of Rwandans

from exile further increased the demand for housing and resettlement (MININFRA, 2009). Widespread poverty among families in rural areas, most of whom lived below the poverty line, limits their ability to build permanent housing and underscored the urgent need for measures to address the housing shortage and improve living conditions in rural areas.

Despite all these challenges, the rural population is still struggling with housing shortages and many still live in scattered locations. The problem persists as the people are not willing to move to planned rural settlements and prefer to stay on their ancestral land. Therefore, the government is faced with the task of developing strategies to solve this housing issue while accommodating people from their established locations.

#### ***2.4.5.5 Limited financial resources***

According to the Ministry of Infrastructure in 2009, The limited financial resources pose a challenge for the development of rural settlements in Rwanda. Financing mechanisms for rural settlements are underdeveloped and disorganized, which hinders the access to finance for infrastructure development and housing improvement. On top of this, housing schemes lack effective design and implementation, which makes the problem even worse (MININFRA, 2009). This shortage of funds limits the ability of the government to invest in key infrastructure and services, hampering efforts to improve living conditions in rural areas.

## **2.5 RURAL SETTLEMENT RE-ORGANIZATION IN RWANDA**

### **2.5.1 National Human Settlement Policy**

The historical context of state intervention in rural settlement development in Rwanda reflects a series of attempts and initiatives aimed at improving living conditions, infrastructure, and community organization in rural areas (MININFRA, 2009). A notable intervention phase began in 1978 with the attempt to group scattered settlements into villages. This initiative aimed to bring the population together in better organized and functioning villages. Examples include the villages of Gashora in Bugesera and Sake in Kibungo and the pilot village of Rango in Butare (MININFRA, 2009; Ngoga, 2015).

These interventions were motivated by various factors, including the need to address socio-economic inequalities, increase agricultural productivity and promote social cohesion. However, despite the well-intentioned efforts, these early attempts faced major challenges and ultimately failed to achieve their objectives (MININFRA, 2009). Several factors contributed to their failure, including the lack of monitoring and supervision by the authorities and inadequate basic infrastructure to support the newly formed villages (MININFRA, 2009; Ngoga, 2015).

In the late 20th century, the Rwandan government-initiated awareness campaigns to promote the use of iron sheets and tiles for roofing in rural settlements (MININFRA, 2009). The 1978 and 1991 censuses showed a trend towards improving housing conditions, switching from thatched roofs to iron sheet or tiles. These efforts were aimed at improving living conditions and infrastructure in rural settlements, which was an important step in Rwanda's rural development initiatives (MININFRA, 2009; Ngoga, 2015).

The genocide against the Tutsi in Rwanda in 1994 triggered a humanitarian crisis during which a large number of displaced people returned to find their homes destroyed (MININFRA, 2009). To address the housing challenges arising from this crisis, the Rwandan government, in particular the Ministry of Public Works, implemented measures to promote rural settlement development (MININFRA, 2009). In December 1996, instructions were issued to promote consolidated settlements (imidugudu)<sup>c</sup> in rural areas in order to create planned residential patterns and improve living conditions (MININFRA, 2009; Ngoga, 2015).

As part of this policy, efforts were also made to provide adequate housing for vulnerable groups such as widows, orphans, and people with disabilities. In addition, existing settlements were to be upgraded to ensure access to basic services and amenities. The government's resettlement program emphasized social inclusion and community cohesion and aimed to create an enabling environment for all sections of Rwandan society (MININFRA, 2009). These measures marked a significant shift towards planned rural settlement development and laid the foundation for subsequent initiatives to improve housing infrastructure and enhance the quality of life of rural dwellers in Rwanda (Ngoga, 2015).

### **2.5.2 Resettling the rural population from dispersed and high-risk areas to planned villages.**

In 2008, among the key measures taken by the government to drive rural settlement development in Rwanda was the establishment of the Rural Settlement Task Force (RSTF) to accelerate the relocation of the rural population to planned villages that are in line with the Vision 2020 goals (RHA, 2018). In 2014, the RSTF team moved from MINALOC and joined the Rwanda Housing Authority (RHA) to form the Rural Settlement Planning and Development Department. This division within the RHA was responsible for ensuring that displaced populations should be settled in the approved planned settlements sites. It was also responsible for monitoring the displaced persons, especially the vulnerable groups (RHA, 2018).

### **2.5.3 Vision 2050**

As part of national rural settlement development strategy, the Rwandan government is aiming for 70% urbanization by 2050, with only 30% of the population living in rural areas (MINECOFIN, 2020). The plan is to densify rural settlements with the most important infrastructure and services. It envisages increasing the proportion of rural households living in integrated planned settlements to 80% by 2024 and 100% by 2035 and maintaining this level thereafter. With this initiative, the government aims to promote sustainable urban growth while ensuring that rural communities have access to adequate facilities and amenities to improve their standard of living (MINECOFIN, 2020).

### **2.5.4 National Land Use and Development Master Plan 2020 – 2050**

As outlined in the NLUDMP 2050, the rural landscape of Rwanda encompassed around 13,661 villages in 2019, in which 82% of the population lived (NLA, 2020). However, the large number of scattered homesteads and Imidugudu villages prevents scale economies. There has therefore been an urgent need to restructure rural settlements (NLA, 2020). Proposed measures include streamlining settlement structures to increase efficiency and encourage sustainable rural development.

The measures outlined in NLUDMP 2020 - 2050 proposed a far-reaching approach to rural settlement development in Rwanda that focuses on consolidation, optimization and sustainability (NLA, 2020). By consolidating rural settlements to around 3000 sites and introducing strict boundaries, the government aims to limit urban sprawl and promote efficient land use. The

restructuring of Imidugudu system into organized clusters and the move away from traditional village administrative structures underscore the shift towards more cohesive and economically viable settlements (NLA, 2020). The emphasis on high-density housing models and the promotion of smaller housing units reflects a commitment to maximizing the efficient use of land and meeting housing needs. Beyond this, the directive to avoid new development outside settlement boundaries is consistent with the goal of controlled and organized residential growth. Ultimately, advocating for a change in mindset regarding land use highlights the importance of community engagement and awareness in promoting sustainable rural development practices for present and future generations (NLA, 2020).

## **2.6 STRATEGIES AND MECHANISMS IN REORGANIZING SCATTERED SETTLEMENTS TOWARDS PLANNED VILLAGES.**

The national human settlements policy in Rwanda prioritizes the improvement of rural settlements to promote socio-economic development (MININFRA, 2009). This objective is backed by specific strategies aimed at rationalizing land use, constructing new quality housing and improving land management. According to the Ministry of Infrastructure in 2009, the strategies also focus on increasing agricultural productivity, creating alternative income opportunities and decentralizing basic services for the rural population. Greater involvement of the population in settlement management and improving the financing system for settlements are also integral parts of the policy. These strategies are in line with the overarching goal of transforming scattered settlements into planned villages through coordinated efforts to optimize land use, infrastructure development and community participation for sustainable rural development (MININFRA, 2009).

### **2.6.1 Promotion of the regrouping of human settlement in rural areas**

According to the National Human Settlement Policy, the strategy to promote the regrouping of human settlements in rural areas and the consolidation of established rural centers represents a significant step in the transformation of scattered settlements into planned Imidugudu villages, consistent with the specific objective of rationalizing national land use (MININFRA, 2009). This strategy includes several related programs designed to facilitate the transition to planned settlements (MININFRA, 2009).

These programs include:

- a. Consolidation of existing imidugudu and rural centers,
- b. Identification and improvement of land for hosting clusters in regrouped settlements,
- c. Development of physical plans for imidugudu sites, preparation of model plans for rural settlements,
- d. Establishment of organizational frameworks for access to land in regrouped sites,
- e. Restructuring of small business centers in rural areas.

These initiatives aim to streamline settlement patterns, optimize land use and improve infrastructure development in order to promote sustainable rural development and improve the quality of life of rural dwellers (MININFRA, 2009).

The Rwandan policy promoting the regrouping of human settlements in rural areas, known as "Imidugudu," seeks to improve living standards by encouraging people to move into organized villages. This initiative aims to enhance access to basic services, optimize land use, and boost economic development. According to Population and Housing Census (PHC) of 2022, 77% of rural households in these settlements now have access to clean water, up from 56% in 2019/2020 (UNICEF, 2024). However, a critical evaluation reveals mixed outcomes. While infrastructure and service delivery have improved, the policy has faced challenges such as land disputes, substandard housing quality, and limited economic opportunities. Overall, the policy has transformed rural settlements by reducing scattered homesteads and creating structured communities, but achieving broader economic and social goals remains a challenge.

### **2.6.2 Strategy for raising public awareness**

The public awareness strategy is to educate both the population and the local authorities on the benefits and process of consolidating scattered settlements into planned Imidugudu villages (MININFRA, 2009). It is in line with the objective of rationalizing national land use by promoting voluntary, gradual, and inclusive settlement consolidation. The National Housing Policy emphasizes the importance of integrating new mindsets, values and standards into regrouped human settlements (MININFRA, 2009).

This strategy includes programs to raise awareness among the population and authorities at all levels, as well as the implementation of pilot programs and the dissemination of their results (MININFRA, 2009). By promoting understanding and acceptance of the redeployment process,

this strategy aims to facilitate the successful transformation of scattered settlements into planned villages, thus contributing to more efficient use of land. The "strategy for public awareness" is vital for transforming scattered settlements into planned ones in Rwanda, aiming to educate the population about the benefits of organized living areas. A major challenge is the initial resistance from residents, where some people are reluctant to relocate due to emotional and cultural ties to their ancestral lands. Strategies to overcome this include comprehensive information campaigns and community meetings. According to MININFRA report, (2020) to promote decent settlement of Rwandans, 8,394 households from scattered settlements and 771 households from high-risk zones were relocated and settled into viable settlements. In addition, IDP Model Villages at the borders of Nyagatare, Gicumbi, Burera & Nyaruguru (phase II) were under upgrading process with overall works progress completed as follows:

1. Burera, Nyagatare and Gicumbi Districts works completed at 100%. Kaborogota IDP Model Village in Nyagatare.
2. Kivugiza/Nyaruguru District works progress completed at 94%. (MININFRA, 2020).

Effective stakeholder engagement involves local leaders, NGOs, and international partners to ensure cohesive messaging and community participation. The socio-political dynamics, such as balancing governmental directives with community autonomy, are crucial in ensuring the strategy's success. Transparent communication and inclusive decision-making processes are essential in navigating these dynamics.

### **2.6.3 Access to housing for vulnerable social groups**

Ensuring access to housing for vulnerable groups is a defining strategy in the transformation of scattered settlements into planned Imidugudu villages, consistent with the objective of providing new housing units (MININFRA, 2009). The National Housing Policy highlights the importance of providing adequate housing, especially to homeless and vulnerable families (MININFRA, 2009). Given the history of Rwanda, marked by war, genocide and the widespread destruction of homes, the rapid provision of housing is critical to promoting social harmony, sustainable peace, and economic development (MININFRA, 2009).

This strategy includes:

1. The implementation of specific support programs targeted at homeless and vulnerable groups,
2. The promotion of neighborhood solidarity and traditional interaction.

Through prioritizing the housing needs of vulnerable groups and promoting community cohesion, this strategy aims to eliminate social inequalities, improve living standards, and contribute to the overall development and stability of Rwandan society (MININFRA, 2009).

"Access to housing for vulnerable social groups" is a key strategy in transforming scattered settlements into planned communities in Rwanda, aimed at ensuring that marginalized populations, such as low-income families, the elderly, and people with disabilities, have access to adequate housing. One significant challenge is the problem of affordability. To address this, the government has introduced subsidized housing schemes and flexible financing options, which have helped reduce this challenge. Stakeholder engagement is crucial, involving local authorities, international donors, and civil society organizations to collaboratively design and implement inclusive housing policies. Socio-political dynamics, including the need for policy alignment across different governance levels and ensuring community participation, are essential to the strategy's success. Transparent and participatory processes enhance trust and cooperation among stakeholders, facilitating smoother implementation.

#### **2.6.4 Promoting the production and use of local building materials**

Promoting the production and use of local building materials is a strategic initiative in the transformation of scattered settlements into planned Imidugudu villages to improve the quality of houses in rural areas (MININFRA, 2009). An important part of the National Housing Policy highlights the significance of establishing production units for durable local building materials, appropriating production techniques and reducing costs to make them accessible to low-income rural households. By organizing marketing channels, some imported building materials was replaced by locally produced ones to promote self-sufficiency and affordability (MININFRA, 2009). This strategy includes an inventory of available local material resources, incentives for local material production, and the establishment and support of stores and outlets for these materials. The aim of these programs is to improve the durability, affordability and accessibility of building materials in order to improve the overall quality of rural housing infrastructure (MININFRA, 2009).

### **2.6.5 Training and information of the population on appropriate technologies**

Educating and disseminating information on appropriate technologies to the population has been a key strategy in transforming scattered settlements into planned Imidugudu villages to improve the quality of rural housing (MININFRA, 2009). In fact, the National Housing Policy underlines the need to equip local communities with the necessary knowledge and skills to actively participate in the socio-economic development of their villages. This includes the development of training modules on construction materials and techniques to be provided by specialized centers, associations and companies involved in the production of construction materials. Additionally, staff training programs was carried out to equip professionals with the necessary knowledge in rural housing construction (MININFRA, 2009). By strengthening municipal capacities and technical know-how, this strategy aims to promote sustainable development and accelerate the transition to better housing standards in rural areas.

### **2.6.6 Strengthening the institutional structures involved in the management of human settlements.**

Strengthening the institutional structures involved in the management of settlements is a critical strategy in the transformation of scattered settlements into planned Imidugudu villages, aimed at empowering local communities in settlement management (MININFRA, 2009). The National Housing Policy places emphasis on the need to involve local authorities in the whole process of settlement activities and the establishment of functional settlement commissions. This strategy includes reactivating the settlement commissions and strengthening the existing administrative structures to enhance their capacity to effectively manage settlement issues. By strengthening the institutional framework and facilitating the active participation of local authorities, it aims to decentralize decision-making processes and promote community participation in the planning, development and management of settlements (MININFRA, 2009).

## **2.7 EXPECTED OUTCOMES OF REORGANIZING THE SCATTERED SETTLEMENTS TOWARDS PLANNED SETTLEMENTS.**

### **2.7.1 Socioeconomic impacts**

The socio-economic impact of transforming scattered settlements into planned settlements in rural areas encompasses several important aspects (Cloke, 2013a). These include significant improvements in infrastructure development, improved livelihood opportunities for residents, improved access to basic services such as healthcare and education, strengthened social cohesion within the community, increased investment and broader development, and improved security (Cloke, 2013a). These changes drive up the standard of living and quality of life for residents and contribute to sustainable growth and prosperity in rural areas, creating a favorable environment for long-term socio-economic progress.

#### ***2.7.1.1 Improved access to infrastructure***

The transformation of scattered settlements into planned villages brings remarkable socio-economic results and impacts (Cloke, 2013a). Planned villages empowered with improved infrastructure, such as enhanced water supply, electricity connections and better road networks, which enable residents to experience a higher standard of living and more economic opportunities. The planned villages promote Access to basic amenities such as improved hygiene and sanitation not only improves public health, but also contributes to overall well-being. In addition, planned settlements promote centralized resources and services that improve efficiency and facilitate community development (Cloke, 2013a). This leads to higher productivity and economic growth and promotes socio-economic progress in rural areas. The shift to planned settlements therefore contributes both to improving the socio-economic conditions of residents and to sustainable growth within rural communities.

#### ***2.7.1.2 Diversification of livelihood opportunities***

Socioeconomic benefits resulting from the transformation of scattered settlements into planned rural settlements are significant. Improved livelihood opportunities are a key benefit, with the creation of employment opportunities and income generation opportunities leading the effort (Cloke, 2013a). Planned settlements facilitate the establishment of businesses and industries, promoting economic growth and prosperity in the community. Access to basic services such as

education and healthcare is improved, which contributes to the development of human capital and improved well-being. Furthermore, planned settlements attract investment and infrastructure development, which further boosts economic activity and improves living standards. Social cohesion is strengthened as residents participate in community development initiatives, fostering a sense of belonging and unity (Cloke, 2013a). The transformation of scattered settlements into planned settlements promotes sustainable socio-economic development, enhancing the quality of life of residents and laying the foundation for future prosperity.

### ***2.7.1.3 Access to essential services***

By transforming scattered settlements into planned villages, there are significant socio-economic outcomes and impacts (Cloke, 2013a). Improved access to basic services such as healthcare, education, markets, and administrative facilities enhances the well-being and quality of life of residents. Health services ensure better medical care and disease prevention, leading to better public health outcomes and higher productivity. Educational facilities provide access to formal education, empowering individuals and promoting the development of human capital. Markets provide opportunities for economic exchange and growth, supporting local businesses and livelihoods (Cloke, 2013a). Administrative services streamline government processes, ensure efficient delivery of public services, and promote community engagement.

### ***2.7.1.4 Social cohesion among the residents***

The establishment of planned rural settlements promotes social cohesion among residents by encouraging organized social activities, community gatherings and interactions (Cloke, 2013a). These structured gatherings offer residents the opportunity to connect with each other, build relationships and develop a sense of belonging to the community. By participating in shared activities and sharing spaces, residents develop a sense of belonging and mutual support, leading to stronger social bonds and solidarity (Cloke, 2013a). This increased social cohesion not only contributes to a greater sense of community identity, but also fosters collaboration and collective action towards common goals, thereby enhancing the wider sense of wellbeing and resilience of the village.

### ***2.7.1.5 Improved security***

Ensuring improved safety is an important result of transforming scattered settlements into planned villages. With organized infrastructure, better access to essential services and greater social

cohesion, planned villages create a safer environment for residents (Sojasi Qeidari, Vazin, Moradi, & Erfani, 2020). In addition, planned villages often introduce security measures, such as community policing initiatives or neighborhood watches, which promote a sense of safety and discourage crime (Sojasi Qeidari et al., 2020). As a result, residents feel safer in their homes and communities, leading to greater peace of mind and a higher quality of life.

## **2.7.2 Environmental impacts**

### ***2.7.2.1 Improved erosion control***

One of the key impacts of transforming scattered settlements into planned villages is improved erosion control. In scattered settlements, unplanned construction and deforestation often lead to soil erosion, especially in hilly or sloping areas (Haregeweyn et al., 2017). Nevertheless, in planned villages, appropriate land use planning and infrastructure development can reduce the risk of erosion. For instance, the construction of terraces, retention ponds and vegetative barriers helps to stabilize the soil and reduce surface run-off, thereby preventing erosion and sedimentation in water bodies. In addition, drainage systems and erosion control structures such as gabions or retention dams can effectively channel rainwater and minimize erosion impacts during heavy rainfall events (Haregeweyn et al., 2017). By implementing these measures, planned villages can protect agricultural land, conserve natural resources, and maintain ecological balance, contributing to long-term environmental sustainability and resilience.

### ***2.7.2.2 Waste management system.***

An important environmental consequence from the transformation of scattered settlements into planned villages is to establish a waste management system (Omollo, 2019). Centralized waste collection points, such as communal garbage pots or recycling hubs, in planned villages are set up to efficiently manage and dispose of solid waste. Organic waste composting and material recycling initiatives are also introduced to minimize pollution and promote sustainable resource use. Community awareness programs educate residents on proper waste disposal and promote waste separation and responsible waste management behaviors (Kalwani, 2010; Omollo, 2019). Through these measures, the planned villages effectively reduce the environmental risks associated with the

uncontrolled accumulation of waste and contribute to a cleaner environment and healthier ecosystems (Kalwani, 2010).

### ***2.7.2.3 Integration of green spaces***

A significant ecological outcome of the transformation of scattered settlements is the integration of green spaces into planned villages. Green spaces include parks, gardens and tree-lined avenues improve biodiversity, air quality and aesthetics (De Jong, 2014). The planning and development phase designates areas for green spaces that are easily accessible to residents. Planting native vegetation and adopting sustainable landscaping practices contribute to ecosystem restoration and climate resilience (De Jong, 2014). Furthermore, community involvement in the maintenance of green spaces fosters a sense of ownership and environmental awareness. By prioritizing green spaces, planned villages promote environmental sustainability and create vibrant, livable communities (De Jong, 2014).

### ***2.7.2.4 Conservation efforts***

Conservation efforts are integral environmental outcomes of transforming scattered settlements into planned villages (Raka & Runa, 2018). These efforts involve preserving natural habitats, biodiversity, and sensitive ecosystems within and around planned villages. Implementation strategies include establishing protected areas, wildlife corridors, and buffer zones to safeguard critical habitats and species. Additionally, promoting sustainable land management practices, such as agroforestry and soil conservation measures, minimizes habitat degradation and ecosystem fragmentation. Community engagement and education programs raise awareness about the importance of conservation and empower residents to participate in habitat restoration and wildlife protection initiatives. Through these measures, planned villages contribute to the conservation of natural resources, enhance ecosystem resilience, and promote environmental sustainability (Raka & Runa, 2018).

### 3 RESEARCH METHODOLOGY

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This chapter details the methodology used to obtain the research results. It covers the methods used to collect, analyze and interpret the data, which ultimately led to the expected results. The study areas focused on are Gatebe and Rwabiharamba sites in Nyagatare district where the effectiveness of planned rural settlements in Rwanda was assessed. In this chapter, the planning process for rural settlements in Rwanda has been discussed in detail, drawing on literature from various sources. It also explains the methods and data sources used to assess the effectiveness of planned rural settlements in Rwanda and describes the analytical and conceptual setting for the study.

