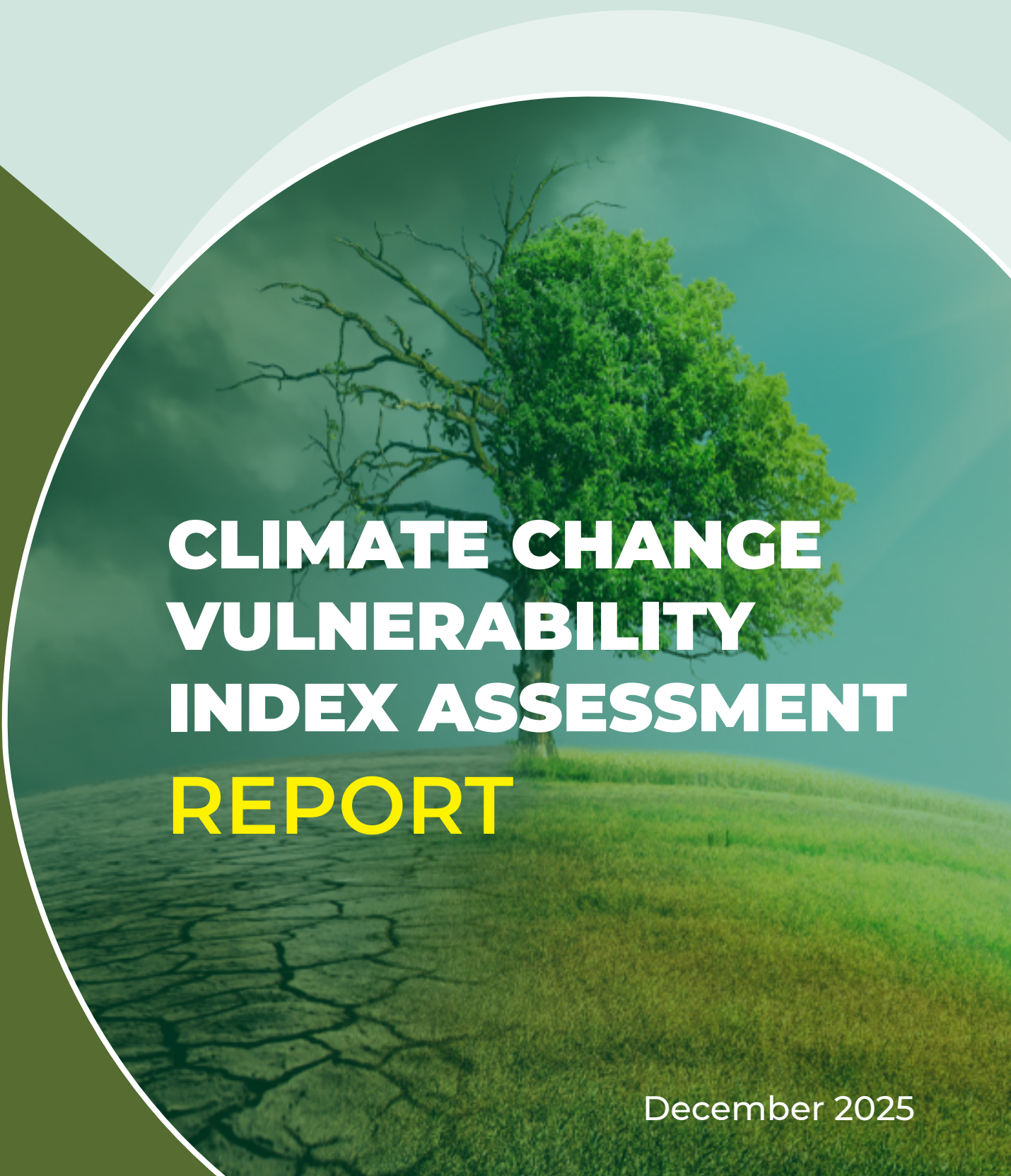


A large circular graphic dominates the lower half of the page. It contains a photograph of a lush green tree standing on a grassy hill. In the foreground, the ground is cracked and dry, suggesting drought. The sky is a mix of blue and green, with a faint rainbow visible on the right side. The text "CLIMATE CHANGE VULNERABILITY INDEX ASSESSMENT REPORT" is overlaid on the image in white and yellow capital letters.

