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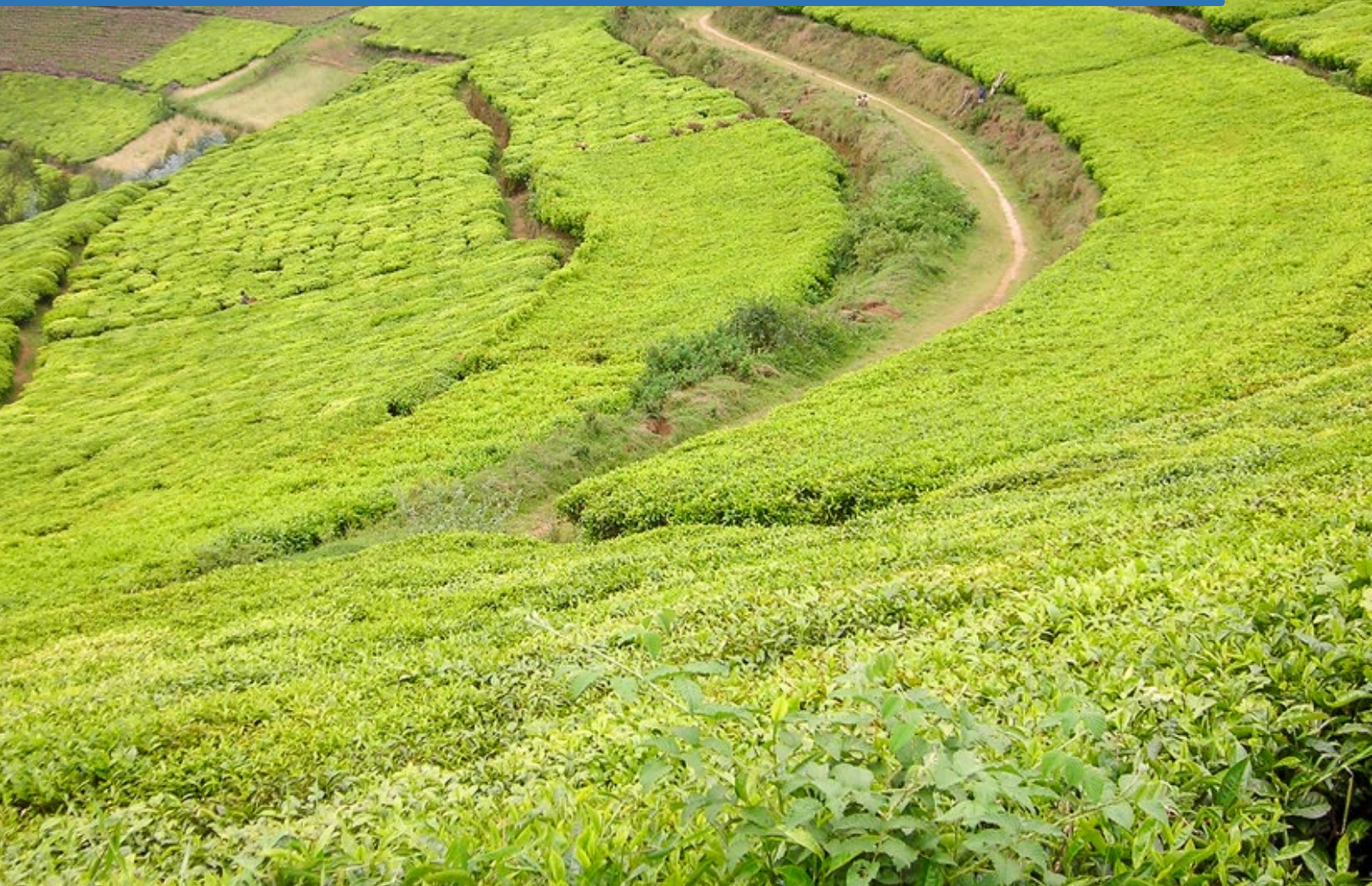


MINISTRY OF ENVIRONMENT

# Rwanda's Climate Adaptation Monitoring, Evaluation, and Learning System in the Human Settlements and Transport Sectors:

Technical report assessing adaptation outcomes

September 2024



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**Rwanda's Climate Adaptation Monitoring, Evaluation, and  
Learning System in the Human Settlements and Transport  
Sectors: Technical report assessing adaptation outcomes**

Ministry of Environment, Department of Environmental and Climate  
Change, Kigali, Rwanda

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## Table of Contents

Executive Summary.....	1
1. Introduction .....	3
2. Rationale for Selected Indicators of Adaptation Outcomes .....	4
3. Methodological Approach for Assessing Adaptation Outcomes .....	6
3.1 Detailed Observations from Field Visits.....	7
4. Assessment of Adaptation Outcomes.....	8
4.1 The Percentage of the Rural Population Living in Clustered Settlements .....	14
4.2 Access to Water and Sanitation Services .....	17
4.3 Reduction of the Length of Roads Vulnerable to Floods and Landslides.....	22
5. Conclusion and Recommendations.....	29
References .....	31
Appendix .....	32

## List of Tables

Table 1. NDC adaptation indicators in the human settlement and transport sectors: Baseline values, targets, and actual status for three indicators.....	8
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## List of Figures

Figure 1. Map of Rwanda showing districts visited and features identified during the field visits.....	7
Figure 2. Rulindo Gakenke and Musanze corridor.....	9
Figure 3. Road damage in Gakenke (A) and terraces for erosion control in Rulindo (B).....	10
Figure 4. Karongi, Rutsiro, and Rubavu route.....	10
Figure 5. Damaged roads (A) and quarries (B) along the Muhanga, Ngororero, and Karongi route....	11
Figure 6. Karongi, Rutsiro, and Rubavu route.....	12
Figure 7. Landslide (A) and embankment (B) along the Karongi-Rutsiro-Rubavu road.....	13
Figure 8. IDP model settlement of Kinigi, Musanze District .....	14
Figure 9. Examples of terracing on the Karongi-Rutsiro-Rubavu route.....	22
Figure 10. Examples of embankments along the Karongi-Rutsiro-Rubavu route .....	23
Figure 11. Examples of gabions along the Kigali-Rulindo-Gakenke and Musanze roads .....	24
Figure 12. Examples of afforestation along the Karongi-Rutsiro-Rubavu route.....	25

## List of Abbreviations

DHS	Demographic and Health Survey
EICV	Integrated Household Living Conditions Survey
IDP	Integrated Development Program
MEL	monitoring, evaluation, and learning
MoE	Ministry of Environment
NDC	nationally determined contribution
NGO	non-governmental organization
NISR	National Institute of Statistics Rwanda
RPHC5	fifth Rwanda Population and Housing Census
WASH	water, sanitation, and hygiene

# Executive Summary

The Ministry of Environment in Rwanda has implemented a climate adaptation monitoring, evaluation, and learning (MEL) system to assess adaptation outcomes in the human settlement and transport sectors. This initiative aims to evaluate progress against Rwanda's nationally determined contribution (NDC), with a focus on monitoring the resilience of infrastructure and communities to climate change impacts. Rwanda's updated adaptation NDC identifies seven key indicators in the human settlement and transport sectors, but only three primary indicators have been selected for detailed assessment:

1. **Percentage of rural population living in clustered settlements:** This indicator helps understand the adaptation challenges and benefits for rural communities.
2. **Access to water and sanitation services:** Reliable access to these services is crucial for health and well-being, especially under climate change.
3. **Reduction in the length of roads vulnerable to floods and landslides:** Roads are vital for connectivity and economic activities, therefore their resilience to climate impacts is critical.

These three indicators were selected because they effectively address the specific vulnerabilities and adaptive capacities of both rural and urban communities. They also aim to ensure that essential services and public health needs, such as water and sanitation, are met, while safeguarding critical infrastructure and connectivity. This targeted approach is intended to assess and enhance Rwanda's climate adaptation strategies, thereby fostering resilience and maximizing the benefits in the face of climate change impacts.

The assessment gathered empirical evidence from the field using varied methods, including a literature review, interviews, and field visits with residents and stakeholders to collect qualitative data on adaptation challenges and benefits.

The assessment of adaptation outcomes reveals the following:

1. **Rural population living in clustered settlements:** According to the fifth Integrated Household Living Conditions Survey, 61.3% of the urban population lives in unplanned settlements, with a goal to decrease this to 47% by 2025. The fifth Rwanda Population and Housing Census (RPHC5) (2022) reveals that 42% of urban areas have planned rural settlements, 25% have spontaneous housing, and 24% have planned urban housing. As for rural areas, they are composed of 65.4% planned settlements and 19% isolated housing. The objective is to raise the proportion of planned rural settlements to 80% by 2025 (National Institute of Statistics for Rwanda [NISR], 2022). The model village in Kinigi, Musanze District, showcases the benefits of clustered settlements, including improved living conditions and access to basic infrastructure. However, challenges such as infrastructure stress and increased water demand need to be addressed.