For the data collection, the sample size was calculated based upon the target population. This resulted in a sample of 33 households in Gatebe and 34 households in Rwabiharamba. The data collection techniques employed for this study included surveys, interviews and field observations for statistical and non-spatial data collection, while GIS techniques were used for spatial data collection. During data analysis, the research employed a proximity analysis with buffer and distance analysis as well as an overlay analysis for spatial data. Statistical and content analyses were used for non-spatial data. Various software tools were used in the data analysis phase. GIS software such as ArcGIS Desktop, ArcGIS Pro, QGIS and Google Earth were used together with remote sensing software such as ENVI and ERDAS for spatial data analysis and image classification. SPSS and R were used for statistical data analysis.

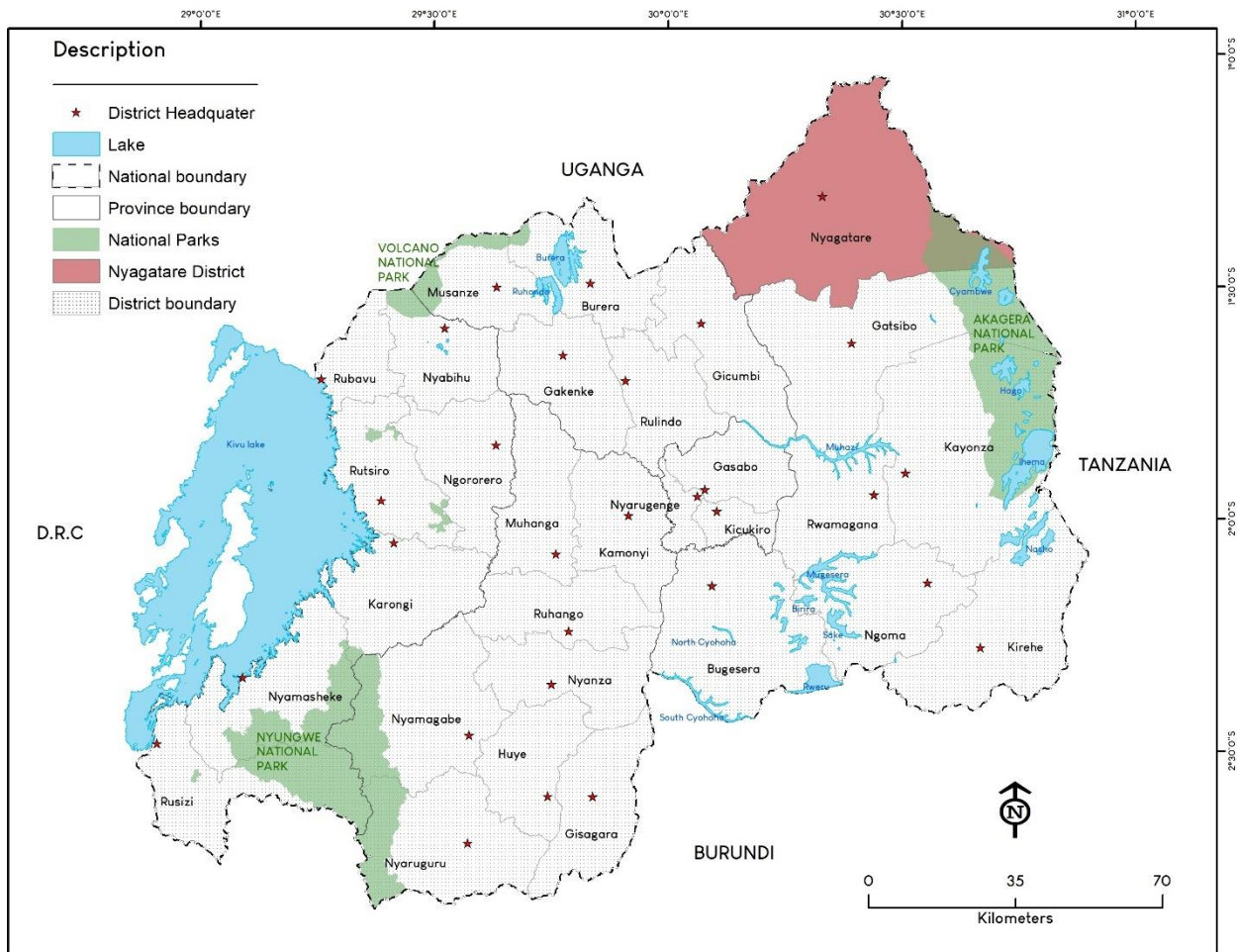
The results of the study were comprehensively presented using maps, tables, figures and photos. These visual tools were included in the report to enable a clear understanding of the results. By combining advanced analytical techniques and various data sources, the chapter provides a deep exploration of the methodologies underpinning the assessment of planned rural settlements in Rwanda. The methodological rationale ensures that the results of the study are reliable and provide valuable insights into the effectiveness of rural settlement planning in the study areas.

### **3.1 CASE STUDY: RWABIHARAMBA AND GATEBE SITES IN NYAGATARE DISTRICT**

#### **3.1.1 Description of the study area**

Nyagatare is one of the seven districts and the largest in the Eastern Province of Rwanda. It is bordered to the south by Gatsibo District and to the west by Gicumbi District of the Northern Province. Nyagatare District also shares borders with neighboring countries, Tanzania to the east, along the Akagera River, and Uganda to the north (MINECOFIN, 2018). Nyagatare is also among 8 districts with secondary cities, these urban areas supporting Kigali, the capital of Rwanda. This city helps the country boost its economy and development in the north-eastern periphery as a commercial hub linking Rwanda to Uganda and other East African countries (NLA, 2020). The whole district is dominated by agriculture and livestock, which are the main livelihood activities of the community, while being supported by tourism based on the Akagera National Park (MINECOFIN, 2018). Nyagatare is also home to a recent history based on the liberation of the country from the Rwandan community conflicts that culminated into the genocide against the Tutsis and is considered one of the places where the first troops to end these conflicts began (Shirley, Wylie, & Friesen, 2018).

Map 1: Location of Nyagatare district in the national context



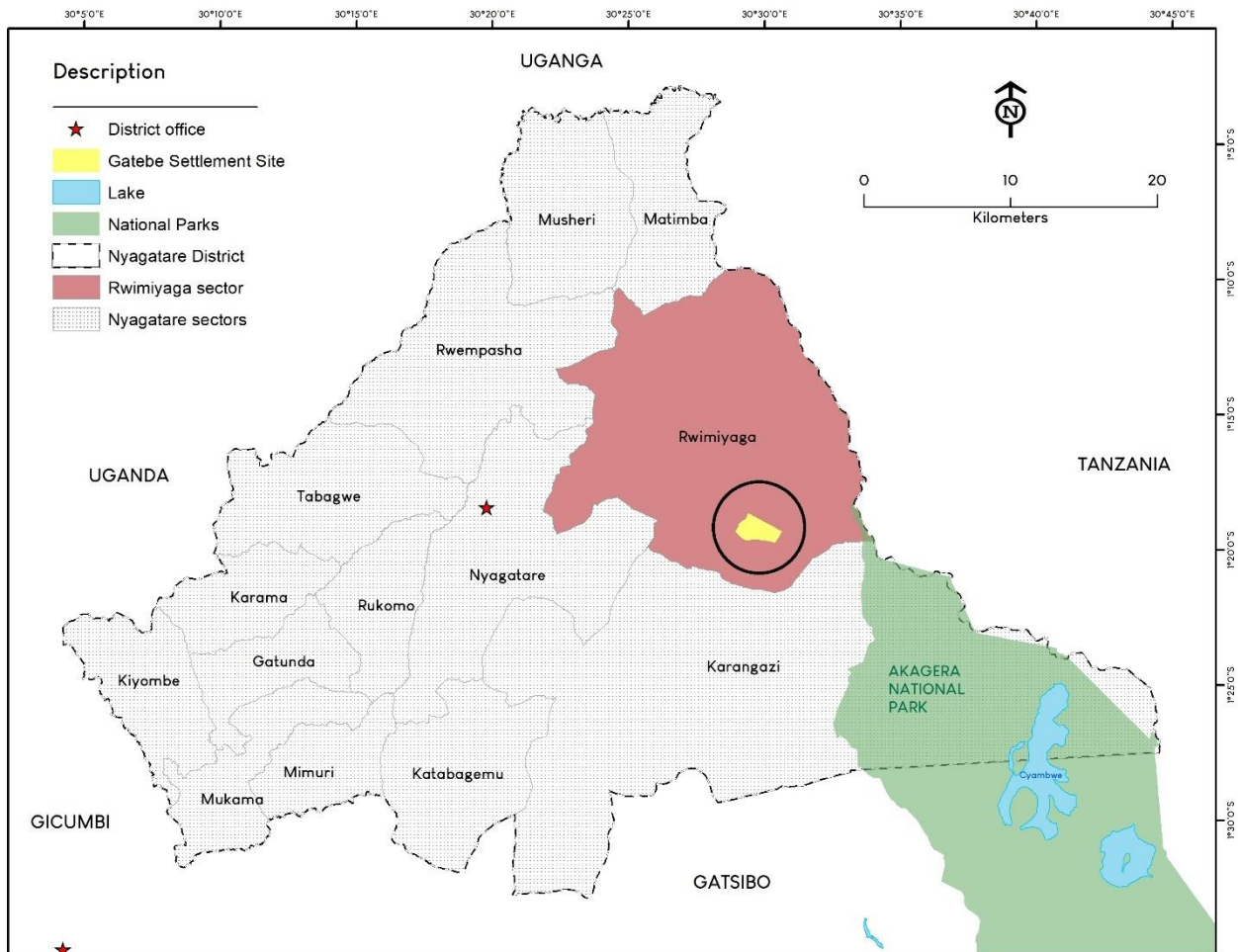
Source: NISR, 2012 and NLA, 2020

Gatebe and Rwabiharamba were chosen as case study sites for evaluating the effectiveness of planned rural settlement initiatives in Rwanda due to several compelling factors beyond their readiness status. First, their geographic and demographic representativeness is significant; both sites exemplify typical rural Rwandan communities, characterized by agricultural livelihoods, moderate population density, and a mix of subsistence and small-scale commercial farming. This representativeness ensures that findings can be generalized to similar rural areas across the country. Additionally, Gatebe and Rwabiharamba have distinct socio-economic characteristics that make them ideal for this study. Gatebe and Rwabiharamba sites are located not far from Nyagatare city, benefiting from relative proximity to urban amenities and markets.

### 3.1.1.1 Gatebe rural settlement site

Referring to the administrative entities in ascending order, Gatebe is a newly developed rural settlement site located in Gatebe I village, Kirebe cell of Rwimiyaga sector in Nyagatare district of Rwanda's Eastern Province. It is located very close to the neighboring country of Tanzania, with 8 km from the border. The site covers a total area of 141 hectares of which 34% is for residential zone, 27% for the residential extension area and 39% for non-residential uses such as agriculture and livestock. This site is extended within the livestock land, which is one of the main respectful land uses in Nyagatare and contributes significantly to the social livelihood of the community in terms of income and food generation.

Map 2: Location of Gatebe rural settlement site in the context of Nyagatare district

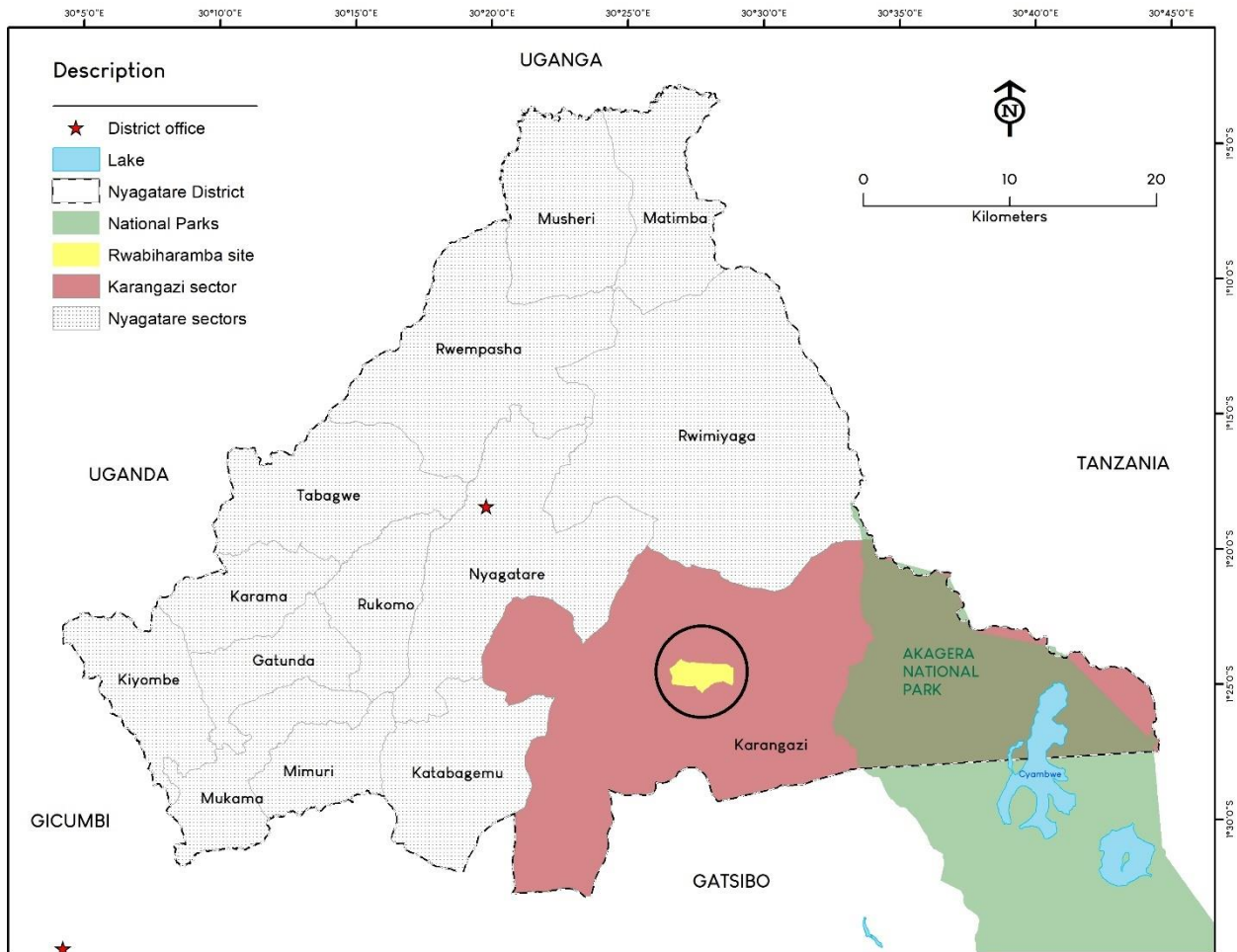


Source: NISR, 2012 and NLA, 2020

### 3.1.1.2 *Rwabiharamba rural settlement site*

Regarding the sites that are not prepared in the field, the research adopted Rwabiharamba site as one of the backward sites. It is located in Rwabiharamba village of Ndama cell in Karangazi sector, Nyagatare district. The site covers an area of 123 hectares, of which 45% is devoted to residential and 55% to agriculture and livestock, and also the site slightly away from the border with Tanzania.

Map 3: Location of Rwabiharamba rural settlement site in the context of Nyagatare district



Source: NISR, 2012 and NLA, 2020

### 3.1.2 Overview of the rural settlement planning process in Nyagatare district

In line with the country as a whole, rural settlement planning in Nyagatare District was introduced by MINALOC in 2014 and later by the Rwanda Housing Authority in 2015 after governmental institutions reforms. The objective was to relocate and settle rural households of Nyagatare District

effectively and efficiently. It was aligning with the government's seven-year programme set to meet Vision 2020 and guide the next four years under the National Transformation Strategy (NTS1 2017-2024) which stipulates settling in integrated, sustainable and planned settlements.

In accordance with the EDPRS2, the government considered rural settlements to ensure that people can settle well while having easy access to economic and social services. To achieve this goal, rural settlement layout plans appear to be the solution to help people get settled well. It is in this framework that even in Nyagatare district, Gitebe and Rwabiharamba have been chosen among 167 rural settlements site to be planned.

### **3.1.3 Methods and data sources used to evaluate the effectiveness of rural settlement planning.**

The effectiveness of rural settlement planning is assessed by applying different methodologies and a range of data sources. In this research, which adopts a comparative approach, data was collected for two study areas. The data that was collected can be broken down into two main categories: spatial data and non-spatial data. The spatial data will support the research in the mapping analysis by providing the spatial location of the study areas and can help in the identification of the different land uses of the site with their respective areas and percentages covered. Non-spatial data is in place to support the research by describing the allocation and other statistical characteristics of the study areas as well as to support the research analysis by addressing community, environmental and social livelihood issues in rural settlements.

Besides spatial and non-spatial data categories, both primary and secondary data was collected as part of the research to capture all the relevant information. The methodologies to be used in collecting the primary data would be applied to the field by the field survey, observation, questionnaire survey and interview guide to collect the qualitative and quantitative data that will support data analysis. The construction of survey instruments and interview guides involves designing household questionnaires, service provider questionnaires, and interview guides for residents and key informants. Household questionnaires will gather demographic data, satisfaction levels, perceived factors of settlement effectiveness, and accessibility of basic services, alongside collecting GPS coordinates for GIS analysis. Service provider questionnaires will detail service availability, accessibility, and challenges, also incorporating GIS data collection. Resident interviews will explore personal impacts, contributing factors to effectiveness, service

accessibility, and suggestions for improvement. Key informant interviews with local leaders and planners will focus on planning processes, critical success factors, GIS technology use, service provision strategies, and policy recommendations. This structured approach ensures comprehensive data collection aligned with research objectives, facilitating an evaluation of the effectiveness of rural settlements, and providing actionable insights for policymakers and planners.

However, a literature review with different documentations and other sources regarding rural settlements, secondary data which should be spatial and non-spatial was collected and analysed to fulfil the research objective. With the collection of secondary data, different institutions such as the Rwanda Housing Authority (RHA) - the institution in charge of housing development, the National Land Authority (NLA) - the institution in charge of land use planning and management, and other institutions such as WASAC and REG that supply water and electricity in the settlements will need to be consulted.

With the spatial analysis that was done for this research, geospatial technology was used in an advanced sense, for instance the use of google earth imagery, Elshayal smart GIS, and other GIS technologies to effectively collate the work and demonstrate the results more accurately.

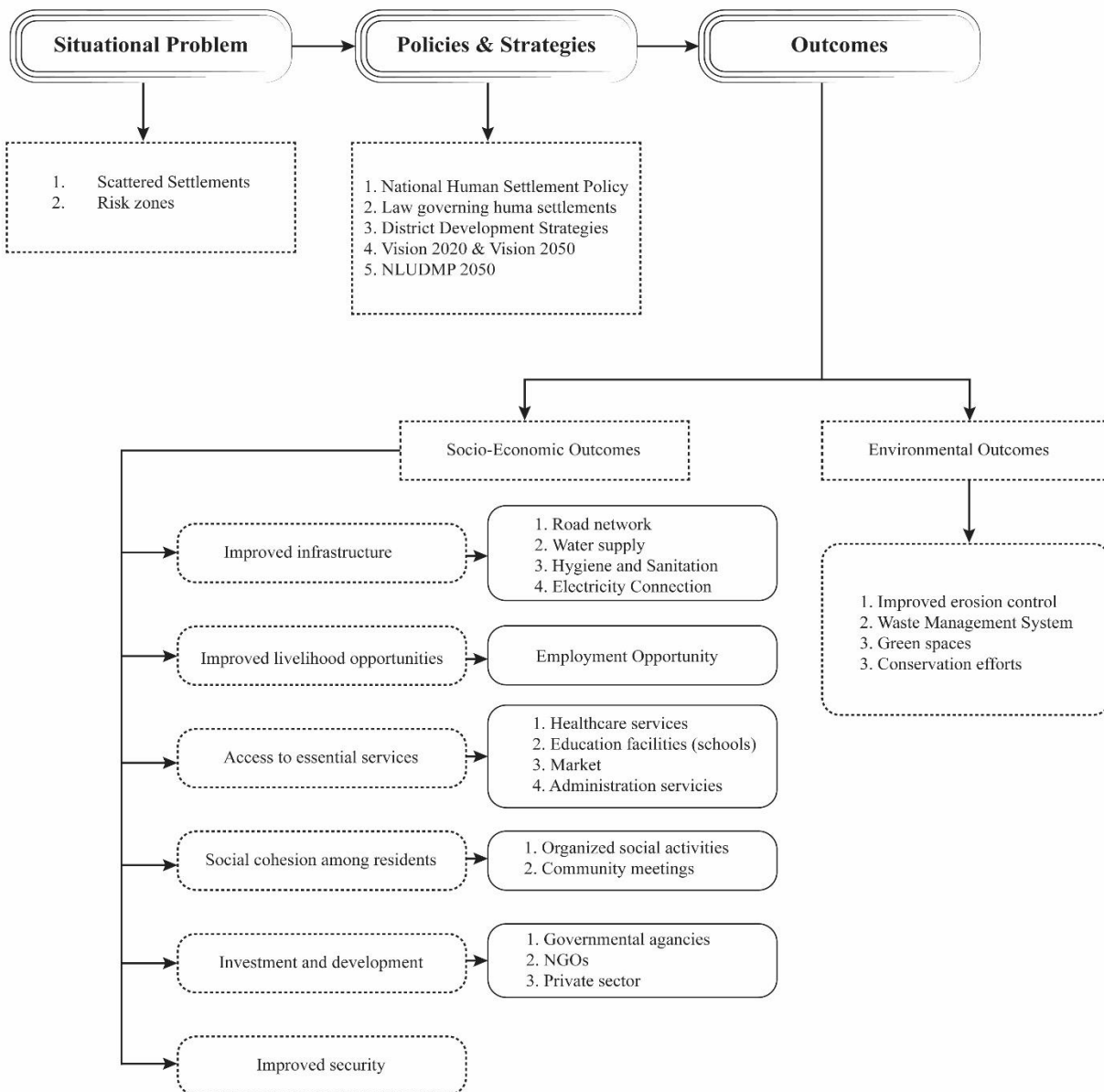
### **3.2 ANALYTICAL AND CONCEPTUAL FRAMEWORK**

The main underlying concern is that settlements in Rwanda are widely scattered and high-risk zones, leading to problems such as limited access to infrastructure and services as well as nature hazards. To address these issues, strategies and measures have been undertaken, including the establishment of planned rural settlements like Gatebe and Rwabiharamba. Among the outcomes of interest are socio-economic benefits such as improved livelihoods, access to basic services and economic opportunities for households and individuals. Key environmental outcomes are also important, with a focus on sustainability and ecological balance within the planned settlements as well as areas where the population relocated from.