CLIMATE CHANGE VULNERABILITY INDEX ASSESSMENT REPORT

December 2025

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Executive Summary

This document presents the final report of the Rwanda Climate Change Vulnerability Index Assessment (CCVIA). Rwanda has responded to the reality of climate change at policy and program levels and is eager to be regularly informed about the success of its overall national policy, strategy and program responses with progress reports backed up with data, providing the opportunity for a comprehensive understanding and interpretation of what's been accomplished. The purpose of this National Climate Change Vulnerability Index Assessment report is to provide relevant and detailed information to policy makers.

The CCVIA aims to contribute to Rwanda's national efforts by policy makers to set development priorities, make investment decisions and monitor the country's progress in adapting to climate change and strengthening resilience. It aims to enable Rwandans to know more about how effective the country has been in its efforts to reduce the overall vulnerability to climate change impacts along its journey towards the achievement of Vision 2050.

Rwanda has prepared previous national Vulnerability Assessment reports, in 2015 and 2018. This 2025 CCVIA Report builds on the approaches used on those two previous occasions and provides for a comparison or an assessment of change, particularly from 2018 to 2025.

This report covers three assessments in one document: 1) a **National Situation Analysis** on adaptation and resilience in eight sectors – socio-economic development, water, agriculture and livestock, health, forests, energy, transportation infrastructure and human settlements, which in this report helps to convey the work that has been implemented in Rwanda to address vulnerability and strengthen resilience; 2) a **National Household Vulnerability Assessment** which, along with a framework of household Vulnerability Indicators, has provided the data for preparing a Vulnerability Index of perceived or experienced vulnerability among households; the index facilitates a comparison of vulnerability among districts and provinces, and for a historical comparison with the 2018 CC Vulnerability Assessment Index; and 3) a **National Vulnerability Assessment** using framework of national vulnerability indicators and national data; these indicators are similar to the household vulnerability indicators.

The national situation analysis report is a new feature that has been added to the 2025 assessment, compared to the 2018 assessment.

The National Climate Vulnerability Assessment methodology has used two assessment frameworks of various indicators to measure vulnerability – one framework of indicators to measure vulnerability at the national level using national-level data, and another framework of indicators to measure household-level vulnerability and perceptions of vulnerability, using household-level data. These 2 frameworks of indicators have been used in assessments 2 and 3, above.

Three methods of data collection were used, one for each component of the CCVI Assessment. For the National Situation Analysis, eight sector experts carried out desk studies including literature review, complemented by Key Informant Interviews. They prepared reports following a similar reporting template. For the Index Assessment, a national household survey was carried out with 2568 households selected using a random sampling technique covering in all 30 Districts, complemented by Focus Group Discussions in each district; the responses were codified into numerical values and analyzed to create an Index for each vulnerability indicator for each district. For the National Indicator Assessment, national data was accessed from a variety of national sources, primarily from NISR.

The **Climate Change Vulnerability Index** provides the key findings presented in this report. The Index has facilitated the comparison of districts and provinces using Vulnerability Indicators for the Sensitivity and Exposure of households to climate change, and for the Adaptive Capacity of

households in the face of changing climate. These findings are presented by ranking the districts and presenting the results in maps. The findings are discussed with reference to the achievements and challenges, including ongoing strategies, programs and projects of key government Ministries and Agencies engaged at ground level across the eight sectors.

The findings of the **Vulnerability Index Assessment** indicate that Rwanda's vulnerability has changed with an increase in the 2025 national index compared to the index calculated in 2018. The vulnerability of Rwanda deteriorated statistically and significantly from 0,394 in 2018 to 0,524 in 2025. A lower or a declining index suggests a better or an improved situation or trend compared to a higher index. This change points to an increase in vulnerability overall from the perspective of households, based on people's experience, perceptions and situation. It is a view from the ground level.

The Assessment used a statistical approach which verified that vulnerability has changed in all the districts with a similar decline across all the districts, though Eastern Province saw the largest increase in vulnerability followed by Southern Province, followed by the City of Kigali, followed by Western Province, followed by Northern Province.

The 2025 Index Assessment tells us that a low adaptive capacity has contributed the most to the decline or deterioration in vulnerability.