2. **Access to water and sanitation services:** Progress has been made in expanding water distribution coverage and sanitation facilities, resulting in health and welfare benefits. According to the sixth Integrated Household Living Conditions Survey conducted in 2019 and 2020, 89.2% of households in Rwanda had access to improved water sources (NISR, 2021). Another survey, the 2019–20 Demographic and Health Survey (DHS), reported a slightly lower percentage of 80%, with urban areas having a higher access rate of 96% compared to rural areas, which stood at 77% (NISR, Ministry of Health, & ICF, 2021). The RPHC5 survey showed a percentage of 82.3% (NISR, 2022). The sixth Integrated Household Living Conditions Survey also discovered that 89.6% of households had access to improved sanitation facilities (NISR, 2021). The RPHC5 survey reported a higher percentage of 92%, with 72.1% of households using basic sanitation facilities (NISR, 2022). However, the DHS survey indicated a lower percentage of only 72%, with urban areas at 56.4% and rural areas at 78%, which falls below the set goal for 2025. Challenges remain in terms of infrastructure coverage and consistency.
3. **Reduction in length of roads vulnerable to floods and landslides:** A Multi-Criteria Analysis under the Developing Capacity for Climate-Resilient Road Transport Infrastructure project prioritized hotspots for climate-resilient road infrastructure. Vulnerabilities were found in Western, Northern, and Southern Provinces, with moderate ones in Eastern Province and Kigali City. A full 60% of hotspots were high-risk, requiring immediate intervention. The road connecting Muhanga, Ngororero, Karongi, Rutsiro, Rubavu, Musanze, Gakenke, and Rulindo was chosen for the pilot project due to its critical importance. Engineering solutions such as terracing, embankments, and gabions have been effective in reducing road vulnerability. Afforestation and the banning of plastics also contribute to managing flood risks.

The report also includes the following policy recommendations:

1. **Enhanced support for clustered settlements:** Accelerate development policies and provide additional resources for infrastructure.
2. **Strengthen water and sanitation infrastructure:** Increase investments and adopt advanced technologies for climate-resilient infrastructure.
3. **Comprehensive vulnerability assessments for roads:** Conduct detailed assessments and establish a dedicated fund for road maintenance and upgrades.
4. **Policy integration and coordination:** Foster integration across sectors and enhance coordination among government agencies, non-governmental organizations, and the private sector.
5. **Community engagement and capacity building:** Increase community involvement in planning and implementation and expand capacity-building programs.
6. **MEL enhancements:** Strengthen the MEL framework for rigorous data collection and analysis and use digital tools for better decision making.

Rwanda's Climate Adaptation MEL system in the human settlement and transport sectors has made significant progress in enhancing resilience against climate impacts. However, intensified efforts are required to meet ambitious targets and address ongoing challenges. Implementing the recommended policies will help Rwanda build on its successes and ensure a resilient future for its infrastructure and communities.

# 1. Introduction

The Ministry of Environment (MoE) in Rwanda implemented its first work program from April 2022 to February 2023 (MoE, 2023a, 2023b). The program focused on operationalizing a framework for monitoring, evaluation, and learning (MEL) for adaptation, with the agriculture sector serving as a pilot test due to its significant role in Rwanda's economy and its vulnerability to climate change impacts. The National Adaptation Plan Global Network and the International Institute for Sustainable Development provided technical and financial support for the implementation. The primary goal of this MEL initiative was to conduct a pilot assessment of the adaptation measures within the MEL framework, specifically within the agriculture sector, in line with Rwanda's revised commitments under its nationally determined contribution (NDC).

In September 2023, the National Adaptation Plan Global Network extended its support to the Government of Rwanda for the second phase. This phase emphasized the practical application of the adaptation MEL system and aimed to monitor progress against four adaptation indicators within the human settlements sector and three within the transport sector, as outlined in the NDC.

The human settlements and transport sectors are particularly susceptible to climate change phenomena, including extreme weather conditions and fluctuating temperature patterns. The transport sector, crucial for economic vitality and connectivity, is especially at risk from these impacts, which could result in infrastructure damage, operational interruptions, and increased maintenance expenses. Adapting these sectors to climate change is vital for mitigating adverse effects, enhancing resilience, and promoting sustainable development.

This report is divided into five main sections. The introduction serves as Section 1, providing an overview of the work program. Section 2 justifies the selection of indicators related to adaptation outcomes. Section 3 outlines the methodological approach used to evaluate adaptation outcomes. Section 4 focuses on assessing adaptation outcomes within the human settlements and transport sectors, highlighting the benefits and challenges encountered in achieving the expected results and impacts of the NDC adaptation initiatives. The report concludes with Section 5, which presents the conclusions and recommendations.

## 2. Rationale for Selected Indicators of Adaptation Outcomes

Rwanda's updated NDC identifies seven NDC adaptation indicators in the human settlements and transport sectors:

1. Percentage of the urban population living in informal settlements.
2. Percentage of the rural population living in clustered settlements.
3. Average share of the built-up area of cities that is open and green space for public use in line with the United Nation's Sustainable Development Goals.
4. Access to water and sanitation services.
5. Percentage of the urban population in areas covered by master plans with storm water considerations.
6. Environmental and engineering guidelines developed for climate-resilient road infrastructure.
7. Reduction of the length of roads vulnerable to floods and landslides.

To assess the adaptation outcomes in the human settlement and transport sectors more comprehensively, three primary indicators were selected:

1. **Percentage of the rural population living in clustered settlements:** This indicator is crucial in understanding the challenges faced by rural communities in adapting to climate change, including limited access to resources and infrastructure. Clustered settlements have benefits but also expose their populations to vulnerabilities to climate-related hazards such as floods and landslides. Evaluating the challenges and benefits associated with these settlement patterns provides insights into the effectiveness of adaptation measures in rural areas.
2. **Access to water and sanitation services:** Reliable access to safe water and sanitation is essential for human health and well-being, particularly in the context of climate change. Extreme weather events can disrupt these services, making their evaluation critical. Assessing changes in water and sanitation coverage and their impact on health and quality of life helps measure the success of adaptation efforts and their ability to meet basic needs and mitigate risks.
3. **Reduction of the length of roads vulnerable to floods and landslides:** Roads are vital for access to services, markets, and employment, serving as lifelines for communities and the economy. Climate change increases the risk of floods and landslides, which can disrupt this infrastructure. Analyzing the effectiveness of measures taken to reduce the vulnerability of roads to these hazards helps assess the resilience of the transport infrastructure. This analysis ensures ongoing mobility and access for communities and reflects the success of adaptation strategies in safeguarding critical connectivity in the face of climate change.



These three indicators were selected based on their capacity to address the following key aspects:

- **Specific vulnerabilities and adaptive capacities:** The indicators aim to evaluate the ability of both rural and urban communities to adapt to climate risks.
- **Essential services and public health:** The indicators aim to ensure that fundamental and social needs, such as water and sanitation, are fulfilled despite the disruptions caused by climate change.
- **Critical infrastructure and connectivity:** The indicators aim to protect and maintain transportation infrastructure, which is crucial for supporting economic and social activities.

By focusing on these areas, the indicators provide a comprehensive and targeted approach to assessing and improving Rwanda's climate adaptation strategies in the sectors of human settlements and transport. This approach ensures that critical vulnerabilities are addressed, essential services are maintained, and critical infrastructure is protected. Consequently, the potential benefits of adaptation measures in the face of climate change are maximized.

## 3. Methodological Approach for Assessing Adaptation Outcomes

This approach incorporates both quantitative and qualitative analysis techniques using a combination of literature review, stakeholder engagement, and field visits. This strategy aims to capture the complex and diverse nature of adaptation impacts and effectiveness under each selected indicator.

### 1. Rural population living in clustered settlements:

- **Literature review:** Conduct an extensive review of studies, reports, and academic papers to understand the baseline conditions, previous findings on settlement patterns, and the impacts of climate change on rural clustered settlements.
- **Interviews and field visits:** Engage with residents of clustered settlements to collect firsthand accounts of how settlement patterns have evolved, the challenges and benefits experienced due to these changes, and perceptions of improved living conditions over time. These interviews will provide qualitative insights into the effectiveness of adaptation strategies from the perspective of those directly affected.

### 2. Access to water and sanitation services:

- **Data collection:** Use data from relevant institutions, such as the National Institute of Statistics of Rwanda (NISR) and the Ministry of Infrastructure, regarding the provision, coverage, and quality of water and sanitation services.
- **Interviews:** Conduct interviews with government institutions and non-governmental organizations (NGOs) to gather qualitative data on how changes in water and sanitation services have affected the population's daily lives, health, and well-being. This will help understand the real-world impacts of adaptation measures and identify areas where improvements are needed.

### 3. Reduction of length of roads vulnerable to floods and landslides:

- **Data gathering:** Collect data on the extent and effectiveness of adaptation measures implemented to reduce the vulnerability of roads to floods and landslides.
- **Stakeholder interviews and field visits:** Engage with key stakeholders, including government officials and infrastructure experts, to gain insights into the planning, implementation, and outcomes of adaptation strategies. Field visits to affected and treated areas will offer tangible evidence of adaptation success and challenges.