To quantify and measure these outcomes, evaluation indicators are employed. These indicators may include the number of households with access to improved water, sanitation and electricity, the percentage of the population engaged in non-agricultural activities and the rate of job creation in the planned settlements. Further indicators may include the distances between residential areas and key services or facilities.

The analytical framework will employ quantitative and qualitative methods to collect data on these indicators, using surveys, interviews, and site assessments. Data analysis will use statistical techniques to measure the effectiveness of planned rural settlement sites in addressing the challenges of scattered settlements, with a focus on comparing results between Gatebe and Rwabiharamba. This framework will provide a comprehensive assessment of the impact and effectiveness of planned rural settlements in Rwanda.

Figure 6: Analytical & Conceptual framework



Source: Miklovda, et al., 2020 and Ruzindana, 2024.

### 3.3 RESEARCH DESIGN

The overall research design for this study is a mixed methods approach, using a case study design to assess the effectiveness of planned rural settlement sites in Rwanda. The study will use quantitative data collected through surveys and qualitative data collected through in-depth interviews and field observations to create spatial models using GIS technology. The results was presented using tables, graphs and maps, and recommendations was made based on the research findings.

#### 3.3.1 The flow of the research

The research flow represents how research ideas flow together and provides a visual representation of the sequential steps involved in conducting research. In the case of assessing the effectiveness of planned rural settlements in Rwanda, with a particular focus on the case of Rwabiharamba and Gatebe in Nyagatare District, the research flow provides a clear and organized overview of the research process, highlighting key steps and their interconnections in the country and in these particular areas of interest. The research flow chart helps researchers and readers understand the logical progression of the study and the order in which the different activities take place.

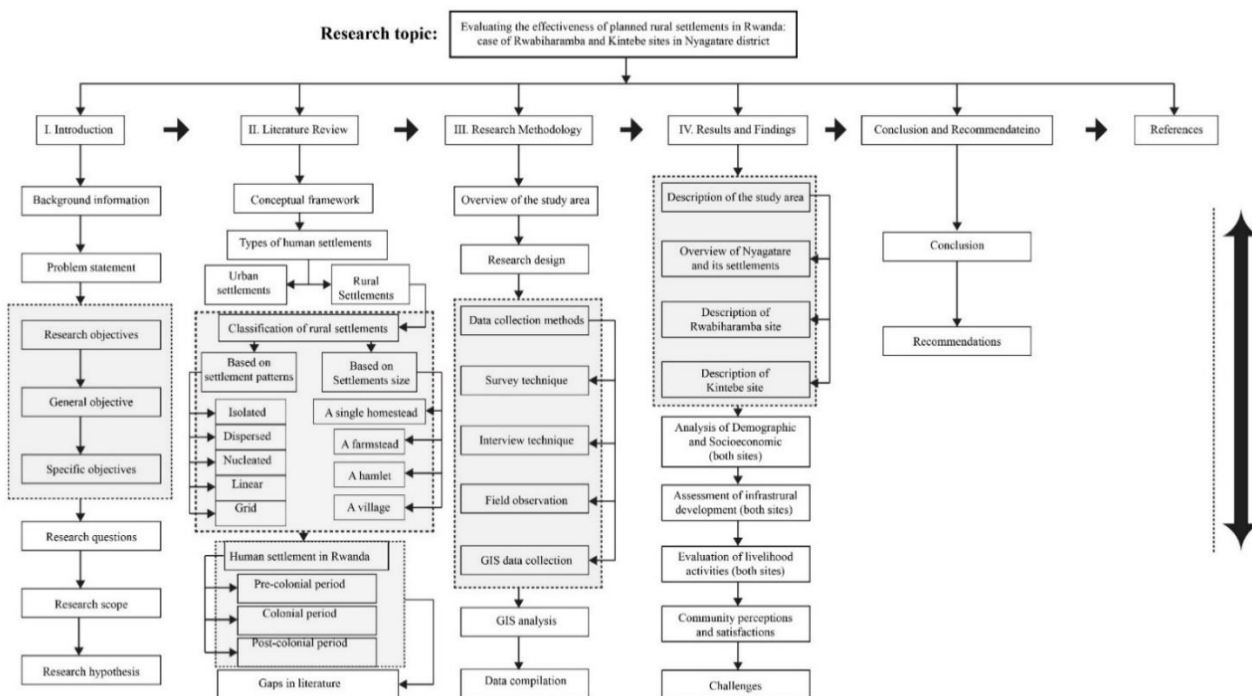


Figure 7: The research flow chart.

### **3.3.2 linkage of the research design to the research questions and objectives**

The research question and the objectives of the topic justify the adoption of a mixed-methods approach using a case study. The research question aims to assess the effectiveness of planned rural settlement sites in Rwanda, in particular Rwabiharamba and Gatebe sites, using GIS technology. The use of a mixed-methods approach allows for the integration of quantitative and qualitative data to obtain a comprehensive understanding of the research question. The case study design is appropriate for this study because it focuses on a specific case, in this case the Rwabiharamba and Gatebe sites, which allows for an in-depth analysis of the effectiveness of rural settlement sites in Rwanda. In addition, the case study design allows for the collection of data from multiple sources, including surveys, in-depth interviews and field observations, to provide a holistic view of the research topic. The integration of GIS technology into the research design is also justified by the research question and objectives, which aim to assess the spatial distribution of basic services and settlement patterns in rural settlement sites. GIS technology allows the creation of spatial models that can be used to analyze the effectiveness of rural settlement sites in Rwanda.

## **3.4 DATA COLLECTION**

### **3.4.1 Target population and sampling**

#### ***3.4.1.1 Target population***

The target population for the study was residents living in the planned rural settlement sites of Rwabiharamba and Gatebe in Rwanda, including residents who have been resettled from surrounding areas. This population will consist of individuals and households that have undergone the resettlement process and are currently residing in these specific settlement sites. The target population may include adults and children.

#### ***3.4.1.2 Sampling strategies***

To ensure a representative sample from the target population, the following sample calculation was applied:

#### 3.4.1.2.1 Sample Size for Gatebe Settlement Site

For evaluating the effectiveness of planned rural settlements in Gatebe site, stratified sampling was appropriate in view of the different population segments. To ensure the validity of the survey results, the sample size was determined using power analysis, aiming for a 95% confidence level and a 5% margin of error.

The formula for a simple random sample was used in this study, which is presented below:

$$n = \frac{N * z^2 * p * (1 - p)}{e^2 * (N - 1) + Zz^2 * p * (1 - p)}$$

Where:

- N = population, representing 896 households in Gatebe site
- z = Z-score for 95% confidence level, which amounts to 1.96
- p = estimated proportion which is equal to 0.1 for minimum variability
- e = margin of error, with a value of 0.1

By applying the formula

$$n = \frac{896 * (1.96^2) * 0.1 * (1 - 0.1)}{0.1^2 * (896 - 1) + (1.96^2) * 0.1 * (1 - 0.1)} = \frac{309.78}{9.29} = 33.34 \approx \mathbf{33}$$

Stratifying the population according to relevant factors such as age and sex. Appropriately assign sample sizes proportionally within each stratum based on their representation in the total population. This approach ensures reliable and statistically valid results that reflect the diverse characteristics of the community in Gatebe.

#### 3.4.1.2.2 Sample Size Calculation for Rwabiharamba Settlement Site

The same formula was used for Rwabiharamba site to determine the appropriate sample size for evaluating the effectiveness of the planned rural settlements, with a population of 5,892, a simple random sampling formula was used as below:

$$n = \frac{N * z^2 * p * (1 - p)}{e^2 * (N - 1) + z^2 * p * (1 - p)}$$

Where:

- N = population, representing 1,537 households in Rwabiharamba site
- Z = Z-score for 95% confidence level, which amounts to 1.96
- p = estimated proportion which is equal to 0.1 for minimum variability
- E = margin of error, with a value of 0.1

By applying the formula

$$n = \frac{1537 * (1.96^2) * 0.1 * (1 - 0.1)}{0.1^2 * (1537 - 1) + (1.96^2) * 0.1 * (1 - 0.1)} = \frac{531.40}{15.70} = 33.8 \approx \mathbf{34}$$

Using this stratified sampling approach ensures a complete and accurate assessment of the settlement patterns and effectiveness of planned rural settlements in Rwabiharamba.

### **3.4.2 Data collection techniques**

The data collection techniques for the study involve surveys, interviews, field observations, and GIS data collection.

#### ***3.4.2.1 Survey technique.***

Surveys are an important data collection technique for the study evaluating planned rural settlement sites in Rwanda. The survey was conducted to the residents in Rwabiharamba and Gatebe sites to gather quantitative data on their experiences living in the rural settlement sites. The survey was designed to capture information on basic services such as access to water, sanitation, healthcare, and education, as well as settlement patterns and housing conditions. The survey data was useful in identifying the strengths and weaknesses of the planned rural settlement sites in Rwanda and will provide insights into the experiences and perceptions of residents living in these settlements. This data can be used to inform policy and decision-making related to rural settlement planning and implementation and can help identify areas where improvements are needed.

#### ***3.4.2.2 Interview technique.***

Interviews were conducted with key stakeholders, including government officials, non-governmental organizations, and community leaders, to gather qualitative data on their perspectives on the effectiveness of the rural settlement sites.

The interview data has been analyzed using qualitative data analysis techniques such as coding and thematic analysis. The interview results were used to identify themes and patterns in the data, which will provide insights into the challenges and opportunities associated with rural settlement planning and implementation.

The interview data were useful in providing a deeper understanding of the perspectives of key stakeholders on the effectiveness of rural settlement sites in Rwanda. The qualitative data will complement the quantitative data gathered through the survey and will help to provide a more nuanced understanding of the issues facing rural settlements in Rwanda. The interview data can be used to inform policy and decision-making related to rural settlement planning and implementation and can help identify areas where improvements are needed.

#### ***3.4.2.3 Field observation***

The field observation was conducted at Rwabiharamba and Gatebe sites to gather data on settlement patterns, housing conditions, infrastructure, and other relevant features. The field observations were carried out using a standardized checklist to ensure that the same data is collected at each site. The data collected through field observations was both qualitative and quantitative. Qualitative data was collected through observations of settlement patterns, housing conditions, and other features, while quantitative data was collected through measurements of infrastructure such as road widths and distances to water sources and other significant infrastructure.

The data collected through field observations was analyzed using a combination of quantitative and qualitative data analysis techniques. The quantitative data was analyzed using statistical software to identify patterns and trends in the data, while the qualitative data was analyzed using coding and thematic analysis. The field observation data was useful in providing a more detailed understanding of the physical features of the rural settlement sites in Rwanda. The data can be used to identify strengths and weaknesses in the infrastructure and settlement patterns of the sites, which can help inform policy and decision-making related to rural settlement planning and implementation.

#### **3.4.2.4 GIS data collection**

GIS data will also be collected to create spatial models that was used to evaluate settlement patterns and the spatial distribution of basic services. GIS data was obtained from government agencies and other sources and was used to create maps and other visual representations to aid in data analysis. GIS (Geographic Information System) technology is a crucial data collection technique for the study. GIS data can provide detailed spatial information about the rural settlement sites, including the location of settlements, infrastructure, and natural resources.

GIS data was collected from various sources, including satellite imagery, aerial photography, and ground surveys. The data collected through GIS was both qualitative and quantitative. The sources of GIS data for assessing the effectiveness of transforming scattered settlements into planned settlements include high-resolution satellite imagery from Landsat, Sentinel-2, and commercial providers like Digital Globe, government datasets from the National Land Authority (NLA), Open Street Map (OSM) for community-contributed map data, and GPS data collected during household and service provider surveys. The accuracy and resolution of this spatial data are critical for reliable analysis. High-resolution satellite and aerial imagery (0.3 to 2 meters) and precise GPS data ensure detailed and accurate mapping of infrastructure and land use changes. Government datasets provide authoritative boundaries and land use plans, while OSM adds contextual information. High-resolution and accurate spatial data enables detailed evaluation of settlement patterns, infrastructure distribution, and service accessibility, leading to robust conclusions and effective recommendations. Inaccurate or low-resolution data could skew results, underscoring the importance of utilizing multiple high-quality data sources. The qualitative data will include visual representations of the settlement patterns and infrastructure of the rural settlement sites, while the quantitative data will include measurements of the size and location of settlements, distances to key infrastructure such as water sources and roads, and other relevant information.

The GIS data was analyzed using specialized software such as ArcGIS or QGIS. The software will enable the researchers to create maps and spatial analyses of the data collected, which can be used to identify patterns and trends in the settlement patterns and infrastructure of the rural settlement sites. The GIS data was useful in providing a more comprehensive understanding of the rural settlement sites in Rwanda. The data can be used to identify areas where improvements are needed

in terms of infrastructure and settlement patterns and can help inform policy and decision-making related to rural settlement planning and implementation.

These data collection techniques will provide a comprehensive understanding of the effectiveness of planned rural settlement sites in Rwanda by integrating both quantitative and qualitative data.

## 3.5 DATA ANALYSIS

### 3.5.1 Data analysis techniques for this study

#### 3.5.1.1 *Spatial Analysis*

It involves analyzing the spatial relationships between the settlement sites and other relevant geographic features, such as roads, water sources, and agricultural land. This analysis was conducted using GIS software, which allows for the visualization and manipulation of geographic data. The spatial analysis will involve identifying and mapping the settlement sites and relevant geographic features using satellite imagery and other data sources. This was followed by a range of spatial analyses, including:

1. **Buffer Analysis:** This analysis involves creating a buffer around the settlement sites to identify the spatial extent of their impact. For example, a buffer may be created to identify the areas within a certain distance from the settlement sites that are affected by their presence.
2. **Distance Analysis:** This analysis involves measuring the distance between the settlement sites and other relevant features, such as roads and water sources. This will help to identify any spatial relationships or patterns that may exist.
3. **Overlay Analysis:** This analysis involves overlaying different layers of spatial data to identify areas of overlap or proximity between the settlement sites and other features. This will help to identify any potential conflicts or synergies between the settlement sites and other uses of the land.

The results of the spatial analysis were used to inform decisions about the effectiveness of the settlement sites, and to identify any areas for improvement. They will also be presented visually in maps and other graphics to help communicate the findings to stakeholders.

To assess the effectiveness of transforming scattered settlements into planned settlements in Gatebe and Rwabiharamba, several spatial analysis techniques were employed. Network analysis will evaluate accessibility to essential services like water, healthcare, and education by calculating the shortest paths and travel times from households to these facilities, highlighting areas with poor accessibility that need infrastructure improvements. Proximity analysis will determine the average distances households must travel to access services, with shorter distances indicating more efficient spatial planning. Spatial distribution and density analysis using kernel density estimation will identify clusters and distribution patterns of population and services, ensuring equitable service provision. Overlay analysis will combine various spatial datasets to provide a comprehensive view of interactions between demographics, infrastructure, and services, while temporal change detection will use time-series satellite imagery to assess the progress and sustainability of planning interventions over time. Together, these techniques will provide detailed insights into the functionality, accessibility, and overall effectiveness of the planned settlements, guiding future planning and policy decisions.

#### ***3.5.1.2 Statistical Analysis***

It involves analyzing numerical data collected from surveys and other sources to identify patterns, relationships, and trends. The statistical analysis will involve identifying and calculating various measures of central tendency and dispersion, such as means, medians, and standard deviations. These measures were used to summarize the data and identify any patterns or trends that may exist.

Additionally, inferential statistical tests such as t-tests analysis has been conducted to test hypotheses and identify significant relationships between variables. For example, regression analysis can be used to identify the relationship between settlement site effectiveness and factors such as distance to roads or water sources.

The results of the statistical analysis were used to inform decisions about the effectiveness of the settlement sites and to identify any areas for improvement. They will also be presented in tables and other graphics to help communicate the findings to stakeholders.

#### ***3.5.1.3 Content Analysis***

This technique involves analyzing the content of documents, such as reports and policy documents, to identify key themes and patterns related to rural settlement sites in Rwanda. This analysis helped

to identify trends and patterns in policy and practice and inform recommendations for future policy and research. Generally, a combination of these techniques was used to analyze the data collected for the study. The results were synthesized and presented in a clear and concise manner and was used to address the research question and objectives.

To effectively assess the transformation of scattered settlements into planned settlements, integrating qualitative and quantitative data is crucial. Initially, qualitative methods like interviews, focus groups, and observations can provide rich insights into community perceptions, social dynamics, and cultural considerations surrounding the transformation process. Simultaneously, quantitative data such as demographic statistics, land use patterns, and infrastructure development metrics can offer numerical indicators of the transformation's tangible impacts. These data sets were analyzed using a mixed-methods approach, employing techniques like triangulation to cross-validate findings from both qualitative and quantitative sources. Triangulation involves comparing data from different methods to confirm findings, enhance validity, and provide a more comprehensive understanding of the phenomenon under study. Additionally, data transformation methods such as normalization or standardization may be utilized to ensure compatibility and comparability between qualitative and quantitative data sets. By employing these integrated analytical techniques, this research aims to synthesize diverse sources of information to evaluate the effectiveness of transforming scattered settlements into planned ones comprehensively.

### **3.5.2 Software used during analysis**

#### ***3.5.2.1 Geographic Information System (GIS) software***

This research study utilized GIS software to capture and analyze data, facilitating the presentation of results in map format. GIS tools were instrumental in creating maps and visualizing data collected from Gatebe and Rwabiharamba settlement sites, thereby assessing the effectiveness of planned rural settlements. Specifically, the study employed GIS software such as ArcGIS and Google Earth. In GIS analysis, ArcGIS stands out with comprehensive spatial tools essential for intricate geospatial tasks, while Google Earth offers intuitive visualization but lacks advanced analytical depth.

### ***3.5.2.2 Statistical analysis software***

Statistical software such as SPSS and R were used to statistically analyze the data from the surveys in Gatebe and Rwabiharamba as well as from other sources. With these software tools, measures of central tendency and variance were calculated, inferential statistical tests were performed and visualizations of the data, especially in tables and graphs, were created. This SPSS is ideal for basic statistical analysis due to its user-friendly interface, making it accessible for beginners. R offers advanced statistical modeling, data manipulation, and visualization, catering to complex analytical needs and customization. STATA combines ease of use with robust statistical capabilities, suitable for a wide range of users.

### ***3.5.2.3 Remote sensing software***

Remote sensing software such as ENVI or ERDAS were used to analyze satellite imagery and other remotely sensed data focusing on the study areas. These tools were used to identify land use changes, vegetation indices, and other spatial patterns that are relevant to the study.

Briefly, for assessing the transformation of scattered settlements into planned ones, the choice of software is critical. Remote sensing software like ENVI or ERDAS enhances analysis by extracting detailed information from satellite imagery, although they require specialized expertise. By combining SPSS or R with ArcGIS and supplementing with ENVI or ERDAS, make it possible for researchers to achieve a reliable and comprehensive approach, effectively integrating statistical and geospatial analyses to evaluate the effectiveness of transforming scattered settlements into planned ones. This combination leverages the strengths of each software while mitigating their individual limitations, ensuring thorough and accurate data handling and analysis.

## **3.6 DATA PRESENTATION**

The results of the data analysis for the research study were presented through various means. Firstly, the statistical analysis results were presented in the form of tables, graphs, and charts to help visualize the data and facilitate comparisons between the different settlement sites. For example, tables can be used to present the number of households, population, and other demographic variables for each settlement site. Graphs and charts can be used to show the relationships between variables, such as the distance to health facilities and access to markets.