The Assessment shows that the City of Kigali has the lowest index for total Vulnerability and Eastern Province has the highest index for total Vulnerability.

The Assessment also shows that the City of Kigali has the lowest index for Adaptive Capacity, meaning high adaptive capacity, and Western Province has the highest index for Adaptive Capacity meaning low adaptive capacity.

It is observed that districts with a low Adaptive Capacity (high AC index) are disadvantaged when it comes to overcoming their vulnerability. This is primarily due to a high to medium high index for Exposure and/or Sensitivity. When index values for specific indicators are examined, we can see that specific AC indicators are driving the Vulnerability Index values higher for the most Vulnerable districts, meaning that these districts have still not overcome their disadvantaged or precarious situation.

In presenting the Findings of the 2025 Index Assessment, specific indicators are discussed that give rise to the increased Vulnerability Index, examining index values under indicators for Exposure, Sensitivity, and Adaptive Capacity. These indicators are also reviewed within the context of each of the eight sector and a few cross-sector indicators.

The 2025 Index Assessment suggests that exceptional efforts are needed in districts with high and very high Vulnerability to significantly boost their Adaptive Capacity, so that they overcome the obstacles and barriers to increasing adaptive capacity – with the aim of comprehensively strengthening resilience among households and sector and multi-sector systems specifically in those Vulnerable districts.

The assessment is supported by five illustrative maps – one for each of E, S, and Vulnerability (joining E and S), AC and total Vulnerability – showing the national distribution of each, based on the district level data and indicator values. Each map shows five index levels – classifying the index values from very high to very low, comparatively. The maps provide colour gradation to vividly allow the viewer to see what Sensitivity, Exposure and Adaptive Capacity is highest or lowest, and where total Vulnerability is highest and lowest.

Total Vulnerability is highest in Nyagatare district. Nyagatare's rank is due to very high index for exposure (E), very high sensitivity for sensitivity (S) and low adaptive capacity (AC). Four districts

follow with high Vulnerability: Nyamagabe, Gatsibo, Ngoma, and Karongi.

Adaptive Capacity is lowest in Nyamagabe, Nyagatare, and Karongi districts, followed by Muhanga and Ngoma and Gatsibo districts.

The combined index values for Exposure and Sensitivity provide an Impact Index. The districts with a high Impact index include Nyagatare, Gatsibo, Gicumbi, Rutsiro, Kayanza, Ngoma, Nyabihu and Gisagara.

Indicators with very high index values for Adaptive Capacity are - Social capital, Participation in building adaptive capacity, Access to climate information, Access to irrigation, Use of resilient farming methods, Proximity to health posts, Proportion of households with water storage capacity, and Level of household assets. Water, Irrigation and Infrastructure indicators are most frequent for the most vulnerable districts.

Additional indicators with very high index values for Exposure and Sensitivity are - Age dependency ratio, Infrastructure vulnerability, Use of electricity for cooking and light, Temperature Variability, and Proportion of the population experiencing malaria.

This report discusses the Findings and looks for evidence of success stories that may illustrate pathways to reducing vulnerability and strengthening resilience. The success stories include:

- Expanding access to energy-saving cook stoves with enhanced local manufacturing,
- Increasing access to irrigation and valley dams to improve livelihoods,
- Strengthening access to pension and health insurance plans for better financial security,
- Increasing the use of early warning systems for community flood protection,
- Supporting community health workers who drive Rwanda's malaria recovery,
- Building more climate-resilient communities for at-high-risk households,
- Extending support for solar powered irrigation to build resilience in drought prone areas,
- Extending support agroforestry for enhanced pest management and land management, and
- Enhancing the adoption of nature-based solutions in rural areas.

Recommendations in this report flow directly from the Findings and the discussion of the Findings from the perspective of eight sectors. Recommendations are specific and pertain to the needs and likely benefits of the most vulnerable districts. Recommendations are directed towards district officials who must seek financial and policy support from national Ministries. They are also directed towards relevant line Ministries, Departments and Agencies that have the mandate to put programs and other initiatives in place to ensure the recommendations are implemented. Recommendations are also directed towards central Ministries, most specifically to MINECOFIN, to adjust priorities in significant ways that will reverse the deterioration in vulnerability.