### 3.1 Detailed Observations from Field Visits

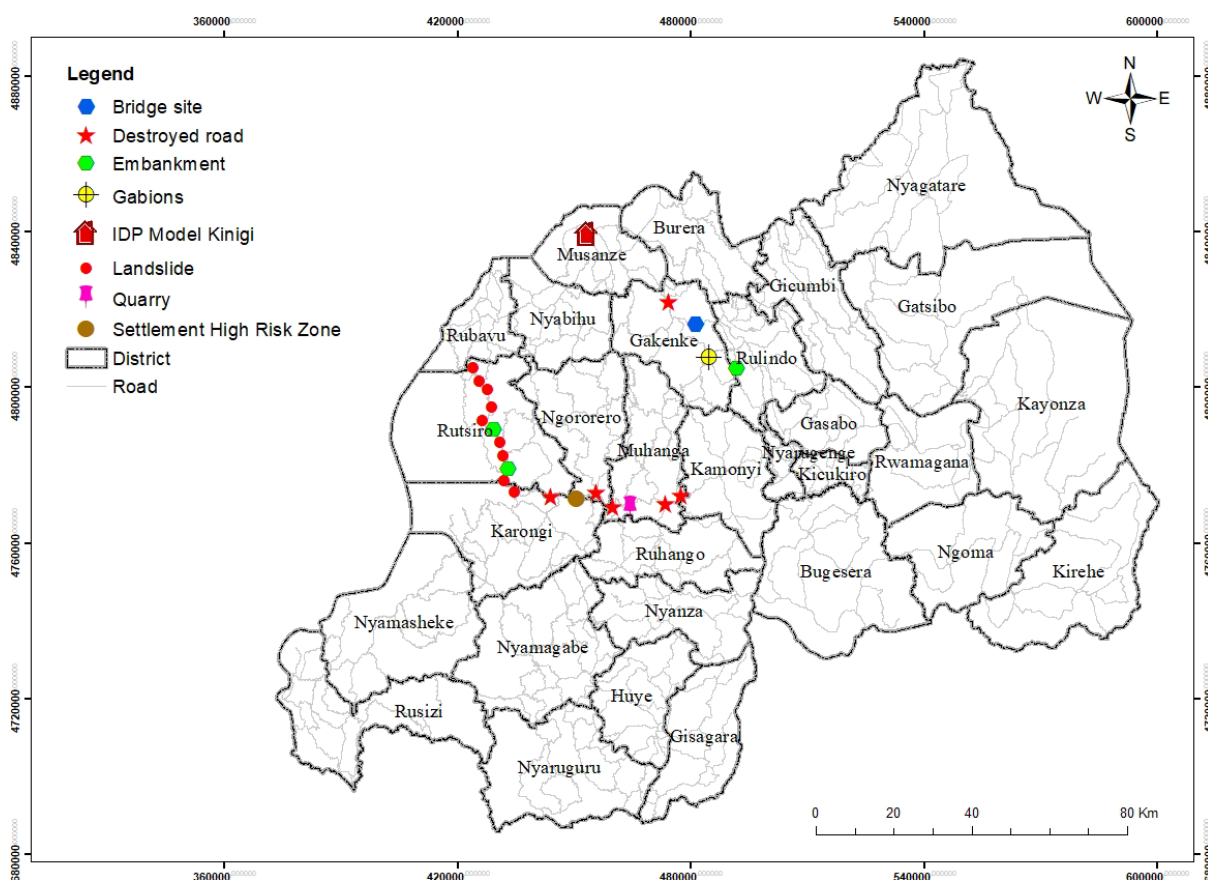
The road from Muhanga and Ngororero to Karongi has been heavily damaged and destroyed, indicating a geographical vulnerability in these areas. Additionally, the road from Karongi through Rutsiro to Rubavu is facing various environmental threats, such as landslides, which further highlights their susceptibility to natural disasters.

Similarly, the road from Kigali to Rulindo and Gakenke is also characterized by damage and potential landslides. During our visits to all districts and sites, we observed the presence of embankments, which are frequently used in road and river management to prevent erosion and flooding. We also noticed the use of gabions, which are cages filled with rocks or concrete, and serve a similar purpose to embankments, primarily focusing on erosion control and stabilization.

Furthermore, along the road from Muhanga to Ngororero and Karongi, we identified excavation sites typically used for extracting stone, sand, or other materials. However, these sites also pose a significant risk of disasters such as landslides.

Figure 1 provides more details about certain environmental and infrastructural features in the districts visited during the fieldwork.

**Figure 1. Map of Rwanda showing districts visited and features identified during the field visits**



Source: Authors.

## 4. Assessment of Adaptation Outcomes

This section reviews the successes and benefits resulting from the implementation of these three NDC adaptation indicators in the human settlements and transport sectors. It also discusses the challenges encountered and provides recommendations.

Table 1 offers an overview of the progress made in Rwanda’s 2020 NDC regarding specific adaptation indicators for the human settlement and transport sectors. This table showcases Rwanda’s dedication to enhancing adaptation measures within the NDC framework. It demonstrates progress made in certain areas, while also shedding light on challenges such as data consistency, target setting, and vulnerability assessments in the transport sector. Rather than solely focusing on tracking progress, this report aims to glean insights from the progress made and identify remaining challenges to optimize expected outcomes and impacts.

**Table 1. NDC adaptation indicators in the human settlement and transport sectors: Baseline values, targets, and actual status for three indicators**

NDC indicators (Rwanda’s 2020 NDC)	Most recent baseline values	Targets (NDC implementation framework)	Actual status 2020–21
<b>Percentage of the rural population living in clustered settlements</b>	61.7% of rural households settled in integrated, planned, green rural settlements (EICV5) (2016–17)	Increase to 80% of rural households settled in integrated, planned, green rural settlements by 2025	65.4% (RPHC5)
<b>Access to water and sanitation services</b>	87.4% of households using an improved water source in 2017 and 86.2% of households accessing basic sanitation facilities in 2017	Increase to 100% of households using an improved water source and 100% of households accessing basic sanitation facilities by 2030	Water: 89.2% (EICV6, 2020), 80% (DHS, 2021) and 82.3% (RPHC5, 2022)  Sanitation: 89.6% (EICV6, 2020), 72% (DHS, 2021) and 92% (both shared and unshared facilities), 72.1% (not shared) (RPHC5, 2022)
<b>Reduction of the length of roads vulnerable to flood and landslides</b>	In 2015, the total length of roads vulnerable to landslides was estimated at 979 km (with 165 km for national paved roads, 210 km for national unpaved roads and 604 km for district roads) (MIDIMAR, The National Risk Atlas of Rwanda, 2015).	To be determined	The vulnerability assessment report of 2022 show that erosion, landslides, and flooding as severe climate change-induced hazards threatening road resilience, with drought posing a lower threat. Ground truthing confirmed 66% of GIS-mapped vulnerabilities at moderate to high levels with 98.6% accuracy.

IECV5 = fifth Integrated Household Living Conditions Survey

RPHC5 = fifth Rwanda Population and Housing Census

IECV6 = sixth Integrated Household Living Conditions Survey

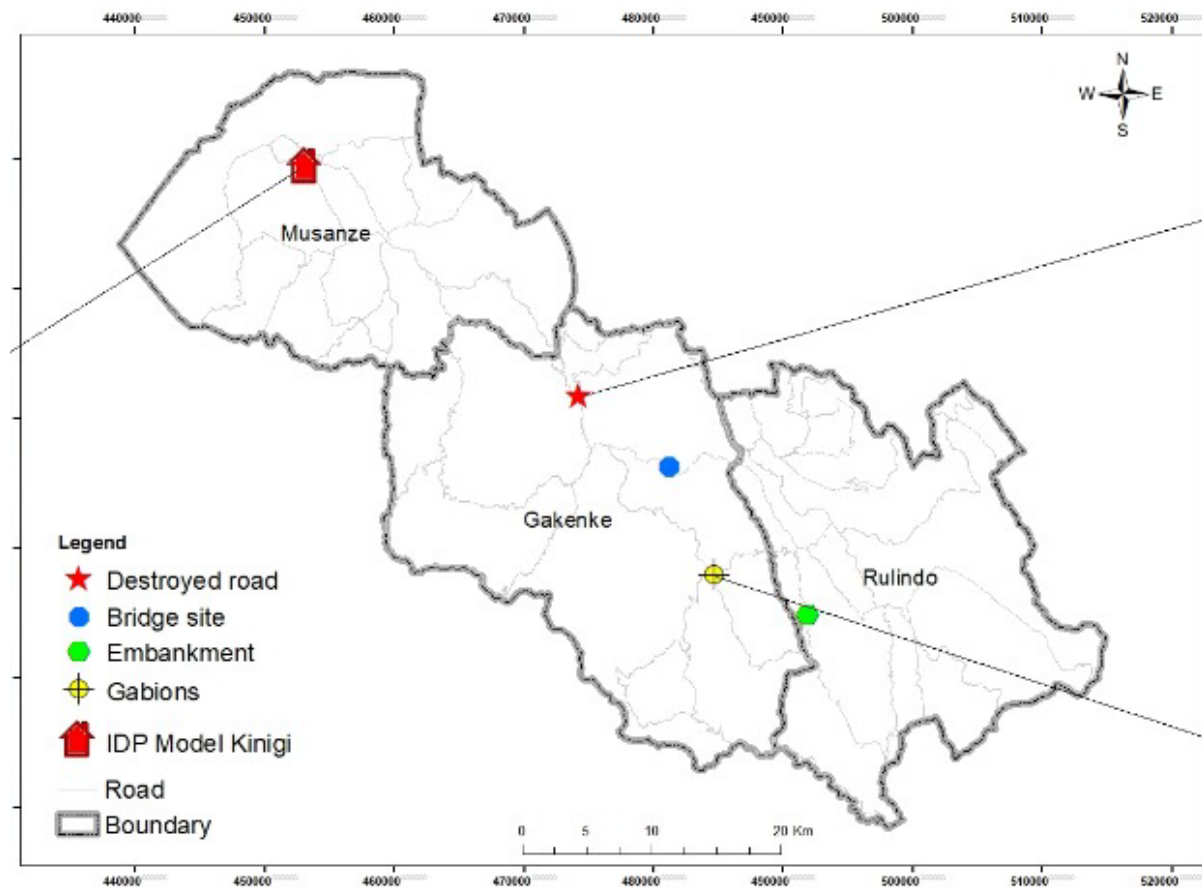
GIS = Geographic Information System

Source: MoE 2020; Ministry of Finance and Economic Planning & NDC Partnership, 2021.