Additionally, spatial analysis results were presented using maps and geospatial visualization techniques to highlight the distribution and patterns of settlement and infrastructure in the study area. Maps can be used to illustrate the location of settlements, roads, health facilities, and markets. Other spatial analysis techniques such as hotspot analysis, buffer analysis, and network analysis can be used to identify spatial patterns and trends in settlement and infrastructure distribution.

The key findings and conclusions of the study are presented in a comprehensive report detailing the research process, methodology, data analysis and results. The report is structured with clear headings and sub-headings to ensure easy navigation and readability. It provides recommendations for policy makers and stakeholders to improve the planning and management of rural settlements in Rwanda, with a focus on improving access to basic amenities and promoting sustainable and equitable development.

Participatory mapping sessions and interactive data visualization tools facilitated understanding and gathered valuable feedback. This research feedback was systematically documented and analyzed alongside the research data to ensure that the final recommendations met the practical needs and concerns of the community. This collaborative approach validated the research findings, promoted stakeholder ownership and improved the uptake and implementation of planning strategies. The report also highlights the importance of using GIS technology in the future planning and management of rural settlements, as demonstrated by the results of the study.

## 4 RESULTS AND FINDINGS

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This chapter presents the results and findings of the research study, highlighting the evolution of the settlements in Gatebe and Rwabiharamba. It looks at the historical background over successive years and provides their spatial representations. The chapter discusses the factors contributing to the reorganization of scattered settlements towards planned settlements and emphasizes the dynamic changes and outcomes in the study areas. It further addresses the persistent challenges in the restructuring of scattered settlements in Gatebe and Rwabiharamba and proposes strategies and mechanisms to overcome these obstacles.

### 4.1 EVOLUTION OF SETTLEMENT IN GATEBE AND RWABIHARAMBA SITES

This research looks at the evolution of settlement patterns in Gatebe and Rwabiharamba areas by evaluating the implementation of government policies and strategies, assessing outcomes and impacts, exploring persistent challenges and strategies to overcome them. The study attempts to provide a comprehensive understanding of the transformation process from scattered settlements to planned villages in these areas by tackling the specific research objectives and questions. While considering various socio-economic, infrastructural, and community-related drivers, exploring the evolution of settlement patterns in the study areas provides valuable insights for informed decision-making and future planning initiatives.

#### 4.1.1 Historical background of settlement development in Gatebe site

As clarified by the Executive Secretary of Ndama Cell, to which Gatebe settlement belongs, and even supported by residents during the questionnaire survey, the evolution of Gatebe settlement in Nyagatare district is an example of the remarkable reorganization of a virgin forest area towards a thriving and diversified community over a period of nearly two decades. Originally covered by extensive forests within the Akagera National Park, Gatebe reorganized from a landscape devoid of settlements or agricultural activities to a strategic location for planned village development. Over time, land use patterns changed, reflecting the increasing presence of livestock and agriculture, which eventually led to the establishment of organized settlements for the growing population. The development of Gatebe reflects the dynamic interaction between human settlement aspirations, conservation efforts and economic development and illustrates the sensitive

role of the planned village in preserving ecological integrity and promoting social and economic progress in the area (RHA, 2018).

#### 4.1.1.1 Gatebe Site in 2005

In 2005, as depicted from the satellite imagery, Gatebe site in Nyagatare district was primarily covered by high and low-woodland forest within the extended Akagera National Park totaling 371.28 hectares. The area had no settlements, no livestock, and no agricultural activities. However, there were scattered settlements whose inhabitants lived at considerable distances from the site as per the respondents. The lack of a coherent development policy prevented significant changes in the landscape. Then, as the need for resettlement and development grew, the Gatebe site was chosen as a suitable location for planned village settlement. This decision marked a decisive turning point in the development of the village, which evolved from wooded land with scattered dwellings to a planned settlement for the relocated inhabitants (RHA, 2018).

Map 4: Gatebe site land cover in 2005



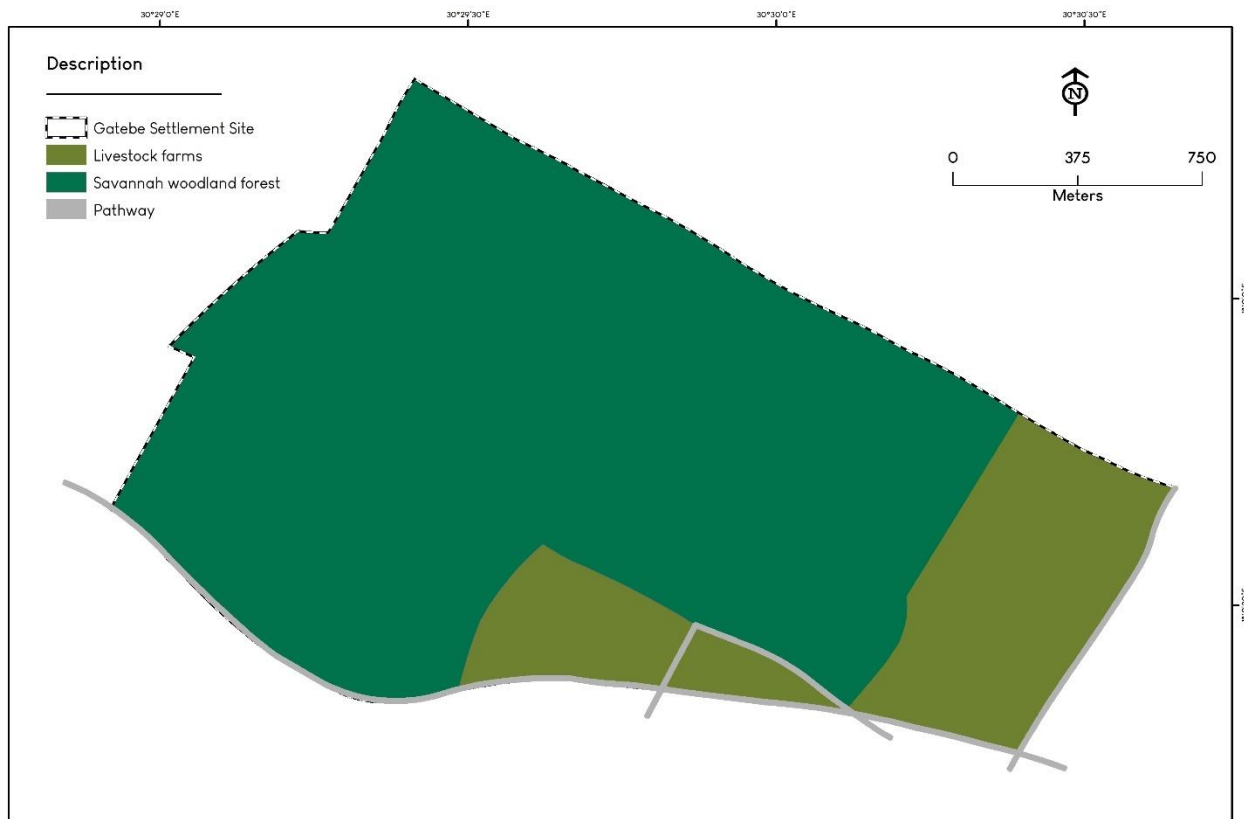
Source: Google Earth Imagery, 2005

#### ***4.1.1.2 Gatebe site in 2010***

According to the satellite imagery, significant land use change occurred in Gatebe site during 2010, with notable portions of livestock grazing and savanna woodland totaling 368.57 hectares. The survey showed that livestock farming had begun in the area, indicating a transition to agrarian practices. However, there were still no settlements or agricultural activities. Scattered settlements remained in the surrounding areas, with residents living a considerable distance from the site due to a perceived lack of appropriate residential development. This historical record reflects the gradual evolution of land use patterns in Gatebe and the surrounding regions and illustrates the dynamic nature of the Interaction between human activities and environmental factors. As the need for development and resettlement increased, Gatebe became a focus of potential change, signaling a possible shift towards planned village settlements in the future (RHA, 2018).

Gatebe site land cover figures illustrate the distribution of different land use categories in hectares. In 2010, the site covered a total of 75.76 hectares designated for livestock, indicating a significant presence of livestock-related operations. Besides, a significant portion of 29.3 hectares was designated as savannah woodland, indicating the predominant natural vegetation in the area. Over and above this, 3.13 hectares of land has been earmarked as road reserves, underlining the importance of road and path to provide accessibility to the area. Cumulatively, as shown on the map below, this balance reflects a combination of agricultural and natural that illustrated the diverse landscape of Gatebe and its importance in supporting ecological integrity in the area.

Map 5: Gatebe site land cover in 2010



Source: Google Earth Imagery, 2010

#### 4.1.1.3 Gatebe site in 2015

In 2015, there were notable changes in land cover patterns in Gatebe, indicating a shift towards the development of group settlements. Agricultural activities were introduced over 37.6 hectares, reflecting the resettlement of the site, and indicating efforts to establish farming activities in the site. Livestock areas expanded to 303.1 hectares, a result of an increasing focus on cattle raising. Settlements were established with an area of 17.67 hectares, signifying the development of living spaces for the residents. The roads and paths, covering an area of 13.23 hectares, ensured easy access within the site. Despite these developments, there was a pond of water amounting to only 0.22 hectares. This transformation marked a departure from its previous status as forest and savannah grassland and indicated new settlement aspirations. According to the responses gathered during the research surveys, the resettlement initiative mainly focused on people from scattered livestock farms in Rwimiyaga sector, as well as Rwandans repatriated from Tanzania, emphasizing efforts to consolidate the population into organized settlements.

Map 6: Gatebe site land cover in 2015

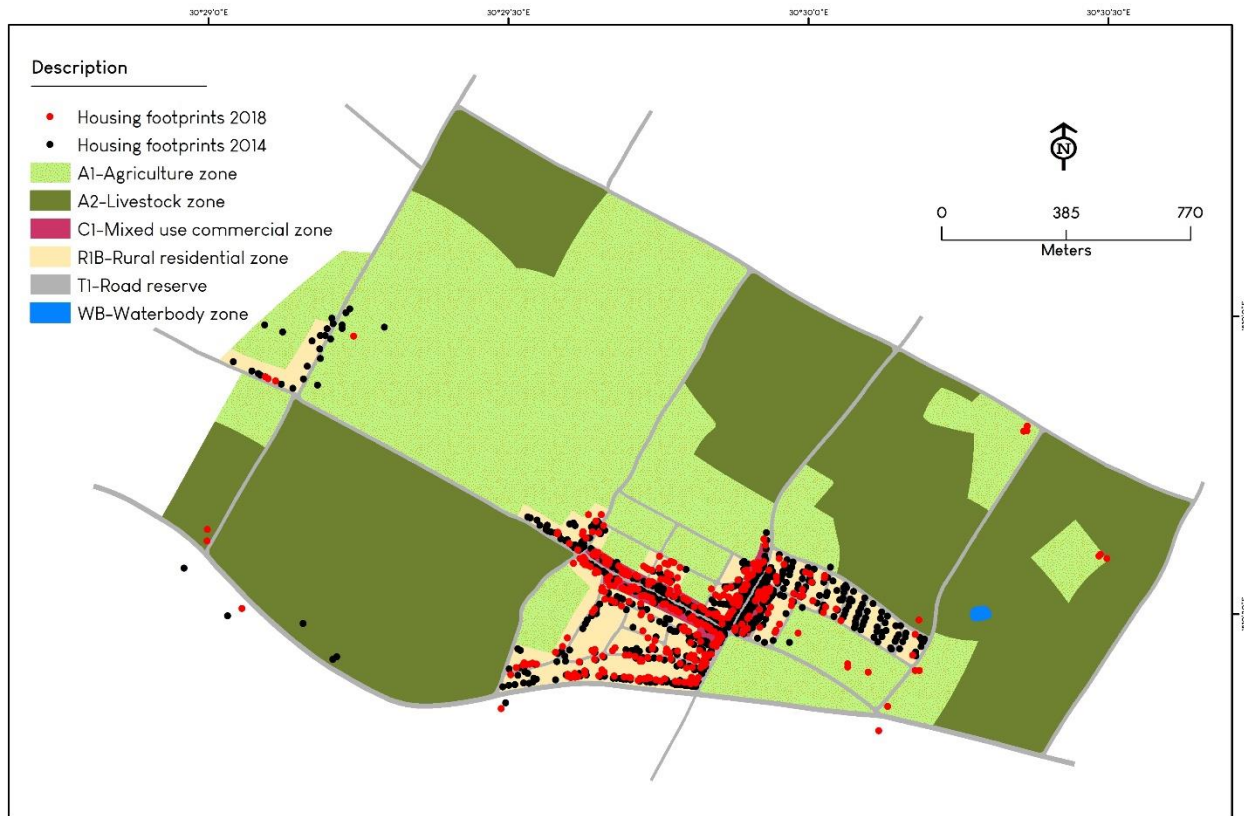


Source: Google Earth Imagery, 2015

#### 4.1.1.4 Gatebe site in 2020

By 2020, Gatebe settlement underwent significant development in land use. Agricultural zones expanded to 143.86 hectares, indicating a maintained focus on agricultural activities as depicted from the map below that is sourced from Data SOI. Livestock areas also grew to 175.19 hectares, indicating consistent livestock development. The expansion of the mixed commercial zone to 5 hectares is particularly interesting, reflecting the diversification of economic activities beyond agriculture. At the same time, the rural residential areas experienced considerable growth with an area of 23.73 hectares, which indicates increased settlement and population density. The transportation infrastructure was significantly expanded with an area of 2536 hectares, which enabled better access to the site. Despite these developments, the water zone remained limited at 0.24 hectares. As per observation, this development underlines the transition from primarily agricultural use to a more diversified economy, driven by the expansion of residential and commercial activity, reflecting the development of the site a well-established settlement.

Map 7: Gatebe settlement site in 2020



Source: Google Earth Imagery, 2020

#### 4.1.1.5 Gatebe site in 2024

The evolution of Gatebe settlement site from 2020 to 2024 reflects a dynamic development towards a more diversified activities in community. From the analysis of spatial data, agricultural areas increased slightly to 149.86 hectares, showing the continuation of farming practices. Livestock zones remained relatively stable at 143.33 hectares, indicating a continued focus on livestock farming. However, the strongest growth was recorded in residential areas, which expanded to 3.9 hectares, indicating a significant increase in settlement and population density. This expansion was further assisted by the establishment of an IDP model village, which provides organized and efficient housing solutions for the population relocated from the farmlands of East Nyagatare.

The establishment of mixed-use and commercial plots covering an area of 6.84 hectares is an indication of the development of non-farm economic activities in the village. The establishment of educational and research facilities covering 5.31 hectares and religious facilities covering 2.05

hectares reflects the efforts of the site to provide essential services and infrastructure to promote the development and well-being of the community. Furthermore, the transportation network has been widened to 26.75 hectares, improving connectivity within and beyond the settlement area. Despite these developments, the water zone remained limited to 0.24 hectares, implying minimal changes to the natural conditions in the area.

Map 8: Gatebe settlement site in 2024



Source: Google Earth Imagery, 2024

## 4.1.2 Historical background of settlement patterns in Rwabiharamba

### 4.1.2.1 Rwabiharamba Site in 2000

In 2000, as depicted from the satellite imagery, land cover in Rwabiharamba was predominantly covered by forest and wetlands: 552.9 hectares were covered by forest and 93.6 hectares were classified as unprotected wetland. This indicates a landscape largely untouched by human settlement and dominated by natural vegetation. The presence of such extensive forest and wetland

areas indicates that Rwabiharamba remained largely uninhabited and served as an ecological zone of high biodiversity. The absence of settlements during this period reflects the historical pattern of limited human activity in the region, likely due to factors such as spatial constraints, and far from infrastructure. Importantly, these percentages highlight the large extent of natural habitat in Rwabiharamba in 2000 and emphasize its importance as a wild environment with minimal human intervention.

Map 9: Rwabiharamba Site in 2000



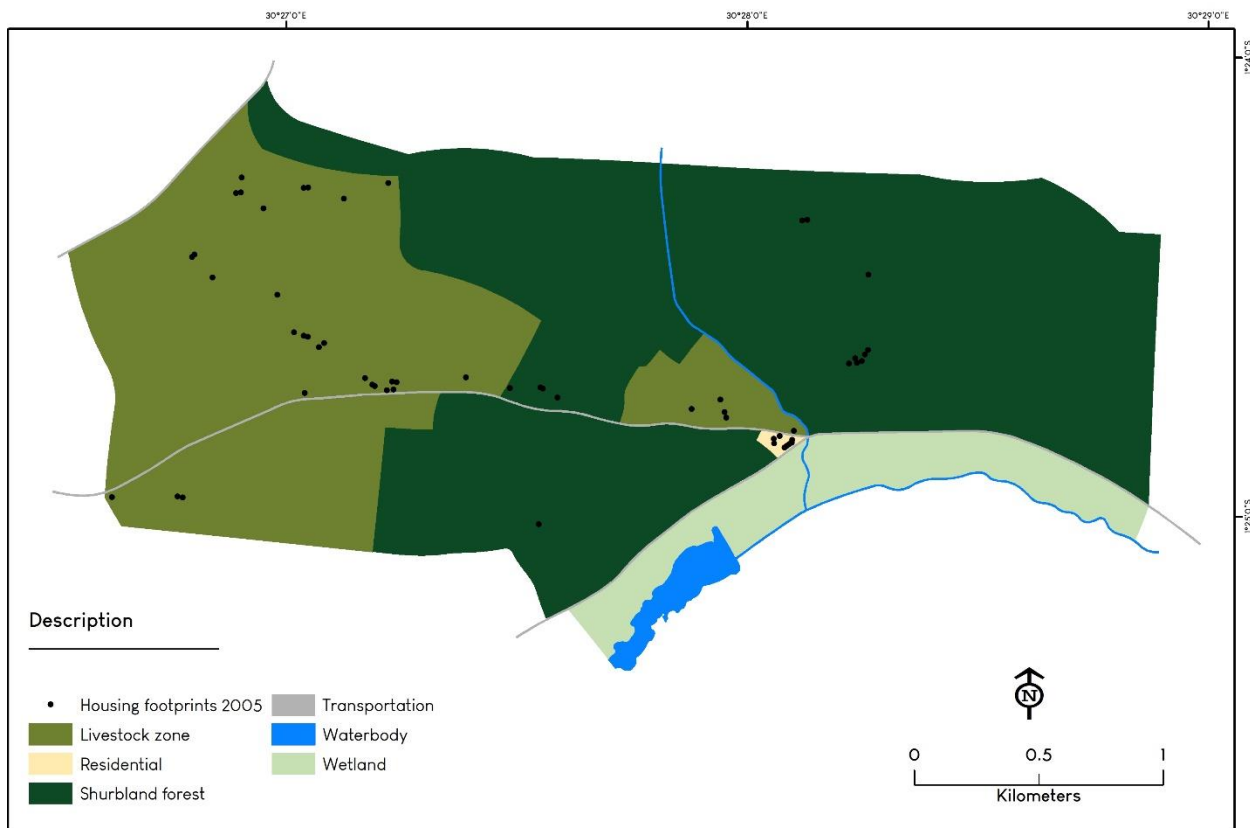
Source: Google Earth Imagery, 2000

#### 4.1.2.2 *Rwabiharamba Site in 2005*

In 2005, based on the satellite imagery, the land cover in Rwabiharamba underwent significant changes, indicating a shift towards agricultural and pastoral activities. The expansion of bushveld and pastoral areas is a clear indication of increasing farming and pastoral practices. In fact, this indicates that humans have encroached into previously uninhabited areas, with habitation

occupying only a minimal portion of the landscape. Scrub forest dominated the area with 61.63% of the land cover, followed by the livestock zone with 16.71%. Despite these changes, significant parts of the water bodies, wetlands and transportation infrastructure have been preserved, underlining the ecological richness of the area and the importance of natural resources for sustaining livelihoods. Water bodies accounted for 4.47 %, wetlands for 8.04 % and transportation pathways for 0.48 % of land cover, illustrating the diverse landscape and resource use patterns in Rwabiharamba site.

Map 10: Rwabiharamba Site in 2005



Source: Google Earth Imagery, 2005

According to the 2005 satellite imagery, around 56 isolated buildings were scattered across the farmland in Rwabiharamba site, including residential-type and cowsheds. These buildings, identified from satellite imagery, were not solely for residential use, but reflected the land use of the area, which was mainly agricultural and livestock farming.