The report concludes that vulnerability of Rwanda has deteriorated statistically and significantly from 2018 to 2025 based on responses of household heads to survey questions. In 2025, ten districts have high or very high vulnerability. Responses to survey questions linked to just ten indicators, mostly related to low adaptive capacity, drive this assessment. Using maps, the Assessment has sought to visibly represent the findings and show the location of the vulnerability.

The change in the national CC vulnerability index between 2018 and 2025 may have occurred be for a plethora of reasons, though hypothesizing on the primary reason for the change is difficult to do and risky. What the difference is and where the change has occurred are easier to discuss. The statistical assessment, using various tests, indicates the change is significant and that the provinces have changed in a similar way. Further, we can also say that different households were surveyed in 2018 and 2025, though households were randomly selected in both cases and the selection of households was done the same way on both occasions.

To explain the changes between 2018 and 2025, we can also say that across Rwanda, there have been changes in the national and rural economy between 2018 and 2025. There have been changes in the actual conditions of peoples' lives from climate change as well, mainly from increased climate variability. Economic changes were not the focus of this assessment. It is recognized that not all communities have benefitted from each of the government interventions, and that communities respond differently to the opportunities made available to them when programs or interventions are implemented or provided. It is important to recognize that local conditions faced by households can be quite different from broader, national conditions, which are better known to national planners in central and sector Ministries and agencies.

Foreword

Rwanda committed to be at the forefront of Africa's efforts to build climate resilience and advance sustainable development through evidence-based policies, strategies, plans and innovation. The 2025 Climate Change Vulnerability Index Assessment (CCVIA) marks another important milestone in our country's commitment to understand and address the impacts of climate change on our population, economy, biodiversity, natural resources and ecosystems in general.

This report builds on the foundations laid by the 2015 and 2018 assessments, introducing improved methodologies and a comprehensive national situation analysis across eight key sectors: water, agriculture and livestock, health, forests, energy, transportation infrastructure, human settlements, and socio-economic development. For the first time, the assessment integrates both household-level perceptions and national indicators to provide a nuanced picture of how climate change continues to affect livelihoods, ecosystems, and infrastructure across all Rwanda's districts.

The findings reveal both encouraging progress and emerging challenges. They remind us that while Rwanda has made remarkable progress in implementing climate-resilient policies and programs, ranging from expanded irrigation and afforestation initiatives to the adoption of climate-smart technologies and community-based adaptation programs, challenges persist. The observed increase in the national vulnerability index underscores the urgent need to enhance adaptive capacity, particularly at the community level, and to scale up climate-smart investments in key sectors such as water, agriculture, energy, and human settlements.

This report arrives at a critical moment as Rwanda embarks on the implementation of its NST2, the revised GGCRS, and the NDC 3.0. It provides important insights to guide policy, planning, and investment decisions aimed at reducing vulnerability, protecting livelihoods, and promoting climate-resilient growth. The CCVIA also reinforces the importance of data driven governance, ensuring that adaptation strategies are informed by scientific evidence and local experience. It also demonstrates the Government's strong partnership development partners, and the private sector in driving climate solutions.

Rwanda Environment Management Authority (REMA), extends its appreciation to the many institutions, experts, and communities whose dedication made this assessment possible. This report will inspire collective action among government agencies, local authorities, the private sector, and international partners to continue investing in resilience, innovation, and inclusive development. As we look towards Vision 2050, this assessment serves as a reminder that resilience is not just a goal; it is the foundation upon which Rwanda's sustainable future will be built.

Juliet KABERA

Director General

Rwanda Environment Management Authority (REMA)