The following figures portray the locations of hotspots where roads have been destroyed or landslides have occurred. They also illustrate adaptation measures such as embankments and gabions along the roads.

Figure 2 illustrates the transportation corridor linking Rulindo, Gakenke, and Musanze, highlighting the importance of this route for regional connectivity. This corridor plays a key role in facilitating trade, mobility, and access to services in the northern region of Rwanda.

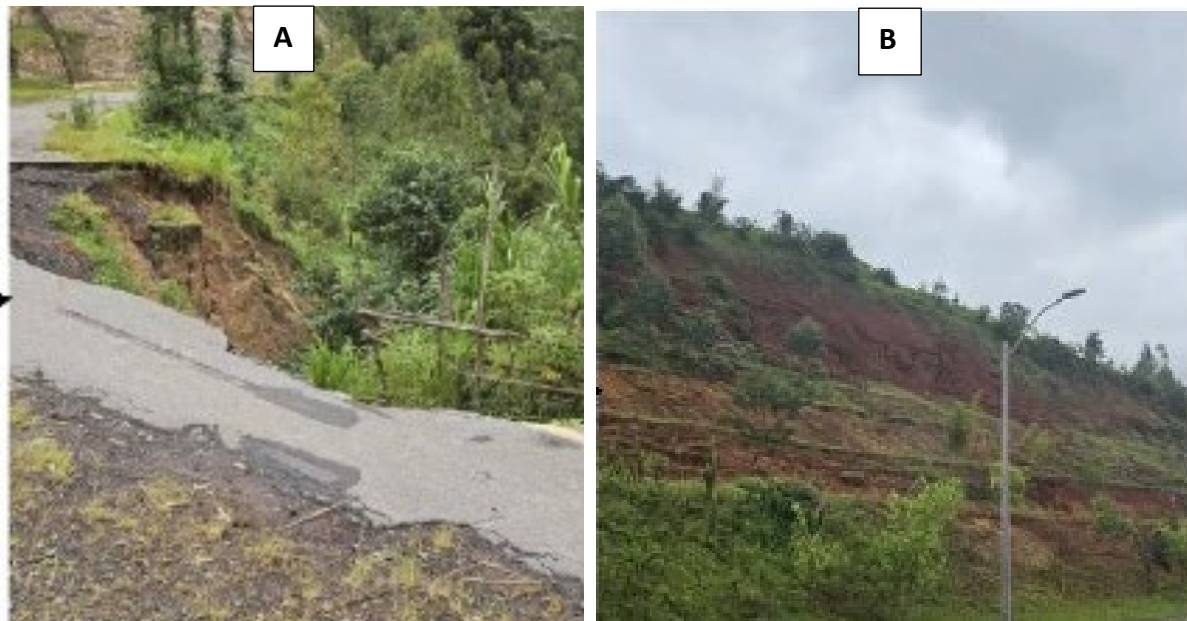
**Figure 2. Rulindo Gakenke and Musanze corridor**



Source: Authors.



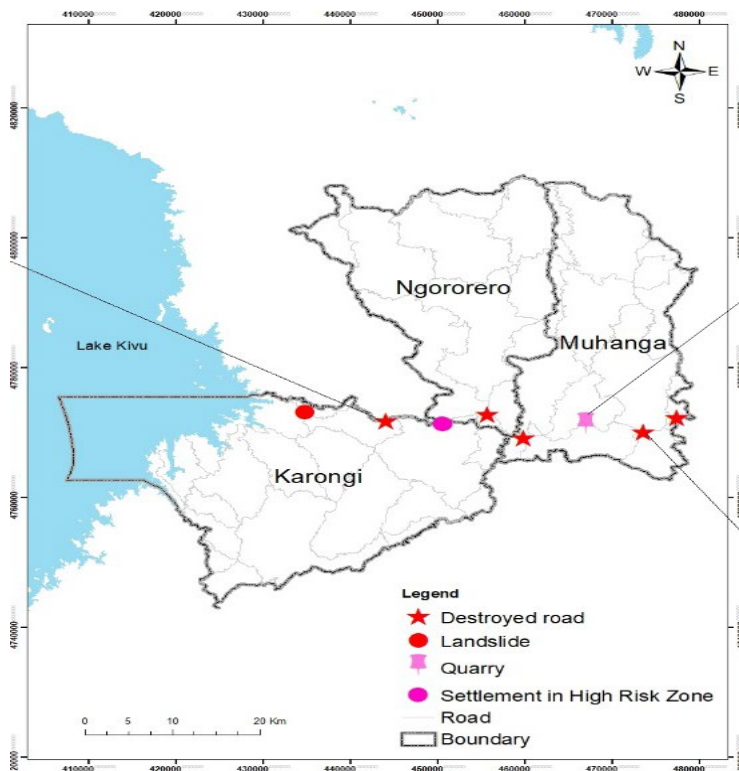
Figure 3. Road damage in Gakenke (A) and terraces for erosion control in Rulindo (B)



Source: Authors.

Figure 4 illustrates the transportation corridor linking Muhanga, Ngororero, and Karongi, highlighting the locations of road damage, landslides during the rainy season, and settlements situated in high-risk areas.

Figure 4. Karongi, Rutsiro, and Rubavu route



Source: Authors.

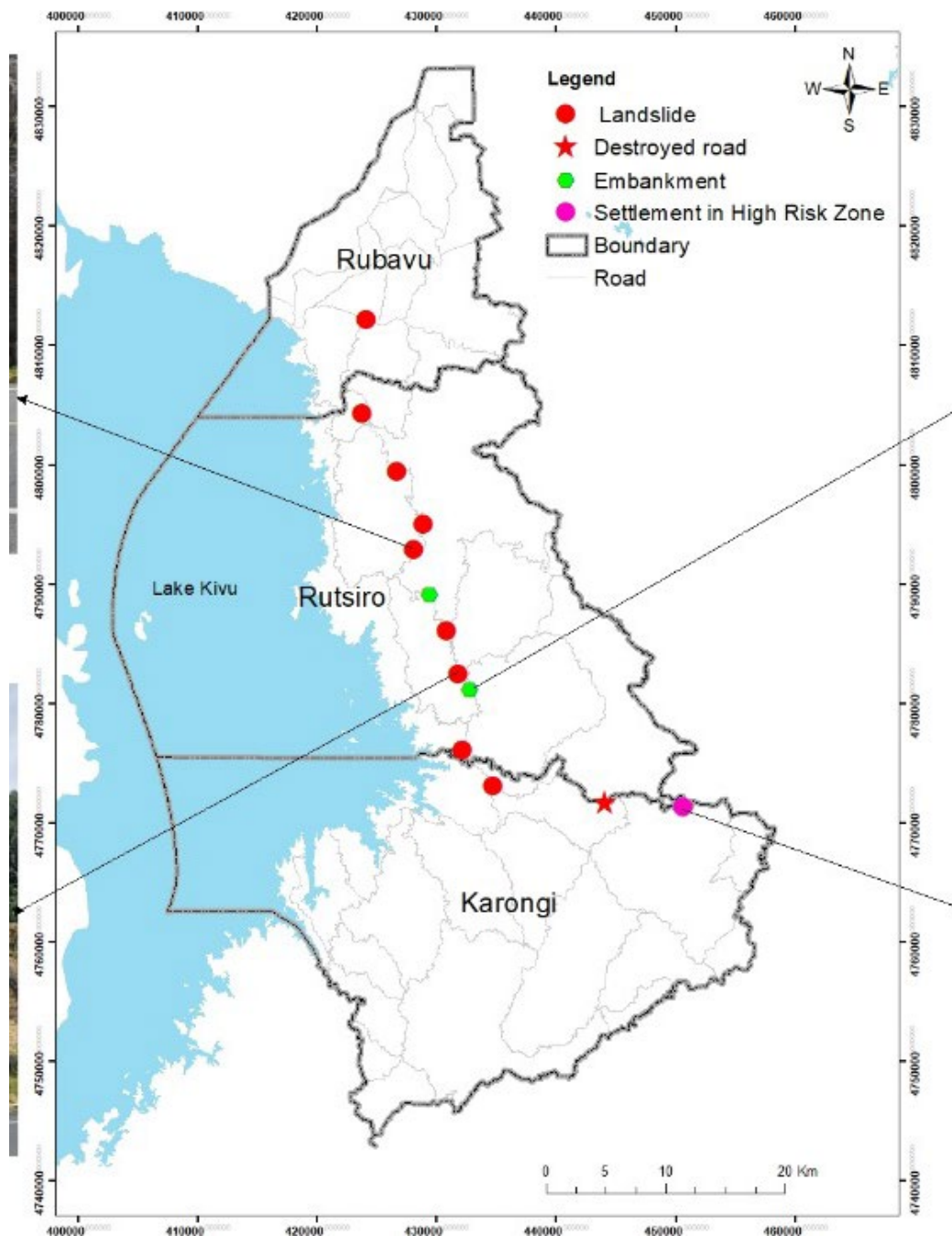
**Figure 5. Damaged roads (A) and quarries (B) along the Muhanga, Ngororero, and Karongi route**



Source: Authors.