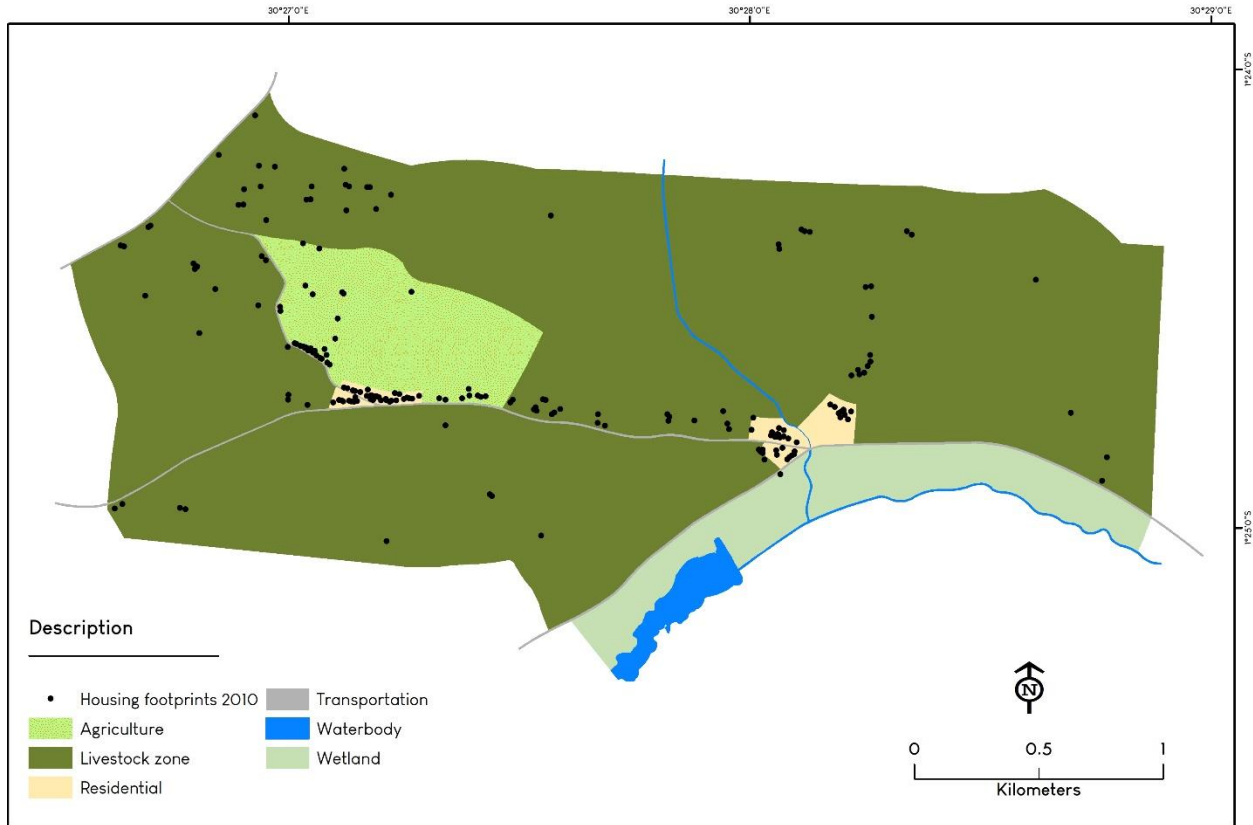
#### **4.1.2.3 *Rwabiharamba site in 2010***

In 2010, there were significant changes in land cover in Rwabiharamba, pointing to a development in settlement patterns. Based on information from local respondents, the Commission for Commission which was responsible for sharing out land to the vulnerable population in 2008 and in 2009 official settlements were allowed. This change marked the beginning of a shift in land use patterns. Cattle grazing areas expanded significantly, reflecting the growing importance of pastoralism, which occupies 45.37% of the area. Agriculture also saw significant growth, taking up 16.61% of the area to feed the growing population, showing an increasing shift towards agricultural activities.

Residential areas made highly desirable progress, occupying 2.68% of the area, indicating increasing settlement and population density. This residential growth hints at a shift towards a more stable and structured settlement pattern, with more people moving into officially recognized areas. The presence of water bodies, including dams and run-off water from livestock areas, as well as wetland has been conserved and accounts for 2.96% and 13.30% of the land area respectively. This conservation underscores the ecological importance of preserving these natural resources during development.

Beyond this, transportation with new road to Akagera National Park and paths within the site has been slightly expanded, accounting for 3.51% of the land area, allowing for better connectivity and access within the region. These changes reflect a shift towards a more diversified economic and settlement structure in Rwabiharamba. Based on the observations, the combined growth of agriculture, livestock and residential areas illustrates the dynamic development that is shaping the landscape and improving the living conditions of the local community.

Map 11: Rwabiharamba Settlement Site in 2010



Source: Google Earth Imagery, 2010

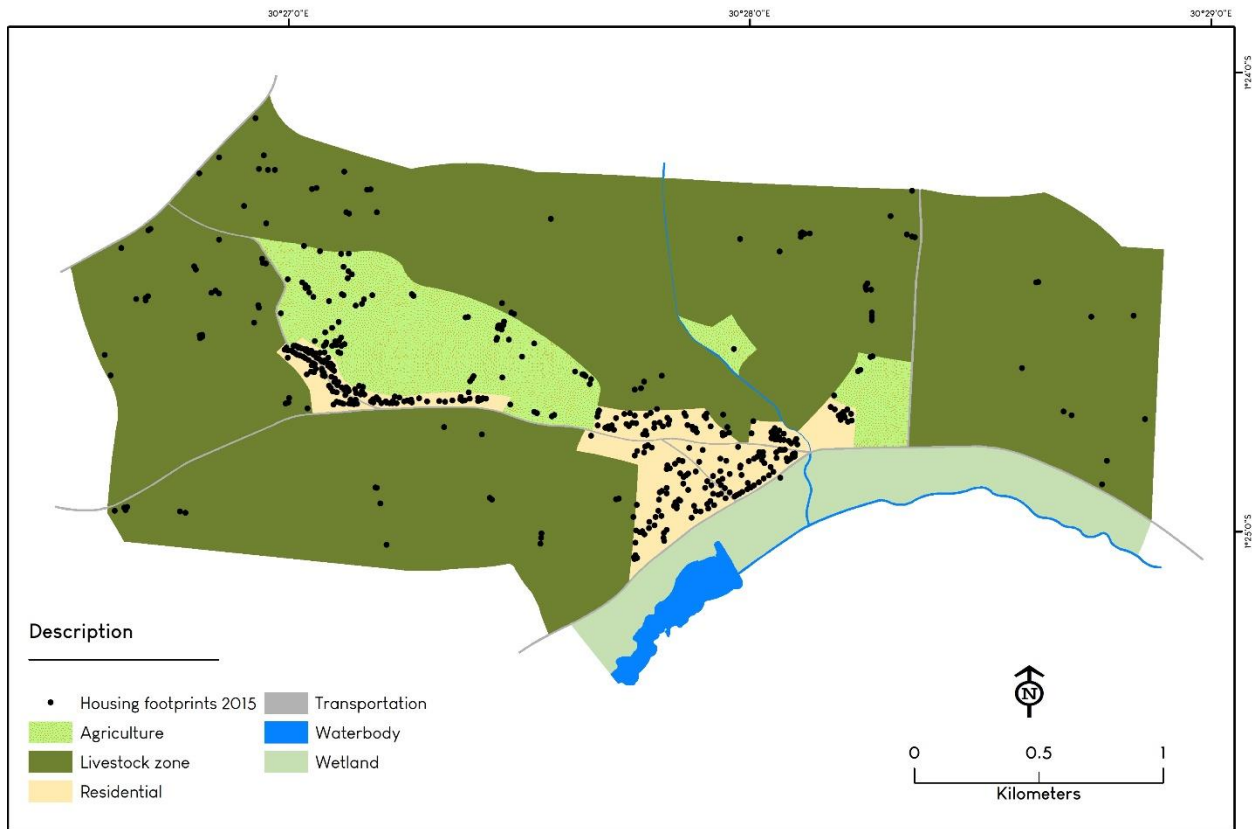
Between 2005 and 2010, the number of buildings in Rwabiharamba increased from 56 to 199. These buildings, which are used for both residential and livestock purposes, generally highlight the farming activities in the area. Several immigrants, including refugees returning from Uganda after the Rwandan Genocide against the Tutsis, and returnees from Tanzania, settled in this area in 2010, contributing to the increase in the number of buildings and supporting the emerging settlement patterns.

#### 4.1.2.4 *Rwabiharamba site in 2015*

During 2015, the land cover of Rwabiharamba showed the evolving settlement patterns driven by population movements and farming economic activities. Livestock areas dominated the area, covering 474.7 hectares (57.2 %), reflecting the emphasis of the district on pastoralism. Agriculture took up 64.6 hectares (7.8%), illustrating its growing impact on supporting the local population.

The residential land grew to 38.6 hectares (4.7%), reflecting an increasing settlement density, often due to immigration of people from across the country seeking suitable land for farming. This immigration included the people who previously scattered across the farmlands of Nyagatare. Connectivity and access were improved as transportation routes were extended over 9.2 hectares (1.1%). Aquatic and wetland areas were conserved over an area of 10.4 hectares (1.3%) and 47 hectares (5.7%) respectively, highlighting the inherent ecological importance of these resources.

Map 12: Rwabiharamba Rural Settlement Site in 2015



Source: Google Earth Imagery, 2015

In the period between 2010 and 2015, the number of buildings in Rwabiharamba has risen significantly from 199 to 502. These buildings were used for residential, livestock and some for commercial functions. The field survey showed that the increase in construction activities have been triggered by several immigrant populations, including people relocated from farmlands in Nyagatare and other districts. This inward flow contributed to the evolving settlement patterns that reflect a mix of agricultural and commercial activities. The diverse population that settled in

Rwabiharamba in 2015 helped drive this change and created a more complex and cohesive community landscape.

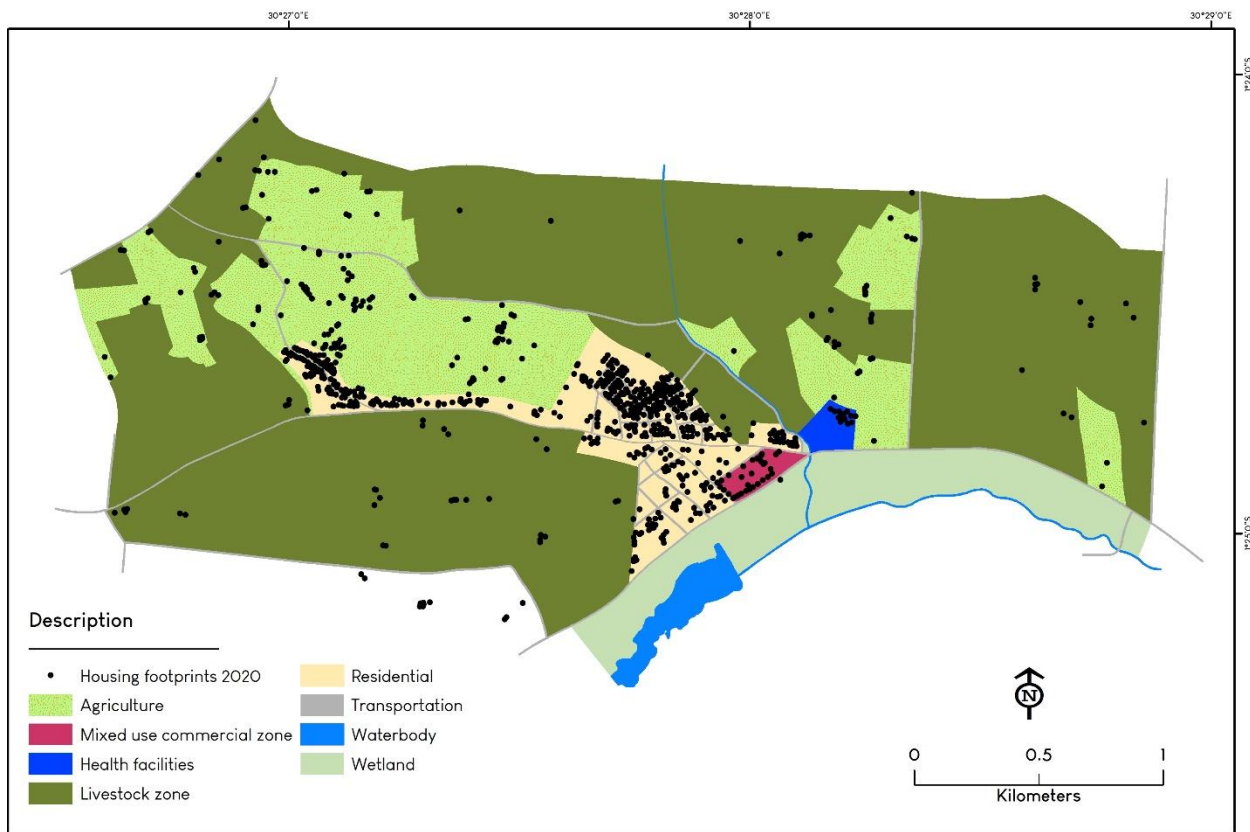
#### ***4.1.2.5 Rwabiharamba site in 2020***

By 2020, the land cover of Rwabiharamba underwent significant changes due to population growth and infrastructure development. At 396.2 hectares (50.2 %), the livestock zone remains predominant, underlining the continued dependence of the area on pastoralism. Agriculture increased significantly with 125.1 hectares (15.8%) and supported the growing population. Residential areas grew significantly to 42.2 hectares (5.4%), highlighting the high level of immigration and the need for housing.

The transportation infrastructure was expanded to 18.9 hectares (2.4%), improving accessibility. Water bodies and wetlands were preserved on an area of 10.4 hectares (1.3 %) and 47 hectares (6.0 %) respectively. The introduction of industrial estates (3.5 hectares, 0.4%) and health facilities (3.3 hectares, 0.4%) testify to the development of essential services.

During this period, the government also resettled vulnerable populations from across Nyagatare and provided shelter as part of the human security program. The introduction of off-grid solar systems provided electricity and facilitated the development of commercial activities and a market in the area. These changes reflect the evolution of Rwabiharamba into a more structured and service-oriented community.

Map 13: Rwabiharamba Rural Settlement Site in 2020



Source: Google Earth Imagery, 2020

However, in 2020, as satellite imagery revealed, the number of buildings in Rwabiharamba had risen to 829. This significant increase is due to continued settlement expansion driven by high rate of immigrants and residents resettled from farmlands in Nyagatare and other districts. The buildings include both housing and livestock, and some commercial boutiques have also been established. This growth highlights the significant transformation of Rwabiharamba into a more densely settled and developed community, in a reflection of its evolving status as a significant resettlement area and its adaptation to increasing population needs.

#### 4.1.2.6 *Rwabiharamba site in 2024*

As of 2020, roughly the land cover of Rwabiharamba exhibited clear shifts in settlement patterns and infrastructure development. With an area of 285.5 hectares (34.2 %), livestock farming

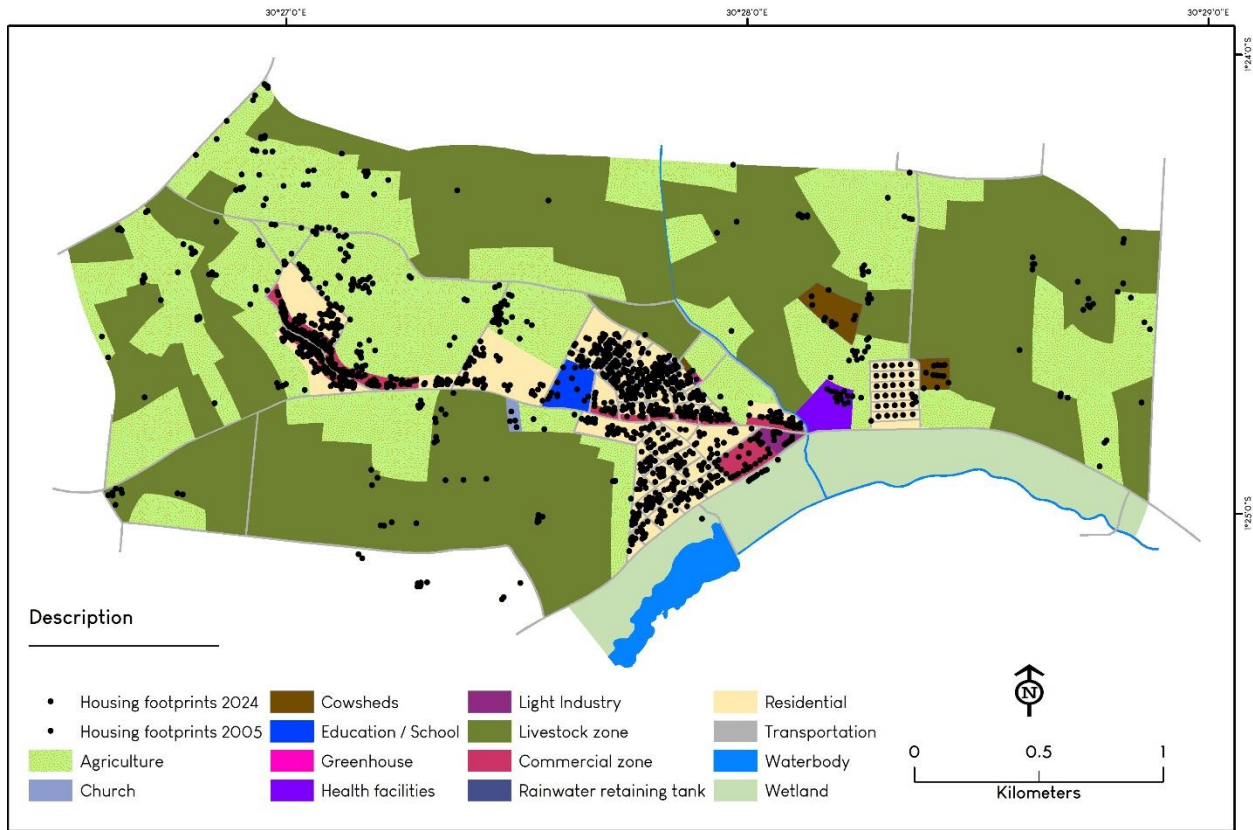
dominated, while agriculture grew to 212.7 hectares (25.5 %), confirming the agricultural emphasis of the area. Settlements expanded to 43.7 hectares (5.2%), highlighting the high immigration rates and the introduction of an IDP model village to house vulnerable populations.

The transportation network extended over 25.9 hectares (3.1%) and improved connectivity. Wetlands and aquatic environments were preserved over 46.6 hectares (5.6%) and 10.5 hectares (1.3%) respectively. Commercial mixed-use areas expanded to 9.5 hectares (1.1%), and health center took up 3.3 hectares (0.4%), indicating the development of essential services. The establishment of MCC (1.1 hectares, 0.1%) and educational facilities (2.8 hectares, 0.3%) are evidence of the area's developing infrastructure.

From 2021, the IDP model village continued to contribute to population growth and house resettled vulnerable communities. In 2022, the construction of two 4-in-1 houses resulted in housing for 8 families from the reserve force community. As part of Gabiro Agribusiness Hub project, 150 households were relocated in Rwabiharamba and another 300 households were relocated to other sites, further increasing the residential area.

Infrastructure development included 4 churches, educational facilities, a milk collection center, 2 modern cowsheds, greenhouse, and rainwater retention tanks. Additionally, during 2021, the area was connected to the electricity grid by REG along with a water supply by WASAC, which has helped improve the quality of life for residents. This comprehensive development reflects the transformation of Rwabiharamba into a well-structured, service-oriented community.

Map 14: Rwabiharamba Rural Settlement Site in 2024



Source: Google Earth Imagery, 2024

Over the period of 2020-2024, the number of buildings in Rwabiharamba increased from 820 to 1,350, which symbolizes a remarkable increase in settlement growth. This increase is primarily due to the large arrival of immigrants from different districts of Rwanda, particularly from Western, Southern and Northern provinces, as well as people who previously lived scattered on farmland. In addition, initiatives such as the IDP Model Village resettlement program and the Gabiro Agribusiness Hub project have helped in providing consolidated houses to vulnerable populations from Musheru and other parts of Nyagatare, further driving the rapid growth of settlement infrastructure in the area.

### **4.1.3 Factors contributing to the development settlements in the study area**

This section discusses the factors that contributed to the development of settlements in Gatebe and Rwabiharamba. According to survey respondents, many people settled in these areas in search of land suitable for farming and livestock. In addition, a significant number of households, especially those relocated from farms, have been attracted by the development of infrastructure and job opportunities in Gatebe and Rwabiharamba.

Other contributing factors include the relocation of families by the Gabiro Agribusiness Project, the Human Security Program, the Land Sharing Program, as well as the inflow of migrants from across the country and returnees from Uganda and Tanzania. This movement has contributed significantly to the development of Gatebe and Rwabiharamba settlements.

#### ***4.1.3.1 Search for suitable lands for agriculture and livestock***

One of the main reasons for the increase in the number of people moving to Gatebe and Rwabiharamba areas is the search for suitable land for agriculture and livestock farming. Numerous individuals and families originally moved to these areas in search of fertile land to support their agricultural and livestock activities. The organized structure of planned settlements provides a productivity-enhancing environment that offers stability and better support for these livelihoods.

#### ***4.1.3.2 The development of infrastructure in Gatebe and Rwabiharamba settlement sites***

People living in scattered farmland with limited access to basic services are often attracted to settlements such as Gatebe and Rwabiharamba. In the more remote areas, residents face problems such as poor road conditions, unreliable electricity supply and inadequate water supply. Moving to Gatebe or Rwabiharamba, where the infrastructure is generally better improved, significantly improves their quality of life. These areas offer better access to markets, healthcare and education. The development of roads, water supply systems and electricity grids in these areas is a major incentive for those seeking a more stable and comfortable living environment.

#### ***4.1.3.3 Job opportunities***

Employment opportunities in agriculture, livestock, transportation and other businesses attract people to Gatebe and Rwabiharamba planned settlements. The organized nature of these villages supports economic activity and provides a structured environment for business and employment.

This pattern increases the potential for economic growth and provides residents with more stable and diverse employment prospects. The result is that these developments become centers for various economic opportunities, attracting individuals and families seeking better livelihoods and steady employment, which further promotes community development and prosperity.