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Acronyms

AC	Adaptive Capacity
AFD	French Development Agency
AfDB	African Development Bank
AFR	Access to Finance Rwanda
CCT	Conditional Cash Transfer
SDC	Sustainable Development Goals
CoK	City of Kigali
CRVS	Civil Registration and Vital Statistics
E&CC TWG	Environment and Climate Change Thematic Working Group
EAC	East Africa Community
EICV	Integrated Household Conditions Survey
EU	European Union
EV	Electric Vehicle
EWS	Early Warning System
FRW	Rwandan Franc
GCF	Green Climate Fund
GGCRS	Green growth and Climate Resilience Strategy
IDP	Integrated Development Project
LOC	Line of Credit
M&E	Monitoring and Evaluation
MINALOC	Ministry of Local Government
MINECOFIN	Ministry of Economic Planning
MINEDUC	Ministry of Education
MINEMA	Ministry of Emergency Management
MININFRA	Ministry of Infrastructure
MOE	Ministry of the Environment
MOH	Ministry of Health
MRV	Monitoring, Reporting, and Verification
NAIS	National Agricultural Insurance Scheme
NDB	National Development Bank
NDC	Nationally Determined Contributions
NISR	National Institute for Statistical Research
NST	National Strategy for Transformation
PROECCO	Promoting Employment through Climate-responsive Construction
RAB	Rwanda Agriculture and Animal Resources Development Board
REMA	Rwanda Environment Management Authority
RGF	Rwanda Green Fund
RHA	Rwanda Housing Authority
RUDP	Rwanda Urban Development Program
RURA	Rwanda Utilities Regulatory Authority
SDGs	Sustainable Development Goals
UNDP	United National Development Plan
VUP	Vision 2020 Umurenge Program

1. Introduction and Background

Global changes in temperature and precipitation and the regional distribution of those changes have been and will continue to be the primary drivers affecting climate-related natural hazards such as floods, landslides, and droughts that have struck Rwanda in recent years with a devastating effect on the population. From the livelihoods of people in rural settlements, along with agriculture, forests and biodiversity to food security in urban settlements, core transport infrastructure, communication, energy, health, water, and institutions upon which populations depend, many of these systems have failed.

Rwanda has responded in the face of climate change at policy and program levels and is eager to be regularly informed about the success of its overall national response strategies, with progress reports backed up with data and detailed understanding and interpretation. This is the purpose of Rwanda's National Climate Change Vulnerability Index Assessment (CCVIA).

The capacity and scale of adaptation to climate change must be built up systematically to deal with climate change vulnerability as it is experienced – and likely to be experienced – by people and natural systems that face the impacts of climate change. It is understood and accepted that vulnerability is shaped or determined by exposure, sensitivity, and resilience including adaptive capacity. It is also understood that Rwanda is experiencing long term climate change, as evidenced by trends in rainfall and temperature. It is further understood that climate change impacts increase in direct relationship to increased climate variability including increased intensity and frequency of extreme weather events such as storms, hot weather, heat waves and lower or higher rainfall. The effect of more frequent and more extreme climate variability can result in lower productivity, for example, from changes in ecosystems, changes in agricultural and water systems, or disruptions to economic and health systems. The vulnerability of natural systems has profound implications for poor people and vulnerable groups who are more directly dependent on ecosystem services and products for their livelihoods. As a result, climate change impacts affect most Rwandans at the household level. At the national level, vulnerability assessments contribute to setting development priorities, making investment decisions and monitoring progress in adaptation and strengthening resilience. Vulnerability assessments will help to identify and map the climate exposure, sensitivity, and adaptive capacity across many sectors. They provide reliable information and accurate data on how human and natural systems are responding to climate change. This in turn provides key inputs for setting development priorities and revising adaptation policies and strategies, or for more investigation to better understand the vulnerability of key systems.

Rwanda's CCVIA is modelled on the Notre Dame Global Adaptation Index, ND GAIN. Rwanda's approach was adopted in 2025 and has been used to make three assessments, 2015, 2018 and 2025. Rwanda's CCVIA takes the relevant indicators used in ND GAIN's framework and compares them with national indicators that rely on Rwandan data. It further 'steps down' these national indicators to household level to understand of exposure, sensitivity and adaptive capacity at the household level. This provides a system for data collection from households to create an index for comparison of vulnerability among districts and provinces and provides a basis for comparison with the Rwanda CC Vulnerability Index prepared in 2018.

A key element of the current development context is Rwanda's significant base of national policies and targets aimed at increasing resilience throughout the country. This includes Rwanda's Nationally Determined Contributions (NDC 3.0), released mid-2025, its 5-Year Government Program: National Strategy for Transformation (NST2), and Rwanda's revised Green Growth and Climate Resilient Strategy to 2050.