The transportation corridor linking Karongi, Rutsiro, and Rubavu faces severe challenges due to landslides, damaged roads, and weakened embankments (see Figure 6). Frequent heavy rains and the region's steep terrain make the area prone to landslides, which often result in road damage and blockages. Key hotspots along this route have been identified where infrastructure is most vulnerable and where damage disrupts travel and trade.

Figure 6. Karongi, Rutsiro, and Rubavu route

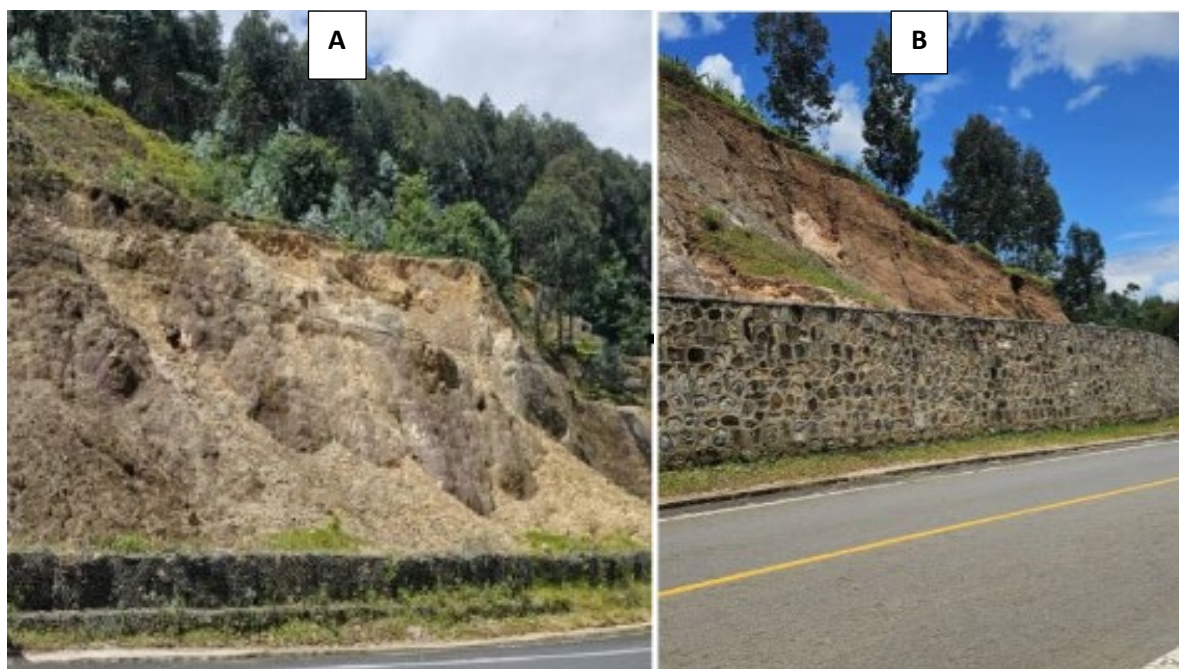


Source: Authors.

Figure 7 shows a landslide (A) and an embankment (B) along the Karongi-Rutsiro-Rubavu road. The landslide (A) is a common hazard in the region due to heavy rainfall and unstable terrain, the combination of which can result in slope failure. The embankment (B) is designed to stabilize the road and prevent erosion and collapse. This embankment effectively addresses the natural conditions and alleviates difficulties.



**Figure 7. Landslide (A) and embankment (B) along the Karongi-Rutsiro-Rubavu road**



Source: Authors.

The transportation routes shown in Figures 2, 4, and 6 are crucial for supporting Rwanda's economy and social activities. To protect these infrastructures, stakeholders should focus on climate adaptation strategies to make them more resilient. This will ensure continuous connectivity and economic stability despite environmental challenges.

There has been a 3.7% increase in progress in rural areas with clustered settlements since the baseline year. However, achieving the 2025 target may require a more assertive approach due to the remaining gap and limited time.

In terms of access to water and sanitation services, there have been some improvements in water access, but sanitation services still have mixed results, which highlight the disparities and challenges in providing consistent service. Meeting the 2030 targets will require significant investments in infrastructure and targeted policy actions to reduce inequalities and inefficiencies.

The data emphasizes the significant risks to road infrastructure due to climate change impacts but does not provide the exact lengths of the roads that are vulnerable to floods and landslides. It is crucial to establish clear reduction targets and strategies for vulnerability mitigation to enhance the resilience of road networks.

## 4.1 The Percentage of the Rural Population Living in Clustered Settlements

A significant proportion of the urban population (61.3%) still resides in unplanned settlements, according to EICV5. The government aims to reduce this to 47% by 2025. Although EICV6 does not provide updated figures, RPHC5 of 2022 provides insights into housing trends, revealing a mix of planned and unplanned urban and rural dwellings (NISR, 2022). The most recent data from RPHC5 shows a prevalence of planned rural settlements in urban areas (42%), followed by spontaneous or squatter housing (25%) and planned urban housing (24%). Isolated housing represents a smaller portion (5%), with other housing types accounting for less than 5% (NISR, 2022). In contrast, rural areas are mainly characterized by planned rural settlements (65.4%) and isolated housing (19%), with other housing types comprising less than 7% (NISR, 2022).

The increase in rural households living in planned settlements from 61.7% to 65.4% (NISR, 2022), with a target of reaching 80% by 2025, signifies a strategic shift towards sustainable living in both urban and rural settings. This shift towards clustered settlements aims to enhance quality of life for residents by providing essential services such as electricity and water, reducing vulnerability to natural disasters, and improving access to public services such as schools and health centres. Additionally, these integrated rural settlements foster optimism about future livelihood improvements, including more employment opportunities, access to financial services, and amenities.

This strategic move towards planned and integrated settlements aligns with the government's broader goals of sustainable development and improved living standards, ensuring that both urban and rural areas benefit from enhanced infrastructure and services. For example, during our visits, we observed an Integrated Development Programme (IDP) model settlement that encompasses living apartments, a secondary school, a modern early childhood development centre, greenhouses, poultry farming houses, a health post,<sup>1</sup> sports facilities, and a waste segregation facility, among other amenities.

**Figure 8. IDP model settlement of Kinigi, Musanze District**



Source: Authors.

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<sup>1</sup> A health post, in the context of IDP model settlements, refers to a small, community-based health care facility that provides essential medical services to the local population. Health posts are typically designed to serve basic health care needs, such as first aid, maternal and child health care, vaccinations, disease prevention, and health education.



#### 4.1.1 Benefits of Clustered Settlements

The residents expressed their joy and gratitude for the support that has transformed their lives, providing them access to basic infrastructure. Some residents shared their thoughts:

“We have escaped poverty for good. The government has relocated us from dangerous areas, and we are hopeful for a better life. I now live in a beautiful house that I never thought I would own. Being one of the recipients of these homes shows that the government truly cares about our needs and supports us on our journey towards development. I am thankful for this decent home that will provide comfort in my old age.”

“I am incredibly excited to receive this new home that comes equipped with all the necessary items. It has furniture, a smart television, and cooking gas, among other things. We extend our special thanks to President Paul Kagame, who oversees and promotes our well-being.”

“Initially, local leaders organized a meeting to inform us about the resettlement, which we resisted. We were against the decision to move us until we visited these homes and were captivated by their magnificence. I am proud to be one of the fortunate residents who have received a home in the model village.”

Several respondents also highlighted the benefits of clustered settlements, which have led to more efficient use of resources such as land, water, and energy. When populations are concentrated, utilities can be provided more effectively, reducing per capita resource consumption and facilitating sustainable urban growth. Officials from the Ministry of Infrastructure and the Rwanda Housing Authority highlighted this in the following quotes:

“The encouragement of clustered settlements has helped preserve land for agriculture by reducing the spread of scattered housing. This focused approach ensures that agricultural land is used efficiently and sustainably.”

“Living in closer proximity has allowed communities to make better use of existing infrastructure. Facilities like roads, water, and electricity are shared more effectively among households, leading to improved accessibility and reduced costs per person for infrastructure.”

An official from Musanze district has emphasized the significant role that well-managed clustered settlements play in promoting environmental sustainability. These settlements contribute to the reduction of per capita land use and the adoption of high-efficiency public transport, thus effectively lowering carbon footprints and mitigating the negative impacts associated with urban sprawl. This observation is consistent with Rwanda's overarching objectives of promoting sustainable and resilient urban growth.