#### ***4.1.3.4 Gabiro agribusiness project***

Gabiro Agribusiness Project has played an important role in the re-settlement to these settlements. As part of this project, 450 families have been resettled from the project area, 150 of them in Rwabiharamba. These government-led projects provide new homes and opportunities to improve livelihoods through organized agricultural programs. This structured support encourages people to move from scattered settlements to better organized settlements, improving their quality of life and improving their economic opportunities.

#### ***4.1.3.5 The Human Security Issues Program***

The Human Security Program made a significant contribution to the resettlement of vulnerable families to Gatebe and Rwabiharamba. Many of these families, previously living in poverty or in disaster-prone areas, were relocated as part of an initiative to improve their living conditions. This resettlement program targets the most vulnerable populations to provide adequate housing, access to essential services and a safer living environment, making planned resettlement a preferable option.

#### ***4.1.3.6 The land-sharing program***

The land-sharing program, which was mainly implemented in the farmlands of the Eastern Province, allowed people who owned large land areas to share parts of it with vulnerable groups to secure their livelihoods. This program enabled individuals to own lands and sell parts of them, which attracted a large number of immigrants from different districts of Rwanda. However, the inflow of people who wanted to buy land and settle in these areas has contributed to the growth of Gatebe and Rwabiharamba.

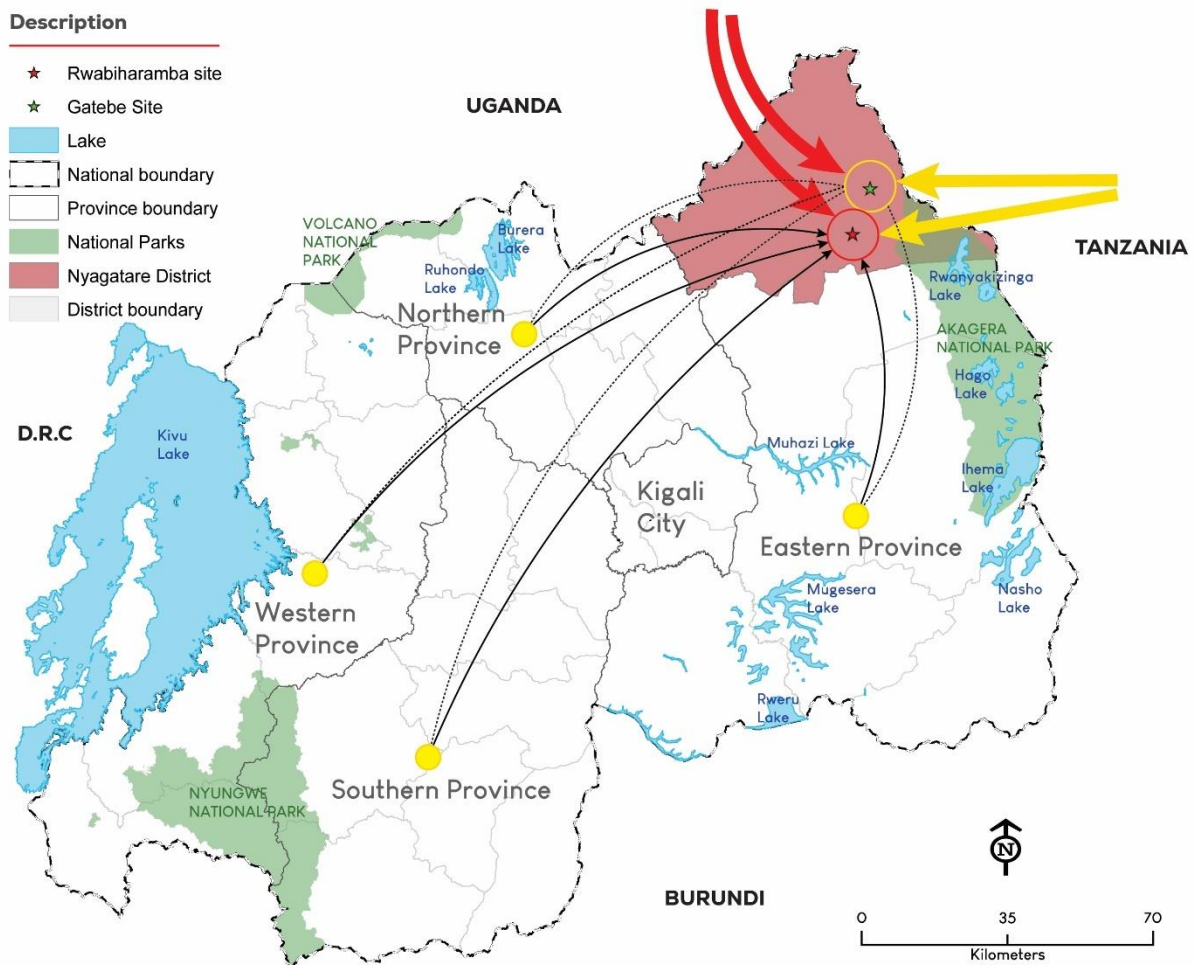
#### ***4.1.3.7 Inflow of Returnees and immigrants***

In accordance with the respondents, Gatebe and Rwabiharamba have experienced an incoming flow of returnees from Uganda and Tanzania, which has significantly increased the population and diversity of these communities. The returnees from Uganda fled partly because of discrimination

against the Tutsi in 1959, 1961 and 1973 and then returned after the genocide against the Tutsi in 1994. In addition, the Tanzanian's political reforms prompted more returnees to settle in these areas. This immigration has enriched the diversity of the community, but also poses a challenge when it comes to integrating the different cultural backgrounds and meeting the increased demand for housing and services.

These returnees have similarly contributed to the demographic changes in Gatebe and Rwabiharamba, thus accelerating comprehensive planning and infrastructure development in these areas to accommodate the diverse and growing population.

Map 15: Inflow of Immigrants and returnees to Gatebe and Rwabiharamba sites



Source: NISR, 2012 and NLA, 2020

As shown in the map above, another aspect of this inflow is the immigration of people from across the country in all provinces to Gatebe and Rwabiharamba. In Nyagatare itself, resettlement has taken place from various parts of the district, including Musheru, Kiyombe, Mimuri and Matimba, often with vulnerable populations moving from farmlands and risk zones to Gatebe and Rwabiharamba with support from the district. This movement also included inhabitants from other parts of Eastern Province, such as Bugesera and Gatsibo, who moved to Gatebe and Rwabiharamba. On-site surveys revealed that a significant number of the immigrants were from Northern Province, particularly Gicumbi, Gakenke and Rulindo, with a relatively few from Musanze and Burera.

In Southern Province, immigrants originated from Nyaruguru, Nyamagabe, Ruhango and Nyanza, while in Western Province people moved from Rusizi, Nyabihu and Ngororero. This domestic migration was primarily triggered by the search for adequate land for agriculture and livestock, as people could not find suitable land in their previous places of residence and moved to Eastern Province for better opportunities.

## **4.2 CURRENT STATUS OF SETTLEMENT REORGANIZATION IN GATEBE AND RWABIHARAMBA**

### **4.2.1 Gatebe Planned Village**

As detailed in Sections 4.1 and 4.2, Gatebe site has undergone significant development from its origins as part of Akagera National Park before 2000 to becoming farmland until 2008. After the land-sharing program in 2009, resettlement of the population started in the area. A considerable inflow of immigrants from various districts of the country, contributed to the scattered settlements within Gatebe. These immigrants were seeking land suitable for farming and livestock, often buying land, or working on farmland and eventually receiving land as a reward. This inflow contributed significantly to the scattered settlements witnessed in Gatebe.

In recognition of the need for more organized settlement development, the government implemented a program to resettle vulnerable populations from various farmlands in Nyagatare, consolidating them in Gatebe. This marked the beginning of planned settlements. Gatebe was

chosen as a site to accommodate returnees who had been pushed out from Tanzania, contributing further to population density. In response to these demographic changes, the government-initiated projects to consolidate the population on smaller, more manageable plots of land, ensuring proper land use.

The government has provided basic needs and essential infrastructure to sustain Gatebe community. These include road maintenance, water supply, and the establishment of an off-grid electricity system. Such improvements have been key to transforming Gatebe towards an organized settlement site. As of 2020, government efforts to address human security issues led to the resettlement of vulnerable communities, many of whom were homeless, from areas such as Musheru, Rwempasha, Kiyombe, Nyagatare, and Matimba in Nyagatare District. Other people were relocated from farmlands and other areas where they did not have adequate housing. The government has provided them with housing in Gatebe, strengthening the planned settlement initiative.

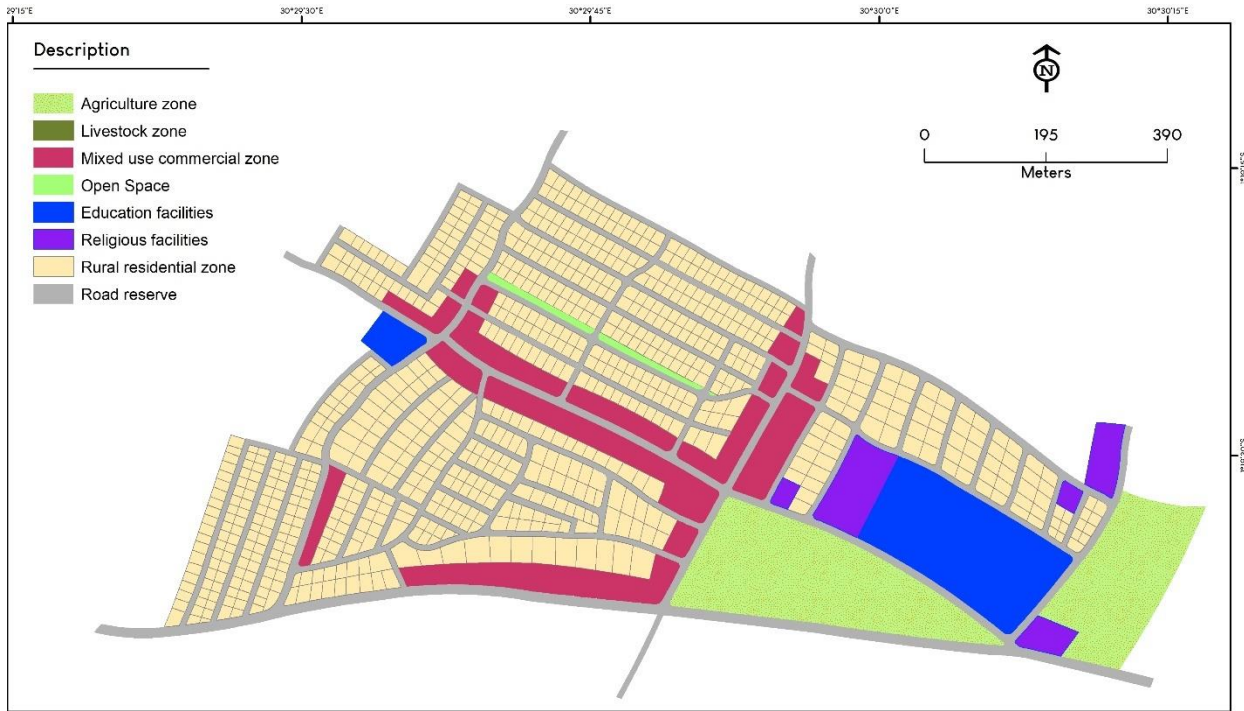
Despite ongoing challenges, the provision of various infrastructure has significantly improved living conditions in Gatebe. These efforts include the development of roads, water supply systems, and off-grid electricity, although much work remains to be done. The transformation of Gatebe from a scattered settlement to a planned village reflects dynamic changes in settlement patterns and the government commitment to building sustainable and organized living communities.

Photo 1: Gatebe Settlement Site



Source: Field Survey

Map 16: Gatebe Settlement Layout Plan



Source: RHA, 2019 and NLA, 2021

#### 4.2.2 Rwabiharamba Planned Village

The settlement dynamics of Rwabiharamba have evolved significantly, reflecting a unique but parallel transformation to that of Gatebe. A portion of the Rwabiharamba community includes returnees from Uganda who moved away during the various civil wars of 1959, 1963, and 1973, while most returned in 1994 and 1995 after the genocide against the Tutsis. The first residents arrived in Rwabiharamba in 1995, and by 2008 the area was home to 53 households.

In 2008, the land-sharing program stimulated further immigration to Rwabiharamba, attracting people from all over the country in search of land suitable for farming and ranching. Like Gatebe, in 2015 Rwabiharamba was also chosen to receive returnees from Tanzania and people who were displaced from farmland in various sectors of Nyagatare district. This shift marked a significant turning point in the settlement pattern of Rwabiharamba.

The government took a decisive role in developing Rwabiharamba as a planned village by providing essential infrastructure. These included access to education and health facilities,

markets, electricity, and improved roads. These developments have been instrumental in transforming Rwabiharamba from a scattered settlement into a planned village.

In 2021, the government established an IDP model village in Rwabiharamba to accommodate 24 vulnerable families in single houses, with 20 out of 30 for each family. In 2022, the IDP model village was extended further to include 8 reserve force families, sheltered in 2 buildings designed in a 4-in-1 model.

Meanwhile, Gabiro Agribusiness Project has had a significant impact on the settlement dynamics of Rwabiharamba. The project resettled 150 households on 2 hectares within the site, relocating people from an area of 5600 hectares covered by the project. Besides, another 300 families affected by this project were resettled in other sites, such as SHIMWAPPAUL site in Nyamirama cell and AKAYANGE site in Ndama cell.

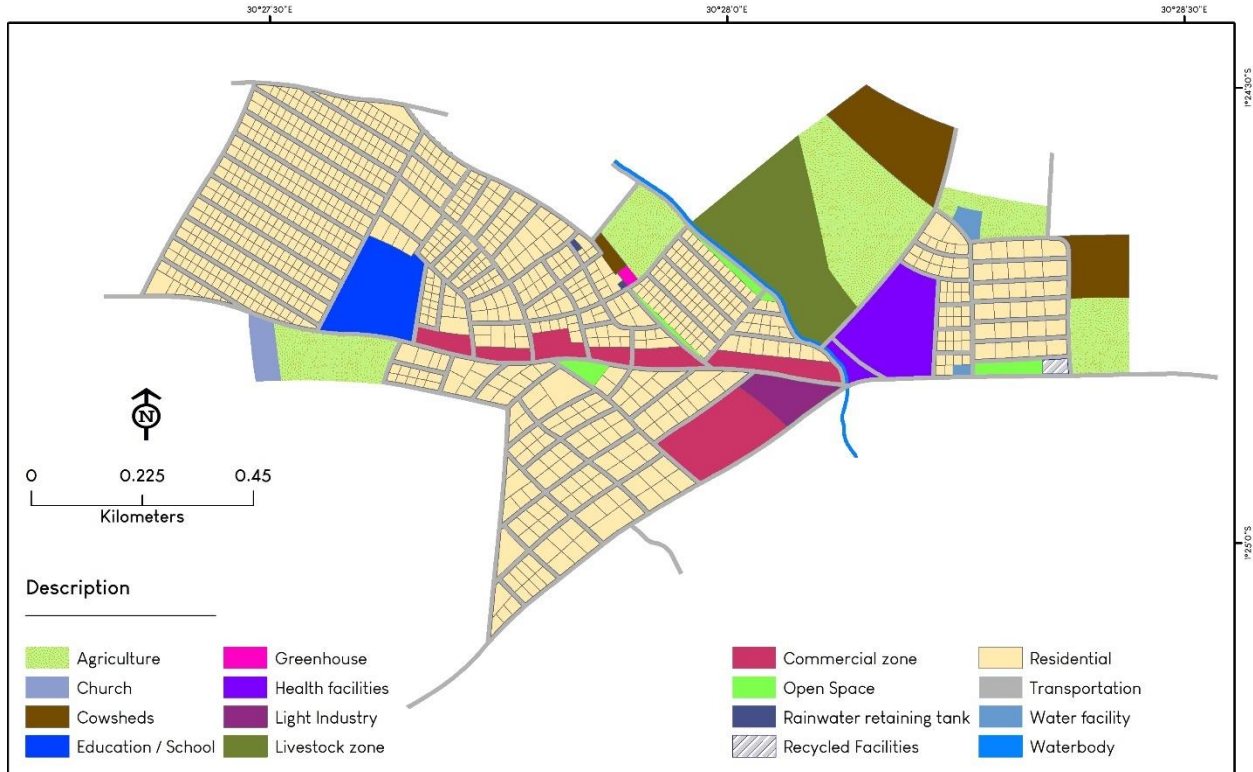
These initiatives and projects have had a major role in transforming Rwabiharamba into a well-planned settlement site. Government efforts to provide basic infrastructure and create organized housing solutions have contributed to the transformation of Rwabiharamba into a model of planned rural development. The continuous improvement of infrastructure and housing reflects dynamic changes in settlement patterns and a commitment to creating sustainable and organized communities.

Photo 2: Planned housing in Rwabiharamba settlement site



*Source: Field Survey*

Map 17: Rwabiharamba Settlement Site Layout Plan

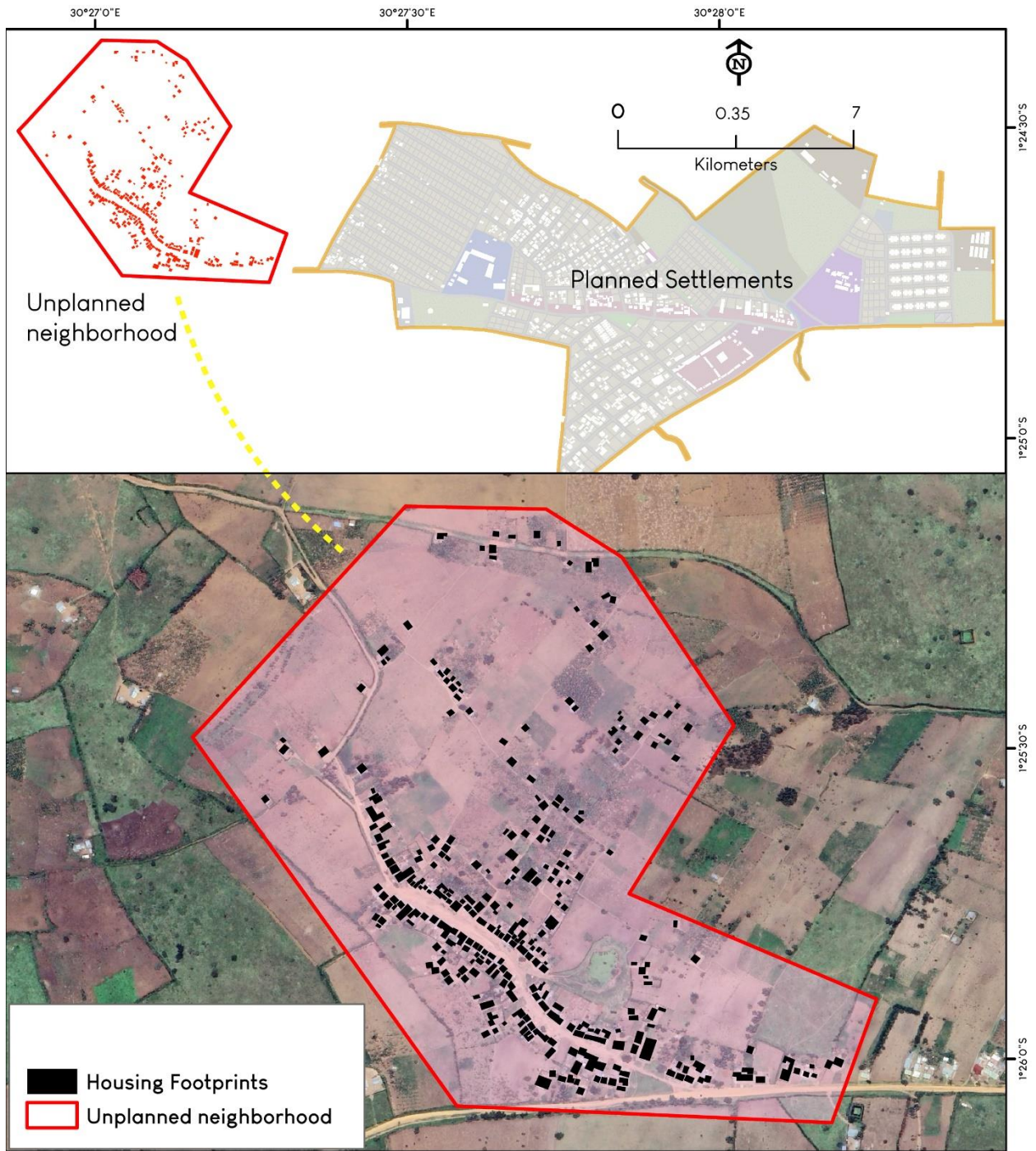


Source: RHA, 2019 and NLA, 2021

#### 4.2.3 Rwabiharamba Unplanned neighborhood

In Rwabiharamba, Kabeza center has developed informally adjacent to Rwabiharamba planned village. Interviewees revealed that the population of Kabeza is largely made up of immigrants who have come from all over the country to work in farming and livestock rearing. Attracted by the work opportunities, they began to earn money and bought land to support themselves. In turn, many of them brought their families to Kabeza, leading to the creation of this informal settlement. Since 2012, the center has grown considerably due to the attraction of agricultural activities. However, this growth has been informal, with some households spreading out and creating scattered settlements. The development of the area highlights the important role of agricultural and livestock employment in attracting settlers and shaping community expansion.