The Government of Rwanda, through the Rwanda Environment Management Authority, previously conducted a vulnerability index assessment in 2018, building on the baseline of the vulnerability assessment report conducted in 2015, and adding the index for the first time. As part of its ongoing commitment to addressing Rwanda's vulnerability to climate change, REMA has again, in 2025, commissioned a national climate change Vulnerability Index Assessment, which is this report.

This 2025 CCVIA report will allow Rwanda to know more about how effective the country has been in achieving its targets related to reducing its overall vulnerability along the journey for vision 2050. It provides a multi-sectoral interpretation of district-level vulnerability based on household data. It provides an assessment in the form of a National Situation Analysis report covering eight sectors, provided separately. It also presents a third element - a review of national vulnerability using data acquired from national sources that updates the national vulnerability indicators. The total CCVIA package provides a comprehensive data-driven assessment and analysis on Rwanda's progress of increasing climate change resilience. It seeks to enable Rwanda to know more about the current vulnerability to climate impacts by providing an index-based assessment, plus recommendations on changes to policies and programs for consideration in setting future priorities.

This National Climate Change Vulnerability Index Assessment-CCVIA is guided by Terms of Reference (ToR) set out by REMA in 2024. ELCG Ltd. was commissioned to conduct this study for REMA.

2. The National Climate Change Vulnerability Assessment - Main Components

2.1 Objective and Scope

This CCVIA focuses on vulnerability of Rwandans to the impacts of climate change and the capacity to adapt to climate change at the household level. It examines people's exposure and sensitivity to a changing climate, and people's current or potential capacity to adapt to climate change. The CCVIA covered people's experience in all 30 Districts of Rwanda and covered examined vulnerability through the lens of eight sectors, namely Water, Health, Agriculture and Livestock, Energy, Transportation Infrastructure, Forests, Human Settlements and Socio-economic. The CCVIA included a look at people's experience with climate or weather events (meteorology) and disasters (disaster risk management) as two cross cutting themes.

The CCVIA acquired data from 2568 households using a household survey and conducted focus group discussions (FGD) to acquire qualitative data from around 240 individuals, an average of 8 participants in each of 30 FGDs.

The work of several Ministries and related Agencies was also included in the scope of the assessment. Data for the National Situation Analysis reports in the eight sectors was collected through a desk study of document and key informant interviews within Ministries and Agencies.

All national level data has been acquired from national sources. The main source of data was NISR. The preparation of the national CC Vulnerability Assessment has involved the following components, in brief:

a. A National Situation Analysis Report related to climate vulnerability and resilience. This component of the assessment was prepared, covering eight (8) sectors. This involved an in-depth sector-based examination of vulnerability in Rwanda. and the preparation of 8 Country Situation Analysis reports, each report authored by a member of the project's panel of Sector Experts - a new feature to the 2025 National Climate Change Vulnerability Index Assessment. This component has added significant depth to the Assessment. It specifically reviewed institutional progress of government Ministries and agencies relative to adaptation targets set in national climate change adaptation policies and strategies.

b. National household survey as the basis for household vulnerability index assessment. Data was collected on Household Vulnerability from 2568 households located in all 30 Districts of Rwanda. Collecting data at the household level aimed to assess climate change vulnerability of households including aspect of social-economic vulnerability. The household survey data was used to develop an index-based ranking of vulnerability to climate change in all the Districts and Provinces covering Exposure, Sensitivity, Adaptive Capacity and Total Vulnerability. The 2025 survey questionnaire included new questions compared to 2018 to cover identified gaps. The HH survey provided data to undertake the index assessment across a range of sectors. Sector experts were brought into the data analysis process to explain the new index assessment especially for the most vulnerable districts. The household data GIS location data supported the preparation of maps to visualize climate-related vulnerability, contributing to an increased understanding of where vulnerability is located. The 2025 index assessment was also compared to the index assessment of 2018, to assess change.