Citizens residing in IDP model settlements have echoed these sentiments and have also highlighted additional benefits that result from concentrated populations. One notable advantage is the generation of non-agricultural income opportunities, driven by the emergence of new business ventures within the community due to a steady local market.

For instance, one citizen stated, "A dense population allows for the efficient sharing of infrastructure such as roads, utilities, and public facilities, thereby improving accessibility and reducing costs."

Furthermore, the proximity of households in clustered settlements contributes to community safety. As another respondent pointed out, "The proximity of households in clustered settlements also enhances security and emergency responses. Community members can watch out for each other and coordinate in times of crisis."

These insights underscore the broader social and economic advantages of the IDP model settlement. It extends beyond mere infrastructure provision to foster a sense of community, economic resilience, and environmental stewardship.

Planning and allocating resources for infrastructure is generally easier in cluster settlements. Residents living in Kinigi's IDP models confirmed that living in proximity fosters social interaction and cohesion. Furthermore, it improves access to essential services such as health care, education, and recreation, thereby enhancing overall quality of life and community well-being.

#### 4.1.2 Remaining Challenges

Despite these benefits, some respondents mentioned challenges associated with clustered settlements:

- High population densities place pressure on existing infrastructure, leading to overwhelmed utilities and social services. This can result in frequent outages, congestion, and reduced quality of service.
- Concentrated populations also escalate the demand for water and sanitation services, leading to shortages, inadequate sewage systems, and a higher risk of waterborne diseases.
- High population density exacerbates waste management and environmental cleanliness problems, such as inadequate garbage collection and poor drainage systems, which contribute to unhygienic conditions and a decline in environmental quality.
- Environmental degradation occurs when activities become concentrated in small areas, leading to significant harm to the environment. This harm includes air and noise pollution, excessive resource consumption, and increased waste production, all of which put a strain on local ecosystems.
- Youth often struggle to find housing opportunities for themselves because of limited space and stiff competition for land in densely populated areas.

### 4.1.3 Recommendations

To effectively manage the advantages and challenges of clustered settlements, a multi-faceted approach is necessary. This approach involves strategic planning, sustainable infrastructure development, and community engagement. Here are some specific recommendations for strengthening the resilience and sustainability of clustered settlements:

1. Improve the resilience and scalability of infrastructure to accommodate growing urban populations.
2. Conduct awareness campaigns to educate residents about the benefits of living in clustered settlements. Highlight advantages such as enhanced security, improved access to services, and increased community support to promote a positive perception and cooperation among residents.
3. Invest in sustainable water and waste management technologies.
4. Promote inclusive urban planning to ensure that resources and amenities are accessible to all.
5. Enforce strict environmental regulations to prevent pollution and degradation.
6. Encourage community-based management practices that involve residents in the planning and decision-making processes. This ensures that the needs and preferences of residents are considered, which enhances the acceptance and effectiveness of proposed projects and policies.

By implementing these recommendations, clustered settlements can transform their challenges into opportunities for sustainable and inclusive urban development, ultimately improving quality of life for all residents.

## 4.2 Access to Water and Sanitation Services

According to the EICV6 (2019–20), 89.2% of households in Rwanda had access to improved water sources (NISR, 2021). The 2019–20 DHS data reported that 80% of households had access to improved water sources, with a significant disparity between urban (96%) and rural (77%) households (NISR, Ministry of Health, & ICF, 2021). Conversely, the RPHC5 data indicated that 82.3% of households used improved water sources (NISR, 2022). The differences among these sources do not necessarily suggest a decrease in access but rather result from variations in statistical methodologies. The RPHC5 aimed to enumerate the entire population to gather comprehensive demographic and economic data, while the DHS and EICV employed sampling techniques to target specific indicators; the DHS focused on health and reproductive health, and the EICV on socio-economic status and living conditions.

The EICV6 (2019–20) report states that 89.6% of households in Rwanda have access to improved sanitation facilities (NISR, 2021). In contrast, the RPHC5 data demonstrates a slightly higher proportion (92%) of households with access to improved sanitation services, including shared facilities, while 72.1% use basic, non-shared facilities (NISR, 2022). The DHS findings reveal that only 72% of households have access to improved sanitation, falling short of the national goal of achieving 100% access by 2025. There is a significant discrepancy between urban and rural areas: 78% of rural households have access to unshared improved sanitation facilities, below the 2025 target, while the proportion is lower in urban areas at 56.4%, also below the national goal.

The progress made in enhancing access to water and sanitation services in Rwanda reflects the country's commitment to improving public health and living conditions as part of its 2030 targets. This enhancement has had a profound and measurable impact on both public health and the general welfare of the population, particularly in rural areas.

Both key informant interviews and consultations with the community at the different sites we visited have shown that the participants recognize the significant progress that has been made. They specifically highlight the expansion of water distribution coverage as a major achievement and emphasize that this expansion has reached a larger number of people and a broader geographic area. This recognition of progress and expansion collectively indicates that efforts to improve water infrastructure and services have had a positive impact on the community, including improved health and sanitation, increased convenience, and enhanced quality of life for residents.

#### 4.2.1 Benefits of the Current Interventions

##### *Health Impact*

The provision of clean and accessible water has significantly reduced the incidence of waterborne diseases such as cholera, dysentery, and typhoid fever. This decrease has not only improved the general health of the population but has also significantly reduced health care expenses related to treating such conditions. One respondent specifically highlighted that diarrhea remains one of the leading causes of mortality and morbidity in Rwanda, especially among children under five. The expansion of clean water services and improved sanitation facilities has led to a significant decrease in diarrheal diseases. For instance, the installation of community water points and household latrines in rural districts such as Bugesera has been correlated with reduced rates of diarrhea among local populations. This is largely due to reduced exposure to contaminated water sources and improved hygiene practices facilitated by easier access to water.

Another respondent mentioned that the reduction in waterborne diseases extends beyond just diarrhea. There has been a notable decline in other diseases, such as cholera and typhoid fever, in areas where water quality and access have been improved. For example, government reports and health data have shown that in areas where the government's water and sanitation programs have been implemented, health clinics report fewer cases of water-related illnesses, contributing to improved community health and reduced health care costs.

Improved sanitation facilities also contribute to better maternal and child health outcomes. When the population has access to clean water and sanitation facilities, the risk of infections associated with childbirth is reduced, leading to lower infant mortality rates. For example, a program focusing on hygiene in rural Rwandan communities has been linked to decreased rates of neonatal illnesses.

### *Welfare and Social Benefits*

1. **Increased lifespan:** The lifespan of the Rwandan population has notably increased, with the average life expectancy reaching 69.6 years, according to the 2022 population and housing census (NISR, 2022). This improvement is largely attributed to better living conditions and reduced exposure to waterborne diseases.
2. **Increased school attendance:** Access to water and sanitation in schools is particularly beneficial for children's education. Schools equipped with proper latrines and water facilities experience higher attendance rates, especially among girls. In Rwanda, initiatives to improve school water, sanitation, and hygiene (WASH) facilities have resulted in improved attendance and reduced dropout rates, as students, particularly girls, no longer must miss school during menstruation.
3. **Decreased time spent fetching water:** Previously, members of the population spent significant amounts of time traveling long distances to collect water, which particularly affected women and children. Improved access to water sources closer to home has dramatically reduced the time required for fetching water. This change has multiple benefits, including increased time for education and employment, which, in turn, can decrease school dropout rates and lessen the economic burden on families and the government. For instance, in communities around Rwamagana, the introduction of community water taps has enabled women to engage more in small business activities and agricultural production.
4. **Improved hygiene practices:** The introduction of water and sanitation services also promotes better hygiene practices. For instance, the installation of handwashing stations in rural areas not only helps in preventing the spread of infectious diseases but also encourages regular handwashing as a daily routine, thus promoting public health.

### *Environmental and Sustainability Impact*

1. **Sustainable water management:** Increased access to water services often brings improved water management practices that ensure sustainability. In Rwanda, community-based water supply systems often incorporate rainwater harvesting and careful water source management to ensure year-round availability.
2. **Enhanced sanitation services:** Improved sanitation facilities are crucial for effectively managing human waste and protecting water bodies from contamination. In Rwanda, efforts to construct and upgrade sanitation facilities, including septic systems and environmentally sustainable latrines, have resulted in cleaner environments and healthier ecosystems. By reducing pollution, this directly benefits communities that rely on rivers and lakes for their daily water supply.
3. **Promotion of sustainable practices:** The focus on improved sanitation in Rwanda also entails promoting practices such as waste segregation, recycling, and composting, which contribute to environmental protection. Programs that integrate waste management with sanitation services aid in reducing the overall environmental impact of human settlements by ensuring the proper disposal of solid and liquid waste.