Map 18: Rwabiharamba unplanned neighborhood



Source: Field Survey and Google Earth Imagery, 2024

### 4.3 OUTCOMES OF SETTLEMENT REORGANIZATION IN GATEBE AND RWABIHARAMBA

The outcomes of the reorganization of settlements in Gatebe and Rwabiharamba include the development of basic infrastructure, such as the establishment of educational, health and religious facilities, as well as improved access to electricity, water and roads. This progress has improved the quality of life of the inhabitants, created employment opportunities and encouraged the development of non-agricultural income-generating activities. In addition, agricultural practices have improved, contributing to the growth of the overall economy and the sustainability of these communities.

#### 4.3.1 Infrastructure development in Gatebe settlement site

Within Gatebe settlement site, transformation began in late 2012 following a land-sharing program that allowed land exploitation and attracted many migrants, returnees, and the government's resettlement program. Infrastructure development in Gatebe to support the community has been happening gradually, yet further progress is still urgently needed. The available infrastructure in Gatebe is further broken into the following categories:

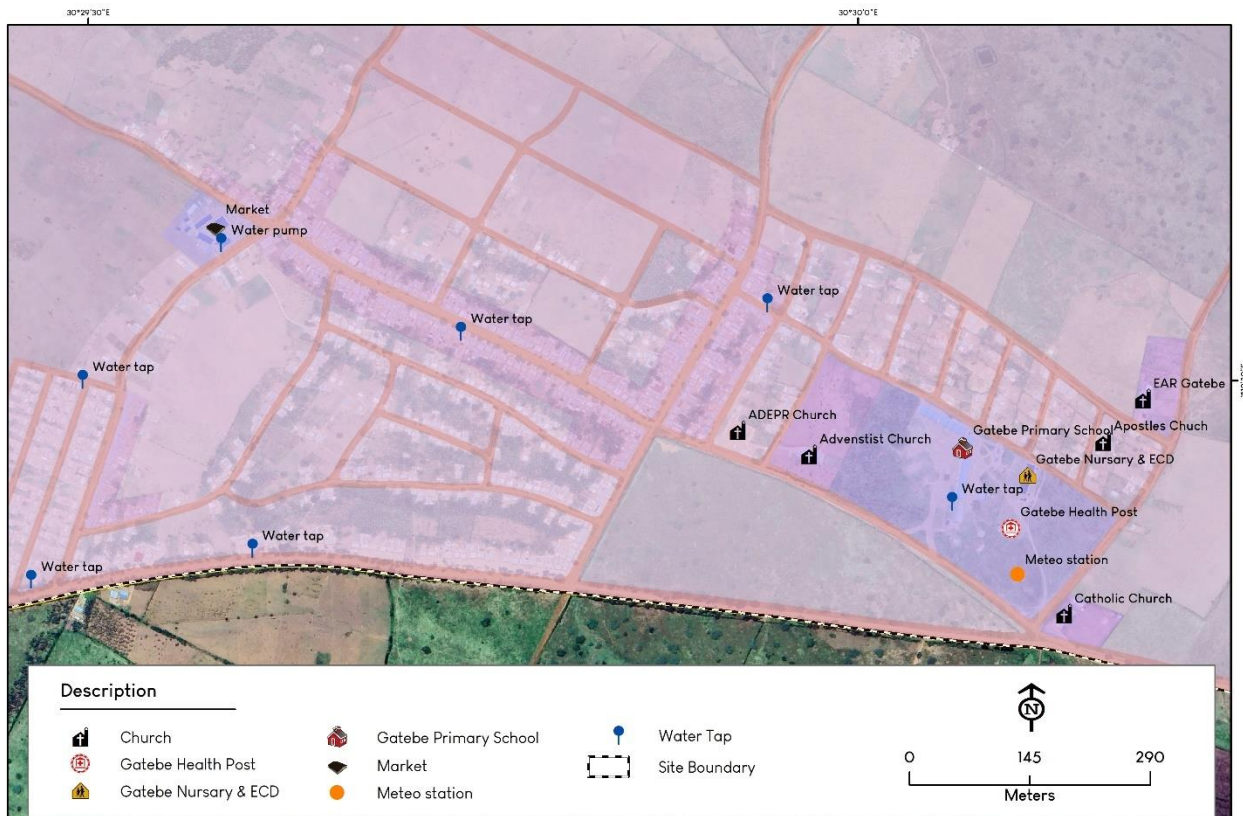
Table 2: Infrastructure available in Gatebe

NO	INFRASTRUCTURE	TYPE	NUMBER
1	Education facilities	ECD	1
		Nursery	1
		Primary	1
2	Health facilities	Health Post	1
		Pharmacy	1
3	Religious facilities	Catholic church	1
		ADEPR	1
		EAR	1
		SDA (Adventist church)	1
		AEBR	1
4	Electricity	EPR	1
		Off-grid (Solar Panels)	847 Households
5	Water	Major Pipeline from Kiyombe	N/A
		Underground water pumping system	N/A
		Small artificial dam	1

Source: Field Survey

As shown on the map below, infrastructure in Gatebe is generally distributed between residential and commercial buildings. They are also installed along roads, providing easy access for residents. Although electricity was not easily mapped, interviewees revealed that a significant number of households, as described in section 4.3.1.4, have access to off-grid systems. All these infrastructures facilitate the daily life inhabitants of Gatebe site and play an important role in job creation.

Map 19: Distribution of infrastructure in Gatebe Settlement Site



Source: Field Survey and Google Earth Imagery, 2024

#### 4.3.1.1 Education facilities

Educational facilities in Gatebe site include an early childhood development (ECD) center, a nursery school, and Gatebe Primary School. However, there is a significant gap in educational facilities as there is no secondary school within the site. This deficiency forces children to walk about 6 kilometers to Karushuga Center to get to secondary school. The absence of a secondary school nearby highlights the urgent need for additional educational facilities in Gatebe to provide accessible education for all age groups in the community.

Photo 3: Gatebe Primary School



*Source: Field Survey*

#### ***4.3.1.2 Health facilities***

There is a health post and a private pharmacy in Gatebe site. Despite these facilities, they do not provide comprehensive health services to residents. For advanced medical needs beyond those provided by the health post, residents must travel 10 kilometers to Bugaragara Health Center in Gacundezi cell. However, according to the NLUDMP 2050, residents should not have to travel more than 4 kilometers to reach a health center. For hospital services, they must travel to Nyagatare City, which is farther from Gatebe. This situation highlights the urgent need to upgrade health facilities within Gatebe to ensure residents have better access to essential and specialized health services.

#### ***4.3.1.3 Religious facilities***

Gatebe site is experiencing significant infrastructure development, particularly religious facilities, due to the inflow of diverse populations from all over the country. The site hosts a variety of religious institutions, reflecting its cultural and religious diversity. These include Catholic church, ADEPR, EAR, SDA (Adventist), EPR, and AEPR. However, there is no Islamic facility. This range of religious infrastructure supports the spiritual needs of residents and promotes a sense of community. The development of these facilities highlights the evolution of infrastructure in Gatebe to accommodate a growing and diverse population.

Photo 4: Gatebe Seventh Day Adventist Church



*Source: Field Survey*

#### **4.3.1.4 Electricity**

Gatebe faces a significant challenge with limited access to electricity. The residents primarily rely on off-grid solar panels, with 847 out of 896 households using this type of electricity. This leaves 49 households without any electricity. However, the current off-grid system is insufficient for all human activities, limiting the residents' daily functions and development. Therefore, there is an urgent need to provide on-grid electricity to support the community in Gatebe more effectively and ensure all households have reliable access to power.

#### **4.3.1.5 Water in Gatebe site**

Water is readily available in Gatebe, supplied by a pipeline from the Kiyombe sector that serves much of Nyagatare. Also, within the site there is an underground water pumping system and a small artificial dam to support the community. Before these upgrades, residents had to fetch water from the Akagera River, a task that became especially challenging during periods of drought when water shortages were common. The new water supply infrastructure has significantly alleviated these problems, providing the population with a more reliable and consistent source of water.

### 4.3.2 Infrastructure Development in Rwabiharamba Settlement Site

Rwabiharamba has experienced a significant infrastructure development, overtaking Gatebe in several aspects. Following the land sharing and resettlement programs undertaken, the population growth due to migration has facilitated this progress. The site now boasts comprehensive infrastructure, including school facilities, health facilities, religious facilities, good road network, electricity, and water supply systems. This progress has been instrumental in supporting the needs of the community and improving the overall quality of life. The continued immigrant inflow has been a key factor in accelerating these developments, transforming Rwabiharamba into a well-equipped and thriving settlement site.

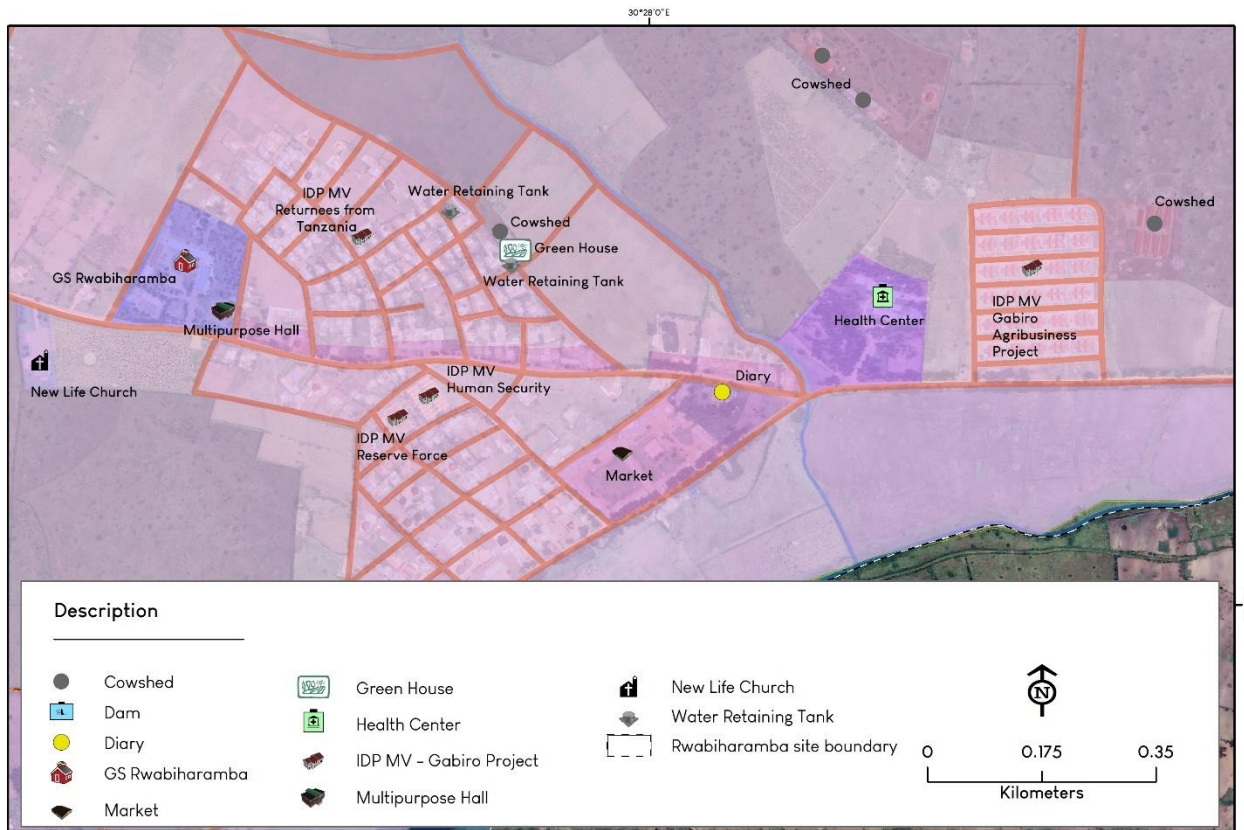
Table 3: Infrastructure available in Gatebe

NO	INFRASTRUCTURE	TYPE	NUMBER
1	Education facilities	ECD	4
		Nursery	3
		Primary	1
		Secondary	1
2	Health facilities	Health Post	1
		Health Center	1
		People Pharmacy	2
		Animal Pharmacy	1
3	Religious facilities	EAR	1
		New Life Church	1
		Miracle Center	1
		Revelation	1
		Apostolic Church	1
4	Electricity	On-grid (by REG)	1,230 Households
		Off-grid (Solar Panels)	307 Households
5	Water	Major Pipeline from Kiyombe	N/A
		Underground water pumping system	N/A
		A dam	1

Source: Field Survey

The map below illustrates the spatial distribution of all the infrastructures identified in Rwabiharamba site. As shown, the infrastructures are accessible directly along the roads. This accessibility, according to the people interviewed, facilitates the daily life of residents and, in many cases, offers employment opportunities.

Map 20: Infrastructure distribution in Rwabiharamba Settlement Site



Source: Field Survey and Google Earth Imagery, 2024

#### 4.3.2.1 Education facilities

In Rwabiharamba, the development of school facilities has been a considerable aspect of infrastructural progress. The site now comprises 4 ECD centers, 3 pre-primary schools (Nurseries), as well as a primary and secondary school. This comprehensive educational infrastructure ensures that children in Rwabiharamba have access to quality education from an early age, facilitating their learning journey without having to travel far from home. These facilities provide a solid foundation for the youth in the community, promoting educational achievement and supporting the overall development of Rwabiharamba as a thriving and well-planned settlement.

#### 4.3.2.2 Health facilities

The health facility in Rwabiharamba site has significantly improved the community's access to health care. The site features 1 health post, 1 health center, 2 people pharmacies, and 1 animal

pharmacy. These facilities provide essential medical services, ensuring that residents receive basic health care and medications on site. However, to obtain more advanced hospital services than those offered by the health center, residents must travel to Nyagatare city. Although distance presents a challenge, the availability of primary health care services within Rwabiharamba marks substantial progress in the village infrastructure, promoting better health outcomes for residents.

Photo 5: Rwabiharamba Health Center



*Source: Field Survey*

#### **4.3.2.3 Religious facilities**

In Rwabiharamba, the development of religious facilities reflects the diverse faith needs of the community. The site is home to five churches: EAR, New Life, Miracle Center, Revelation, and Apostles, which serve the spiritual needs of many residents. However, those belonging to other faith denominations, such as Catholics and ADEPR, travel to nearby areas such as Karangazi and Nyamirama centers for their church services. This mixture of local and external options ensures that most residents can access places of worship within Rwabiharamba site.

#### **4.3.2.4 Road network**

Road network in Rwabiharamba is a key part of the infrastructure, boosting connectivity and accessibility. The site is connected to the district road from Karangazi center to Akagera National

Park, easing access to markets and the movement of goods and services. Another prominent road connects Rwabiharamba to Gabiro on the main road Kagitumba-Kayonza. Locally within the site, there are serviced residential roads that support local neighborhoods. Despite these developments, there is a need to further improve the road network to ensure complete coverage of all residential zones, as indicated in the site layout plan, to better serve the growing community.

#### ***4.3.2.5 Electricity in Rwabiharamba***

As of 2021, Rwabiharamba site was linked to the power on-grid provided by Rwanda Energy Group (Haregeweyn et al.), marking a significant improvement in the site's infrastructure. Before this development, households in Rwabiharamba relied on off-grid solar systems, such as Mobisol, and so on. Currently, 80% of the 1,537 households, representing 1,230 households, are connected to a reliable on-grid system that is robust. This system is connected to a transformer located on the medium-voltage line in Karangazi center and has the capacity to support future growth in the area. Despite this progress, 307 households (20%) are still using off-grid solutions. The introduction of on-grid electricity has significantly enhanced the infrastructure in Rwabiharamba, supporting both current demand and the potential for future expansion.

Photo 6: Electricity supply in Rwabiharamba site



Source: Field Survey

#### **4.3.2.6 *Water supply in Rwabiharamba***

Rwabiharamba site has access to water supply but is facing significant challenges. The water supply line connected to the main line from Karangazi operates sporadically and is often without water for three months due to unidentified connection problems. Despite this, Rwabiharamba has access to groundwater, pumped via solar power. There are five taps in the area: three pump water from underground sources and two are connected to the unreliable main line. Water in Rwabiharamba is publicly managed: households do not own private water supply, except for those with water storage tanks.

#### **4.3.3 *Employment opportunities***

Among the benefits of the reorganization of the residential areas in Gatebe and Rwabiharamba is the creation of employment opportunities. According to the people interviewed, the increase in population in these areas has led to an increase in demand for various services, which in turn has created jobs for residents. For instance, a number of people are now engaged in commercial activities, supported by local residents who serve as their customers. In addition, the reorganization has stimulated the development of education and health services, offering professional career opportunities in teaching and healthcare. Employment has also risen in back-office functions in these areas, such as cleaning, security agents and restaurants. Some residents also secured jobs in the construction sector and as agents for telecommunications companies such as MTN and Airtel-Tigo. Taken as a whole, the reorganization of the Gatebe and Rwabiharamba settlements has made a significant contribution to the local economy, creating a variety of employment opportunities for the community.

#### **4.3.4 *Effective Land Management Benefits***

The relocation of households from scattered settlements and farmland to planned settlement areas in Gatebe and Rwabiharamba has significantly improved the efficiency of land use and modernized agricultural practices. Previously 450 households occupied 5600 hectares of land in scattered settlements, now they are consolidated to only 6 hectares, 2 hectares of which are in Rwabiharamba. This consolidation has freed up large areas for more efficient use, allowing for better planning and utilization of resources. The land freed up by the relocated households has been integrated into the Gabiro Agribusiness Project, which focuses on modernizing agricultural practices and increasing productivity. By consolidating the land, it has now become feasible to

apply large-scale farming methods, use advanced agricultural technologies and increase crop yields.

The resettlement has facilitated the promotion of larger-scale agricultural practices, such as those used in the Gabiro Agribusiness Project, which are more efficient and productive compared to the traditional, small-scale farming methods previously practiced in the scattered settlements. In addition, the newly planned settlements in Gatebe and Rwabiharamba provide better access to infrastructure and services such as roads, water supply, electricity, health and education facilities. The improved infrastructure supports both residential and commercial activities, contributing to a higher quality of life for residents.

Land within the planned settlements has been allocated for various purposes, including agricultural, residential and commercial use. This allocation is structured to ensure that all aspects of the community's needs are met and promotes a balanced and sustainable living environment. In addition, the relocation of scattered settlements to Gatebe and Rwabiharamba sites supports land consolidation policies aimed at reducing land fragmentation and facilitating efficient management of land resources and the adoption of modern agricultural practices.

#### **4.4 PERSISTENT CHALLENGES IN REORGANIZING SETTLEMENTS TOWARDS PLANNED VILLAGES IN GATEBE AND RWABIHARAMBA**

The reorganization of the Gatebe and Rwabiharamba neighborhoods towards planned settlements presents several persistent challenges, as highlighted by respondents to this study survey and confirmed by on-site findings. The financial burden of relocation, including the cost of transporting belongings and furnishing new homes, is significant for many families with limited resources. Interviewees expressed their concern about losing their livelihoods in farming or local businesses, as well as their uncertainty about finding equivalent opportunities in the new living areas. Despite improvements in infrastructure, the development of these areas remains incomplete, leading to problems such as unreliable water supplies, irregular electricity supplies and inadequate road networks. Field observations also revealed a shortage of housing, making it difficult for new arrivals to find suitable accommodation except establishing new homes in the sites.

Cultural and strong emotional attachments to ancestral homelands, deeply rooted in family ties, make many residents unwilling to relocate. Interviewees pointed out that relocation can disrupt

existing social networks and community ties, particularly for older residents or those deeply integrated into their current community, leading to a sense of isolation and resistance to relocation. The lack of information on the benefits, procedures and opportunities associated with moving to Gatebe and Rwabiharamba prevents people from making informed decisions, as noted by several interviewees. The physical distance between dispersed residential areas and planned zones is also a major obstacle, making it difficult for people to live far from their current farmland and to practice the activities of life on their land.

Specific challenges in Gatebe include the absence of a secondary school, forcing pupils to walk up to 6 kilometers to the Karushuga center for education, as reported by interviewees and witnessed in the field. Residents have to travel about 10 kilometers to the Bugaragara health center and even further to the secondary city of Nyagatare for advanced medical care, underscoring the need to improve local health infrastructure. The off-grid solar panel system is insufficient for day-to-day activities, underlining the need for an on-grid electricity system, as field observations have shown. In Rwabiharamba, residents face similar problems, with inadequate road networks, 20% of households relying on off-grid electricity solutions and irregular water supplies, as survey respondents indicated. Tackling these challenges requires comprehensive planning, clear communication and consistent application of policies to ensure a smooth relocation process that benefits all residents.

## **4.5 STRATEGIES AND MECHANISMS TO ADDRESS THE RESETTLEMENT**

### **CHALLENGES IN GATEBE AND RWABIHARAMBA SITES**

Given the persistent challenges encountered during the reorganization of settlements towards planned settlements in Gatebe and Rwabiharamba, the study discussed the strategies and mechanisms for resolving these issues. Such solutions focus on challenges such as the cost of relocation, loss of livelihoods, inadequate infrastructure, housing shortages and strong attachment to the land. By effectively addressing these issues, the implementation of planned settlements can become more effective and successful in Gatebe and Rwabiharamba as well as across the country.