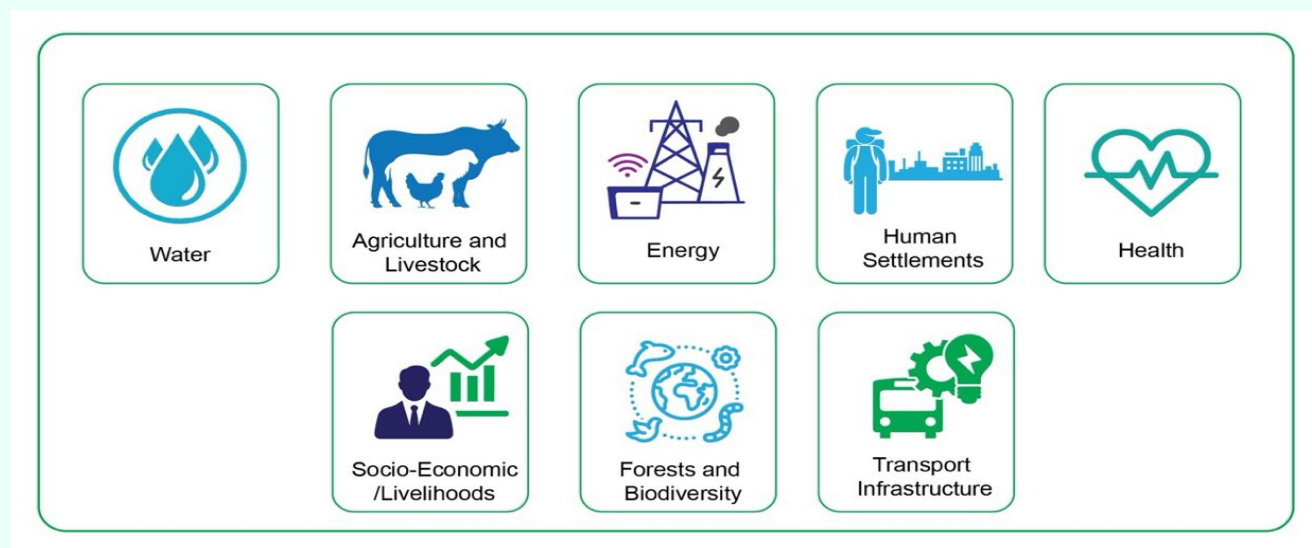
c. An analysis of national data aligned to the National Vulnerability Indicators was prepared. Data was collected related to each of the indicators, and an analysis was prepared that compared new data to the 2018 data to assess the direction of change in national vulnerability – by indicator

and overall vulnerability. The 2025 analysis includes new indicators to fill some sector gaps. The national assessment is found in Section 7 of this report.

2.2 Sector-based national situation analysis

A new feature was added to the 2025 assessment, compared to the 2018 assessment. It is a ‘national situation analysis’ that was prepared by a panel of Sector Experts. The analysis reviewed the policy and program landscape as well as the institutional and legal landscape. It involved a sector-by-sector review of initiatives undertaken in Rwanda to build resilience, nationally and at the various levels where action has been initiated. It also reviewed expectations of change, or the targets set out in national climate and development policies. Rwanda’s resilience targets were drawn from policy documents that articulate the long-term strategic direction for “the Rwanda we want.” These included Rwanda’s Nationally Determined Contributions (NDCs) to 2030, its 5-Year Government Program: National Strategy for Transformation-NST2, with progress observations on NST1, and Rwanda’s revised Green Growth and Climate Resilient Strategy to 2050 (2023 version). Stakeholders were consulted to provide data not otherwise available from documents, to suggest gaps/challenges and successes, to address inter-ministerial coordination mechanisms and to suggest policy and program recommendations. The analysis sought to indicate more than whether changes in resilience is observed or observable, but also to indicate whether Rwanda is making enough of a change, or whether the change is occurring at a sufficiently fast enough pace to meet the challenges.

The panel of Sector Experts contributed to the assessment by contributing their expertise in these eight sectors: **Water, Agriculture and Livestock, Energy, Human Settlements, Health, Socio-Economic/Livelihoods, Forests and Biodiversity, and Transport Infrastructure.**



The Team examines cross cutting issues and themes as well.

i. Template for the National Situation Analysis reports

These reports provide relevant information as follows:

- Introduced, then listed, the most recent policies and strategies in place, noting policy gaps and barriers,
- Summarized how Ministries and Agencies are progressing with action on enhancing adaptation and resilience, mainly in relation to NST2, summarizing relevant initiatives (programs and projects),
- Listed the apparent district priorities,

- d) Noted current monitoring and evaluation capacity given available systems
- e) Listed the coordination mechanisms (inter-departmental)
- f) Summarized opportunities, challenges, and gaps facing Ministries and Agencies
- g) Summarized lessons learned and best practices, and
- h) Provided conclusions, with recommendations.