#### 4.2.2 Remaining Challenges

Despite the significant progress and benefits, there are still challenges and gaps that need to be addressed. In interviews, respondents highlighted various issues and challenges that affect water and sanitation services:

1. **Limited water and sanitation coverage in Rwanda remains a major issue, particularly in rural areas where access to water is still difficult.** This leads to significant disparities between rural and urban areas. The country's diverse topography, including mountains and valleys, presents unique challenges in distributing water and managing sanitation. Steep terrains and remote locations make it costly and technically challenging to extend water supply networks and sanitation systems. Moreover, these geographical factors increase the costs of constructing and maintaining infrastructure. Although 72% of households have improved sanitation, rural areas still lag behind urban areas. Unsafe sanitation practices contribute to accidents, and inadequate hygiene facilities, such as limited access to water and soap, have a negative impact on overall health and well-being.
2. **Policy and legislative gaps are another concern.** The 2016 water supply policy lacks clarity on financing rural water infrastructure, which affects the consistency of services. Moreover, there is a lack of corresponding laws on water and specific laws on sanitation, making it difficult to enforce standards. Inactive or ineffective water user committees further impede the provision of effective services.
3. **Persistent service gaps, infrastructure deficiencies, and mismanagement** contribute to a significant non-revenue-related water challenge, resulting in annual losses of RWF 2 billion, equivalent to 42% of water loss.
4. **Sustainable water and sanitation services** require regular infrastructure maintenance and community involvement. Neglecting the impacts of climate change in developing WASH strategies is problematic, as these systems are vulnerable to climate variability and related infrastructure damage.
5. **Insufficient funding is a pressing issue** that affects WASH infrastructure development. Funding gaps can delay or halt the development of necessary water and sanitation infrastructure. This issue is compounded by the high costs associated with building and maintaining infrastructure in challenging topographies.

#### 4.2.3 Recommendations

To effectively address the challenges in water and sanitation services, a comprehensive strategy is needed. This strategy should include reinforcing planned settlements and mobilizing funds effectively. Here, we present some detailed suggestions and recommendations to tackle these issues.

**Challenge 1:** Limited water and sanitation coverage in Rwanda remains a major issue, particularly in rural areas where access to water is still difficult.

1. Increase investment in infrastructure development, especially in rural and underserved regions, to expand access to safe drinking water and sanitation facilities.
2. Inspect the availability of water and soap in places with handwashing equipment and sensitize and punish those who have not provided water and soap, if necessary.

**Challenge 2:** Persistent service gaps, infrastructure deficiencies, and mismanagement contribute to a significant non-revenue-related water challenge, resulting in annual losses of RWF 2 billion, equivalent to 42% of water loss.

1. Transition the oversight of rural water supply systems from private operators to the Water and Sanitation Corporation.
2. Establish clear contractual agreements with private operators and enforce performance standards.
3. Educate consumers about water conservation and encourage prompt leak reporting.
4. Implement proactive and regular maintenance to reduce infrastructure aging.
5. Promote efficient pumping and distribution and allocate resources to non-revenue-related water waste reduction efforts.

**Challenge 3:** Sustainable water and sanitation services require regular infrastructure maintenance and community involvement. Neglecting the impacts of climate change in developing WASH strategies is problematic, as these systems are vulnerable to climate variability and related infrastructure damage.

1. Develop climate-resilient water and sanitation infrastructure.
2. Integrate climate adaptation and disaster risk reduction strategies into WASH planning.
3. Ensure that the appropriate budget is allocated to the operation and maintenance of water and sanitation infrastructure for sustainable access to services.

**Challenge 4:** Funding is a pressing issue that affects WASH infrastructure development. Funding gaps can delay the development of necessary water and sanitation infrastructure.

1. Explore innovative financing mechanisms such as public-private partnerships and community-based funding.
2. Allocate a sufficient budget and give priority to cost recovery mechanisms.
3. Conduct capacity assessments in the water and sanitation sector and create capacity-building plans.
4. Advocate for social protection measures, such as integrating water and sanitation into the social protection scheme and providing free water to the ultra-poor whenever feasible.

## 4.3 Reduction of the Length of Roads Vulnerable to Floods and Landslides

A Multi-Criteria Analysis was carried out as part of the Developing Capacity for Climate-Resilient Road Transport Infrastructure project to identify and prioritize hotspots based on a comprehensive view of current technical vulnerabilities. This analysis serves as a guide for future infrastructure development and brings attention to areas that may experience exacerbated impact due to climate change. The hotspots were categorized according to levels of risk, with notable vulnerabilities found in the Western, Northern, and Southern provinces. The Eastern Province and Kigali City displayed moderate vulnerabilities. The quantitative data obtained from the analysis revealed that 60% of the identified hotspots fell into the high-risk category, thus necessitating immediate intervention. The hotspot analysis underscored the significance of specific road sections, with particular emphasis placed on the roads of Muhanga, Ngororero, Karongi, Rutsiro, Rubavu, Musanze, Gakenke and Rulindo. Given its criticality and importance, this road section was identified as a top priority for the implementation of the pilot project.

Gathering feedback from local communities and stakeholders who regularly use or live near these roads provides valuable insight into the practical impact of these adaptation measures. Interventions such as constructing and maintaining radical terraces (see next section), road embankments, and channel drains, as well as afforestation and banning plastics, have been implemented to reduce road vulnerability. Each intervention is assessed based on current practices and the challenges that still need to be addressed.

### 4.3.1 Benefits of the Current Interventions

#### 1. Radical terraces on adjacent hills

Radical terracing (see Figure 9) involves creating step-like cuts into hillsides, which can significantly reduce runoff velocity and soil erosion, thereby minimizing the sediment that can block drainage channels and culverts along roads. This method has been proven effective in regions with heavy rainfall and steep slopes because it directly addresses the mechanics of landslides and mudslides by stabilizing the soil.

**Figure 9. Examples of terracing on the Karongi-Rutsiro-Rubavu route**



Source: Authors.

## 2. Embankments and gabions

Engineering solutions such as embankments and gabions (see Figures 10 and 11) are vital for reducing road vulnerability in Rwanda's mountainous terrain and frequent intense precipitation events. Embankments, typically made from earth or rock materials, are constructed alongside roads to prevent land from slipping onto the roadways. They stabilize the soil, redirect water flow, and effectively prevent erosion under and around the road surfaces.

Site visits have shown that properly designed embankments significantly enhance slope stability by altering the natural angle of repose, making them less prone to failure during heavy rains. Incorporating drainage systems within these embankments further improves their effectiveness by managing surface water and reducing hydrostatic pressure on the slope.

**Figure 10. Examples of embankments along the Karongi-Rutsiro-Rubavu route**



Source: Authors.

Gabions are wirework containers filled with rock, concrete, or sometimes sand and soil. They are used to stabilize steep slopes, making them particularly effective in areas prone to landslides. The gabions allow water to drain through, which helps to reduce hydrostatic pressure. Furthermore, the weight of the gabions contributes to the stabilization of the slope.



**Figure 11. Examples of gabions along the Kigali-Rulindo-Gakenke and Musanze roads**



Source: Authors.

The flexibility of gabions allows them to settle without compromising their structural integrity, adapting to movements within the slope. Moreover, their permeable nature aids in efficient water drainage, which is particularly significant in areas prone to landslides. Additionally, gabions excel in erosion control, safeguarding the soil from being washed away during heavy rainfall.

### 3. **Appropriate channel drains**

Constructing and regularly maintaining channel drains is an effective way to manage surface water, as they direct water away from road surfaces. This helps reduce the risk of waterlogging and erosion under and around the road infrastructure, making it less vulnerable to flooding. To enhance the effectiveness of channel drains, proper design and regular maintenance are necessary to ensure they remain clear and functional.

### 4. **Banning the use of plastics**

The aim of banning plastics is to reduce littering, which can clog drainage systems and worsen flooding during heavy rains. Although this measure does not directly address the vulnerability of roads to landslides, it effectively manages water flow during floods. The success of this effort largely hinges on enforcement and public compliance.



## 5. Afforestation

Afforestation, specifically meaning planting trees on hills (see Figure 12), helps stabilize the soil by using root systems to bind the soil and absorb water, thereby reducing runoff and the risk of soil displacement. Moreover, afforestation can provide long-term environmental benefits, including enhancing local biodiversity and facilitating carbon sequestration. However, it is important to note that the effectiveness of the trees in stabilizing slopes depends on factors such as the species selected and the age of the trees.

**Figure 12. Examples of afforestation along the Karongi-Rutsiro-Rubavu route**



Source: Authors.

## 6. Integrated impact

When combined, these measures enhance the road network's resilience against natural disasters such as floods and landslides. The integration of biological approaches (afforestation), physical measures (terracing, embankment, drains), and regulatory actions (plastic ban) provides a broad set of preventive strategies to address immediate and long-term vulnerabilities.

These adaptation measures significantly improve road safety and reduce the risk of accidents associated with adverse weather conditions. Improved road conditions ensure safer travel for commuters and the transportation of goods, both of which are crucial in emergency situations where access to hospitals and evacuation routes can be lifesaving. Furthermore, these measures ensure a smoother flow of goods and services by reducing disruptions. This reliability supports businesses in maintaining their supply chain operations without interruptions, which is essential for businesses that are dependent on just-in-time delivery systems. Moreover, reliable transportation networks attract investments and can lead to an expansion in business activities and tourism, bolstering economic growth and stability. In summary, the adaptation impacts of these combined measures include improved mobility, reduced traffic congestion, reduced travel time, and fewer traffic accidents and injuries. These aspects are highlighted in the following quotes from the officials of Rwanda Transport Development Authority and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ):

“Stable and reliable roads ensure that citizens can travel freely and safely, improving access to education, health care, and employment. For rural communities, this means better connectivity with urban centres, facilitating movement and integrating them more closely with economic and social activities.”