#### **4.5.1 Costs of relocation**

To address the prohibitive expenses associated with relocation, a system of financial support needs to be established on several fronts. This could include government grants and financial assistance programs to help cover the costs of moving and setting up the new home. Grants, low-interest loans or moving allowances could be provided to families with limited financial resources. In addition, public-private partnerships can be involved to co-finance relocation initiatives and provide affordable housing solutions. Implementing a phased approach to relocation, in which families move in stages, can also help spread the costs over time and reduce the immediate financial burden on relocating families.

#### **4.5.2 Loss of livelihood**

The fear of losing their livelihoods, especially among older people, is a major obstacle to resettlement from farmland or scattered settlements to planned village of Gatebe or Rwabiharamba. To alleviate this obstacle, career training and skills development programs should be offered to help residents relocate to new employment opportunities in Gatebe or Rwabiharamba planned villages. Promoting economic diversification within the planned villages by encouraging the establishment of new businesses and industries will create new job opportunities and reduce dependence on a single economic sector.

#### **4.5.3 Inadequate infrastructure**

Although Gatebe and Rwabiharamba planned settlements possess a variety of infrastructure, development is still incomplete or insufficient to meet the needs of all new residents. To overcome these challenges, priority should be given to comprehensive infrastructure development plans that ensure completion of essential services such as water, electricity and roads before large-scale relocation begins. Orderly maintenance programs and upgrade plans are essential to ensure reliability and sustainability. Involving local communities in planning and monitoring infrastructure projects can ensure that developments meet the real needs of residents and foster a sense of ownership and responsibility.

#### **4.5.4 Housing shortage**

The shortage of available housing in Gatebe and Rwabiharamba can make it difficult for new residents to find suitable housing. To address this challenge, housing construction projects should be stepped up using sustainable and affordable housings. Encouraging private developers to invest

in affordable housing projects within planned settlements can also help increase the availability of housing. Efficient land use, through the adoption of high-density housing patterns where appropriate, can maximize available space and accommodate more residents.

#### **4.5.5 Attachment to land**

Many residents of scattered settlements have a strong attachment to their ancestral lands, which can hinder relocation efforts. To solve this problem, cultural sensitivity programs need to be conducted to recognize and respect these connections, while emphasizing the long-term benefits of relocation for future generations. Furthermore, allowing the preservation of cultural and heritage sites within planned villages can help maintain a sense of identity and continuity, making the transition more acceptable to those with deep-rooted ties to their land.

## 5 CONCLUSION AND RECOMMENDATIONS

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### 5.1 CONCLUSION

This study discussed assessing the effectiveness of Gatebe and Rwabiharamba planned settlements sites by analyzing relocation factors, challenges, and overall infrastructure development within these sites. The relocation from scattered rural settlements into planned rural settlements in these sites, has been driven by multiple factors and produced significant socioeconomic impacts. This re-organization originated from several socio-economic and policy factors, including the search for suitable farmland, government resettlement programs, and the need to improve the living conditions of vulnerable populations.

In Gatebe, the development process was driven by the need to address the issue of incoming of immigrants seeking for agricultural and livestock opportunities. Government intervention through the land-sharing program and resettlement initiatives has been critical in setting the population into a more organized and well-planned site. Basic infrastructure, including roads, water supply and off-grid electricity, has been deployed to support this development. These efforts have greatly improved living conditions, although some challenges remain in terms of completeness of infrastructure and adequacy of housing.

Similarly, Rwabiharamba has seen a significant change from farmlands and some scattered settlements to planned village because of the resettlement of returnees and immigrant people. The collaborative role of the government in providing essential infrastructure such as education, health, and electricity has been instrumental in this transformation. The construction of IDP model village for the vulnerable and displaced and Gabiro agribusiness project have further accelerated this process, resettled many families, and ensured better land use. The transformation has led to improved living standards and more sustainable community development.

The effectiveness of this reorganization has been proven by numerous benefits in both Gatebe and Rwabiharamba. Such results include infrastructure development as previously mentioned, expanded employment opportunities, improved quality of life for residents and the development of non-agricultural income-generating activities. Such benefits have been evident in both Gatebe and Rwabiharamba, and based on the successful approach used, this model can be extended to the whole country to solve settlement problems in rural areas.

Despite the development so far made, persistent challenges hinder the full implementation of the planned settlements. For many, the cost of relocation remains prohibitive, resulting in financial strains. Loss of livelihoods and attachment to ancestral lands create resistance to relocation. Infrastructure problems, including unreliable water supply and inadequate road networks, continue to be significant obstacles. In addition, community hardships and lack of comprehensive information on the benefits of relocation further complicate the process.

The reorganization of the Gatebe and Rwabiharamba settlements into planned villages has brought substantial improvements. This model represents a key solution for resolving settlement problems in rural Rwanda. Decision-makers, communities and organizations involved in rural development should adopt this approach to strengthen infrastructure, create employment opportunities and improve residents' quality of life. The government's ongoing commitment and efforts are essential to overcome the remaining obstacles and ensure the success of these initiatives.

This study to assess the effectiveness of planned rural settlements in Gatebe and Rwabiharamba encountered several limitations that affected the scope and depth of the study. Some of the main challenges included logistical difficulties due to the geographical distribution of the sites, limited availability of researchers and financial constraints that limited comprehensive data collection. The distance between Kigali and Nyagatare also made frequent visits difficult, resulting in respondents being overlooked. Problems with data quality, such as insufficient sentinel images and unspecific information from residents about their previous places of residence, also affected the analysis. Despite these limitations, the study was designed to provide valuable insights for informed policy making and sustainable rural development.

## **5.2 RECOMMENDATIONS**

- i. Enhanced data collection strategies: Future research should allocate more time and resources to data collection to ensure comprehensive coverage of study areas. This includes increasing the frequency of site visits and scheduling them at different times of the day to maximize respondent availability. Employing a larger research team or using local enumerators can help overcome logistical challenges and ensure more thorough data collection.

- ii. Grants and subsidies: The government can provide financial subsidies and grants to help residents with the costs of relocation, such as moving expenses and the initial costs of setting up the new house. This financial assistance can make the transition smoother for families with limited resources.
- iii. Encouraging private investment: This is essential for infrastructure development in Gatebe and Rwabiharamba to assist in funding basic facilities such as schools, health facilities and other necessary infrastructure. These investments can improve livability, deliver better services, bridge the needs gap in the population and support sustainable development in these planned settlements.
- iv. Reliable water and electricity supply: Ensure the completion and maintenance of essential infrastructure, including a reliable water supply and constant electricity. Upgrading the current off-grid electricity system to a more resilient and reliable on-grid connection can significantly improve living standards.
- v. Road Network Expansion: Road network improvement is crucial to improving accessibility in Gatebe and Rwabiharamba. In collaboration with the community, the district and / or private sector need to work together to continue improving and maintaining roads to ensure that all areas are accessible. Having good roads facilitates movement and improves access to residential properties, markets, health and education facilities and other activities, which enhances the overall quality of life in these areas.
- vi. Supporting local businesses: Providing support to local businesses and entrepreneurs through micro-loans, business development services, and market access initiatives. Encouraging local business can create jobs and stimulate the local economy in Gatebe and Rwabiharamba.
- vii. Local authorities should create community-building activities that are integral to promoting social cohesion and promoting the integration of new residents in Gatebe and Rwabiharamba. Organizing such activities and programs will help maintain and build new social networks and reduce the sense of disruption caused by resettlement. As the populations in these locations come from different regions and cultures, these activities will create strong bonds and a common spirit of development that will support the overall growth and unity of the community together.

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## 7 APPENDIX

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### 7.1 QUESTIONNAIRE SURVEY

1. *What is your name?*

2. *What is your age range?*

- a. 15 - 20 years
- b. 20 - 25 years
- c. 25 - 30 years
- d. 30 - 35 years
- e. 35 - 40 years
- f. 40 - 45 years
- g. 45 - 50 years
- h. 50 - 55 years
- i. 55 - 60 years
- j. 60 +

3. *Gender*

- a. Male
- b. Female

4. *What is your educational level??*

- a. Primary education
- b. Secondary education
- c. Tertiary education
- d. Postgraduate education

5. *Is Gatebe settlement site your native place??*

- a. Yes
- b. No

6. *If the answer is NO on question 5,*

- a. Where did you live before you became a resident of Gatebe site?
  - i. District
  - ii. Sector

- iii. Cell
  - iv. Village
- b. What did you do for a living before you relocated to Gatebe?
- i. Agriculture
  - ii. Livestock
  - iii. Commerce
  - iv. Other (mention it)
- c. When did you start living in this Gatebe settlement site? (Year of relocation)
- d. What is the difference between living in Gatebe and your previous place of residence?
- i. In terms of infrastructure accessibility
  - ii. In terms of business and employment
  - iii. In terms of social livelihood
  - iv. In terms of economic development

**7. *How many populations and households do you think are living in Gatebe?***

**8. *Among the households that are not native of Gatebe, can you name some places where they were relocated from?***

**9. *What was life in Gatebe before it became a planned rural settlement site?***

**10. *What about life in Gatebe after it became a planned rural settlement?***

**11. *What infrastructure exists in Gatebe settlement site?***

- a. Education facilities
  - i. ECD
    - 1. If only ECD, where do children get further educational services (Nursery, Primary, Secondary)?
    - 2. How long distance (KM) to get there?
  - ii. Nursery
    - 1. If Nursery is of the high educational level in the site, where do children get further educational services (Primary, Secondary)?
    - 2. How long distance (KM) to get there?
  - iii. Primary

1. If Primary is the high education level in the site, where do children get further educational services (Secondary)?
  2. How long distance (KM) to get there?
- iv. Secondary
  - v. Tertiary
  - vi. No education facility in the site
- b. Health facilities
- i. Mention the health facilities available in Gatebe site.
    1. Health post
      - If only health post, where do people get health center or hospital services?
      - How long distance (KM) to get there?
    2. Health center
      - a. If only health center, where do people get hospital services?
      - b. How long distance (KM) to get there?
    3. Hospital
    4. Pharmacy
      - a. If only Pharmacy, where do people get health center or hospital services?
      - b. How long distance (KM) to get there?
    5. Clinic
      - a. If only Pharmacy, where do people get health center or hospital services?
      - b. How long distance (KM) to get there?
    6. No healthcare facility
  - ii. If there are no health facilities in Gatebe, where do people get health services? (The nearest health care facility and its category)
- c. Religious facilities
- i. Christian
    1. Catholic
    2. EAR

3. ADEPR
  4. SDA (Adventist)
  5. EPR
  6. AEBR
  7. Other
- ii. Islam
  - iii. Non-believers
- d. Road network
- What is the main destination area, whether an urban or other settlement, where people from Gatebe tend to go in terms of trade or supply?
- e. Electricity
- i. Does the on-grid system exist in Gatebe?
    1. Yes
    2. No
  - ii. If yes,
    1. How many households are connected to an on-grid system?
    2. Where does the line that supplies the on-grid electricity come from (name and location of the site or voltage line)?
    3. Does the on-grid electricity sufficient or not in Gatebe?
    4. Do you think that the on-grid electricity system needs to be improved? (If so, how do you think it can be improved?)
    5. What are the challenges associated with the on-grid system in Gatebe?
  - iii. If no,
    1. How many households are using the off-grid system?
    2. Does the off-grid electricity sufficient or not in Gatebe?
    3. Do you think that the off-grid electricity system needs to be improved? (If so, how do you think it can be improved?)
    4. What are the challenges associated with the off-grid system in Gatebe?

- iv. How many households are not connected to an electricity system, neither on-grid nor off-grid? And why?
- f. Water
  - i. Does Gatebe settlement site has access to water supply?
    - 1. Yes
    - 2. No
  - ii. If yes,
    - 1. What is the source of water?
    - 2. How many public taps are available within the site? (Number, Village and Cell)
    - 3. How many households have private access to water in their homes?
    - 4. What other water-related infrastructure is there in Gatebe?
    - 5. In which year has water been supplied to Gatebe?
    - 6. Can you compare the situation before and after Gatebe was supplied with water to highlight the change in living conditions?
    - 7. What challenges do the residents of Gatebe face with the existing water supply?
    - 8. Do you think there is a need to improve the water supply at Gatebe site? (If yes, then what do you think can be done?)
  - iii. If no,
    - 1. What is the source of water?
    - 2. Where do people fetch water for domestic use? (Name and location: village, cell)
    - 3. How long distance (KM) do people walk to fetch water for domestic use?
    - 4. What challenges do the residents of Gatebe face with this remote water fetching system?
- g. ICT and Telecommunication
  - i. Which telecommunication network do the residents of Gatebe use?
    - 1. MTN

2. Airtel-Tigo
3. Both
- ii. What ICT and telecommunications infrastructure are in place in Gatebe?
- iii. What challenges do people in Gatebe currently experience in ICT and telecommunications?

**12. What are the major activities supporting the lives of the residents in Gatebe?**

- a. Agriculture
- b. Livestock
- c. Other businesses

**13. If Agriculture,**

- a. What are the most important crops that the residents of Gatebe like to grow?
- b. What methods do the inhabitants of Gatebe use in agriculture?
- c. Does agriculture in Gatebe require irrigation?
  - i. Yes,
  - ii. No,
  - iii. Sometimes
- d. If yes,
  - i. When did the irrigation start in Gatebe neighborhood?
  - ii. What is the importance of irrigation compared to the previous situation in Gatebe?
  - iii. What are the irrigation challenges for farmers in Gatebe?
- e. How long distance (in KM) do the residents of Gatebe have to walk to reach their farmlands?

**14. If Livestock,**

- a. That is the most important type of livestock do the people of Gatebe practices?
  - i. Cattle farm
  - ii. Domestic cow
  - iii. Goats
  - iv. Sheep
  - v. Hen
  - vi. Other?

- b. What are the challenges for Livestock in Gatebe?
- c. What solutions do you propose for these challenges?

**15. If other business,**

- a. What type(s) of other businesses (excluding agriculture and livestock) dominate in Gatebe settlement site?
- b. What are the challenges for doing those kinds of businesses in Gatebe?

**16. Employment**

- a. What is the estimated percentage of residents who are employed?
- b. Can you estimate the percentage of people employed in each sector, such as agriculture, livestock farming, etc.?
- c. What is the unemployment rate in Gatebe?
- d. What are the challenges arising from the unemployment situation?

Open Questions to the community

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1. To what extent are the residents aware of the government's policies and strategies to transform the scattered settlements in Gatebe into planned villages?
2. What specific challenges do residents face when implementing these policies and strategies in their respective neighborhood?
3. Which opportunities does the community in Gatebe currently identify to further improve or expand the planned village concept?
4. Can you describe any noticeable changes in infrastructure, such as roads, water supply, electricity, and sanitation since the implementation of the transformation initiative?
5. How effectively do the communities experience the efforts of the government to provide basic infrastructure and services in Gatebe village?
6. Are there any challenges related to infrastructure development, access to services or community cohesion that persist despite the efforts to transform Gatebe into planned villages?
7. Have you received any support or assistance from the local authorities or other organizations to overcome challenges such as infrastructure deficiencies or community resistance during the transformation process?

8. Do you feel that access to basic services such as health care, education and clean water has improved because of the transformation of Gatebe into a planned village?
9. How has the transformation affected access to basic services such as healthcare, education, and markets within the Gatebe community?
10. How has the lack of access to basic services such as clean water, electricity and health care affected your daily life since the transformation initiative began?
11. Do you feel that the government's strategies to transform scattered settlements into planned villages in Gatebe have effectively addressed the needs and priorities of the community?
12. From your perspective, what are the main advantages and disadvantages of the government's efforts to transform Gatebe into a planned village and how have these changes affected your livelihood?
13. What suggestions do you have to further the development of Gatebe as a planned village?
14. Have you witnessed any improvements in housing quality or living conditions as a result of the transformation, and how do these changes compare to the previous scattered settlement structure?
15. Have you noticed any improvements or changes in your living conditions since the start of the transformation project in Gatebe?
16. Do you experience any improvements or changes in living conditions in Gatebe as a result of the strategies and mechanisms put in place to address the ongoing challenges of transforming scattered settlements into planned villages?
17. Have you observed any positive impacts on socio-economic aspects such as employment opportunities, income levels or access to markets following the transformation of Gatebe into planned villages?
18. How has the transformation of scattered settlements into planned villages affected the socio-economic dynamics and general well-being of the residents in Gatebe?
19. How do you think that the transformation of scattered settlements into planned villages has contributed to a sense of community cohesion and social integration in Gatebe?

20. Have you encountered any persistent difficulties or obstacles during the transformation process from scattered settlements to planned villages in Gatebe?
21. Have you observed any specific strategies or mechanisms put in place by the local authority to address the persistent challenges in transforming scattered settlements into planned villages in Gatebe?
22. What measurable outcomes or indicators can you identify that demonstrate the effectiveness of the strategies and mechanisms put in place to address the persistent challenges in the transformation process in Gatebe?
23. Are you aware of any initiatives or programs initiated by the local authority to address the obstacles encountered in transforming scattered settlements into planned villages in Gatebe?
24. Have you received sufficient information and support from the local authorities regarding the transformation of scattered settlements into planned villages in Gatebe?
25. Do you feel that the current strategies and approaches of the local authorities are effective in addressing the ongoing challenges of transforming Gatebe into a planned village?
26. What additional measures do you think could be taken to overcome the ongoing obstacles in this transformation process?
27. Can you share any personal experiences or stories related to the transformation of Gatebe into a planned village, including any positive changes or difficulties you have experienced?
28. Have you encountered any issues related to land ownership or property rights during the transformation to a planned village? If so, how were these issues addressed and do you feel they were adequately resolved?

#### Open Questions to the local authority

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1. Which policies and/or strategies of the government have helped in the transformation of scattered settlements into planned villages in Gatebe?
2. What challenges did you encounter during implementation of these policies in Gatebe and how did you overcome these challenges?

3. How effective were the government's policies and strategies in overcoming these challenges and what improvements or adjustments do you think are needed to overcome them?
4. Were there any deviations from the planned approach outlined in the government policy during the transformation process in Gatebe?
5. Can you confirm whether the government has provided the necessary resources and support to facilitate the transformation process in Gatebe?
6. Have you conducted any assessments or evaluations to measure the outcomes and impacts of the transformation of scattered settlements into planned villages in Gatebe?
7. Have you encountered any obstacles or difficulties in transforming scattered settlements into planned villages in Gatebe?
8. How have these challenges affected the outcomes and impact of transforming Gatebe into planned villages?
9. Can you provide any data or statistics on improvements in infrastructure, housing quality and access to basic services in Gatebe since the implementation of the conversion initiatives?
10. How have you observed the results of the transformation of scattered settlements into planned villages in Gatebe, particularly in terms of improvements in infrastructure, housing quality and access to basic services?
11. How do you assess the impact of the transformation on the socio-economic development and overall wellbeing of communities in Gatebe?
12. What indicators do you use to evaluate progress such as employment rates, income levels and poverty reduction?
13. What impact has this transformation had on the socio-economic conditions of residents in Gatebe, such as changes in livelihood opportunities, income levels and the overall well-being of the community?
14. How do you plan to monitor and evaluate the long-term sustainability and effectiveness of the transformation initiatives in Gatebe?
15. What are the expected long-term benefits and sustainability of transforming Gatebe into a planned village, and what measures are being taken to ensure continued progress and development in the community?

16. What additional resources or support do you think would be beneficial to overcome the remaining obstacles and ensure the successful transformation of Gatebe into a planned village?
17. Are there any particular challenges related to land acquisition, infrastructure development or community participation that have persisted during the conversion efforts in Gatebe?
18. Have there been any budget or resource constraints that have hindered progress in overcoming the persistent challenges in converting Gatebe to planned villages?
19. What specific strategies and mechanisms has the local government put in place to address the ongoing challenges in transforming scattered settlements into planned villages in Gatebe?
20. Have resources been allocated specifically to address the ongoing challenges of transforming Gatebe into planned villages, and if so, to what extent?
21. Have partnerships or collaborations been established with other stakeholders, such as government agencies or non-governmental organizations, to support the implementation of strategies to address persistent challenges in Gatebe?
22. Were there collaborative efforts or partnerships with other stakeholders, such as non-governmental organizations or community-based organizations, to address these challenges? If so, what role did they play in the transformation initiative?
23. Can you share examples of successful initiatives that have facilitated the transformation of scattered settlements into planned villages in Gatebe?
24. What role do you think local leaders have played in supporting and promoting the transformation of these settlements, and what further support or resources do you think are needed to scale up efforts?
25. How were these challenges addressed or should be addressed?
26. From your perspective, what role do you think local leadership has played in facilitating or hindering the transformation process, and how can leadership efforts be improved to better support the community?
27. Can you identify specific socio-economic or environmental factors that have hindered the successful implementation of the transformation initiative in Gatebe?

28. What do you think are the key lessons learned from Gatete experience in transforming into planned villages, and how can these lessons inform future initiatives aimed at transforming scattered settlements into planned communities?
29. What are the key lessons learned from previous experiences in dealing with persistent challenges and how have they influenced the development of new strategies or approaches?