“By preventing road blockages due to landslides, well-maintained roads keep traffic moving efficiently. This is crucial in areas where alternate routes are limited, ensuring transportation arteries remain open and functional.”

“Good road conditions directly translate to reduced travel times, allowing for more predictable and shorter journeys. This efficiency benefits individual commuters by saving time and enhances community productivity by enabling quicker transport of goods and services.”

“Roads less vulnerable to sudden failures like landslides and flooding are safer, leading to a decrease in road accidents and related injuries. This saves lives and reduces burden on the health care system and associated costs.”

### 4.3.2 Remaining Challenges

While the current measures are providing benefits, reducing road vulnerability to flooding and landslides in Rwanda involves addressing several complex challenges that are far from solved. The main current challenges are as follows.

1. **Limited financial resources for comprehensive infrastructure upgrades:** Infrastructure projects, especially those aimed at enhancing resilience to natural disasters, require significant investment. Rwanda, like many low-income countries, faces major budgetary constraints that limit its ability to implement comprehensive upgrades.
2. **Technical complexities in implementing engineering solutions on diverse terrain:** Diverse geographical landscapes, such as mountainous areas, pose distinct technical challenges when it comes to designing and implementing resilient infrastructure.
3. **High road maintenance costs:** Maintaining road infrastructure, particularly in areas prone to natural hazards, can be costly and strain national and local government budgets.
4. **Balancing environmental conservation with infrastructure development:** Infrastructure projects often risk disrupting local ecosystems, leading to long-term environmental degradation and reducing the natural resilience of the landscape.
5. **The challenge of siloed planning:** In Rwanda, separate entities handle catchment restoration, flood control, and road infrastructure, leading to inconsistent objectives, resource inefficiency, and suboptimal outcomes.

### 4.3.3 Recommendations

The following strategic recommendations aim to effectively mitigate the vulnerabilities associated with the challenges listed in the previous section.

1. **Leverage funding opportunities**
  - Use funding from international donors, climate adaptation funds, and public-private partnerships to increase financial resources.
  - Focus on programs such as the Green Climate Fund and World Bank grants.
2. **Adopt cost-effective design choices**
  - Adopt cost-effective engineering solutions, including nature-based solutions.
  - Use local materials or simpler yet still effective technological solutions.
3. **Employ customized engineering approaches**
  - Develop tailored engineering solutions that consider local terrain and geological conditions.
  - Combine hard engineering methods (such as retaining walls and drainage systems) and soft engineering methods (such as vegetation buffers and slope stabilization through reforestation).
4. **Use technology and innovation**
  - Use advanced technologies such as AI-driven simulation models to plan and predict the impacts of natural disasters on road networks.
5. **Choose innovative construction techniques**
  - Use durable, low-maintenance materials and innovative construction methods to reduce the frequency and cost of repairs.
6. **Implement sustainable financing mechanisms**
  - Implement road tolls or leverage taxes specifically earmarked for road maintenance to provide a sustainable financing model.
7. **Conduct integrated environmental assessments**
  - Conduct comprehensive environmental impact assessments to understand and mitigate the ecological consequences of infrastructure projects.
8. **Adopt eco-friendly construction practices**
  - Implement construction practices that reduce environmental impact, such as using permeable materials and designing road alignments that avoid critical habitats and conservation areas.

**9. Establish a multidisciplinary task force**

- Create a task force that includes representatives from all relevant sectors to ensure cohesive planning that is aligned with national development goals.

**10. Implement comprehensive impact assessments**

- Make it mandatory to conduct comprehensive environmental and social impact assessments before approving projects to identify potential conflicts and synergies.

**11. Develop catchment-based management plans**

- Create catchment-based management plans to coordinate and support all interventions within a catchment to optimize flood control and ecosystem services.

**12. Engage communities and stakeholders**

- Involve local communities and stakeholders in the planning processes to reflect local needs and enhance the sustainability and acceptance of projects.

**13. Integrate funding and budgeting**

- Consolidate funding streams and budgets for related projects to encourage integrated planning and collaboration between departments and sectors.

## 5. Conclusion and Recommendations

Rwanda's climate adaptation MEL system in the human settlement and transport sectors demonstrates a structured approach to enhancing the resilience of critical infrastructure and communities against climate-induced vulnerabilities. Significant progress has been made in developing clustered settlements, which has greatly improved living conditions and provided communal benefits. The IDP model settlement in Kinigi, Musanze District, serves as an excellent example of these benefits, but challenges such as infrastructure stress and increased water demand need to be addressed. While progress has been made in expanding access to water and sanitation, variations across metrics indicate challenges in service consistency. Significant measures have been taken to reduce road vulnerability to natural disasters. Engineering solutions and other measures have contributed to flood risk management, but challenges remain.

Based on the findings and the challenges outlined in this report, the following policy recommendations are proposed to enhance adaptation outcomes.

### 1. Enhance support for clustered settlements

- Implement more aggressive development policies to establish clustered settlements at a faster pace.
- Provide additional resources and support for infrastructure development in these areas to meet increased demand.

### 2. Strengthen water and sanitation infrastructure

- Increase investments in water and sanitation infrastructure to achieve 100% coverage by 2030.
- Adopt advanced technologies for water management and climate-resilient infrastructure to cope with more frequent extreme weather events.

### 3. Conduct comprehensive vulnerability assessments for roads

- Conduct detailed vulnerability assessments for road networks to identify critical areas requiring immediate attention.
- Establish a dedicated fund for the maintenance and upgrade of road infrastructure to ensure long-term sustainability and resilience.

### 4. Enhance policy integration and coordination

- Foster greater integration of adaptation strategies across sectors and sub-sectors (transport, water resources, water supply, sanitation, housing, and settlements) to create a unified approach to climate resilience.
- Enhance coordination among government agencies, NGOs, and the private sector to streamline efforts and maximize the impact of adaptation measures.



**5. Expand community engagement and capacity building**

- Increase community involvement in planning and implementing adaptation measures to address the local needs and preferences.
- Expand capacity-building programs to equip local communities with the necessary skills and knowledge to actively participate in adaptation initiatives.

**6. Enhance the MEL framework**

- Strengthen the MEL framework to ensure more rigorous data collection, analysis, and feedback mechanisms to inform real-time policy adjustments and improvements.
- Use digital tools and platforms to enhance the accuracy and timeliness of data collection and to facilitate better decision-making processes.

By implementing these recommendations, Rwanda can build on its current successes and address the identified challenges, ensuring a resilient future for its infrastructure and communities in the face of escalating climate threats.

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## Appendix

**Table A1. List of participants to be interviewed during data collection**

Name	Organization	Email	Subject
Vincent Bayingana	Enabel	Vincent.bayingana@enabel.be	Rural population living in clustered settlements
Dieudone Niyigena	Rwanda Transport Development Authority	Dieudone.niyigena@rtda.gov.rw	Reduction of the length of roads vulnerable to floods and landslides
Jean Marie Rutaganda	UNICEF	jrutaganda@unicef.org	Access to water and sanitation services
Dr Abias Maniragaba	Rwanda Climate Change and Development Network	abiasrw@gmail.com	All three
Rachael Businge	Rwanda Water Resources Board	Rachael.businge@rwb.rw	Reduction of the length of roads vulnerable to floods and landslides
Jean Bosco Mugwaneza	Rwanda Environment Management Authority	bmugwaneza@rema.gov.rw	All three
Oscar Sibomana	National Institute of Statistics Rwanda	Oscar.sibomana@statistics.gov.rw	All three
Gonzague Ndamushima	Ministry of Infrastructure	gonzague.ndamushima@mininfra.gov.rw	Reduction of the length of roads vulnerable to floods and landslides
Yves Tuyishima	KWF	Yves.tuyishime@kwf.de	All three
Veronique Uwamariya	Rwanda Green Fund	v.uwamariya@greenfund.rw	All three
Jean Marie Kuradusenge	Rwanda Housing Authority	Jmv.kuradusenge@rha.gov.rw	Rural population living in clustered settlements
Innocent Musabyimana	GIZ	Innocent.musabyimana@giz.de	All three
Jovanith Kirabo	Collectif des Ligues et Associations de DÇ_fense des Droits de l'Homme au Rwanda (CLADHO)	Kirabojovanith19@gmail.com	Access to water and sanitation services
Lydie Uwantege	Institution of Engineers Rwanda	Lydie.uwantege@engineersrwanda.rw	All three

Rwanda's Climate Adaptation Monitoring, Evaluation,  
and Learning System in the Human Settlements and Transport Sectors

<b>Name</b>	<b>Organization</b>	<b>Email</b>	<b>Subject</b>
Fred Mugisha	Enabel	Fred.mugisha@enabel.be	Rural population living in clustered settlements
Laurent Ndizihiwe	Ministry of Infrastructure	Laurent.ndizihiwe@mininfra.gov.rw	Reduction of the length of roads vulnerable to floods and landslides
Emmanuel Ngendahayo	Water and Sanitation Corporation	engendahayo@wasac.rw	Access to water and sanitation services

**REPUBLIC OF RWANDA**



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