2.3 Index Assessment

2.3.1 Framework of vulnerability indicators

National Level Vulnerability Indicators

The National Climate Vulnerability Assessment methodology has used a framework of vulnerability indicators at the national level. Both previous vulnerability assessments, 2015, 2018, used the same framework of national vulnerability indicators. The framework of national vulnerability indicators was reorganized by sector in 2025. A few indicators were added in 2025 to reflect areas where Rwanda is aiming to make progress. See Annex C for the list of national vulnerability indicators, with new indicators highlighted.

Household Level Vulnerability Indicators

The climate change vulnerability assessment also uses a framework of indicators that pertain to household-level vulnerability and perceptions of vulnerability at the household level, which can be measured using household-level data. The household-level vulnerability indicators step down the national vulnerability indicators to the household level and reflect similar considerations as the national indicators. Both previous national assessments, 2015, 2018, used the same framework of household vulnerability indicators, though this 2025 assessment including additional indicators to capture more data in the sectors. For example, additional indicators were added to capture data related to the energy and transportation infrastructure sectors. Most new indicators captured data on adaptive capacity. The reorganization of the indicators by sector was prepared at the request of REMA, as set out in the TORs. 2025 becomes a baseline line year for the new household indicators. Both previous assessments, 2015, 2018, used the same survey questionnaire, though this 2025 assessment added questions to capture more data in the sectors, at the request of REMA and as set out in the TORs. See Annex A for the list of household vulnerability indicators, with new indicators highlighted.

Vulnerability Indicator Selection

The vulnerability indicators were selected using specific criteria. National indicators were selected in 2015; Household indicators were selected in 2018. The criteria for selecting the indicators are provided below.

For a national vulnerability indicator to be accepted into the CCV Assessment framework, it must meet the following criteria:

- Indicators must be measurable.
- Indicators should be sensitive to changes.
- Indicators must be supported by data from a national source, e.g., NISR; they must measure change and should be regularly and frequently updated; the data must be available for public use and scrutiny.
- Indicators must be intentionally balanced to capture exposure, sensitivity, and adaptive capacity.
- Indicators must be consciously balanced across all sectors and cross cutting themes.
- Indicators should be resistant to confounding factors.
- Indicator data should be available across the whole country, across all locations.
- Indicators should be able to measure both long-term trends and short-term fluctuations.
- Indicators for a sector should capture sufficient elements to represent that sector.

- Indicators should include sectors and features represented in Rwanda’s current national resilience policies, while still representing exposure, sensitivity and adaptive capacity.
- Indicators should complement each other, cover unique fields or areas, and should not overlap.
- Indicators should be similar to those used in other countries or jurisdictions, for comparability and for international reporting.

The framework of national vulnerability indicators has now been used in 3 assessments: 2015, 2018 and 2025. This framework has been validated each time with input from REMA and stakeholders. The final set of 2025 National Vulnerability Indicators is presented in Annex B.

Data collected in 2015 provided a baseline line for the national vulnerability assessment. Data collected in 2018 provided an update and the 2025 data builds on the assessment made in 2018.

2.4 National Climate Vulnerability Index Assessment Methodology

2.4.1 Data Collection

The CCVIA methodology served the objectives of the study. Data was collected and analyzed to assess vulnerability to climate change impacts using an index-based approach that allowed for the ranking of vulnerability in all 30 Districts of Rwanda, to provide a basis for future change investigations, with GIS shapefiles provided to REMA along with climate-related vulnerability maps, and policy and strategy recommendations to reduce vulnerability to climate change in Rwanda.

2.4.2 Household survey

The tool used is a questionnaire administered at the HH level. It is based on the questionnaire that was used in the first and second assessment, 2015 and 2018. The questionnaire was validated with input from REMA and Stakeholders. A VISA was obtained from NISR to conduct the HH survey.

Household Data Collection and Analysis

Here are the steps taken to collect household data:

Enumerators were selected and trained by ELCG Ltd., with a focus on the survey’s subject matter and the clarity of the questions in Kinyarwanda. Field testing of the questionnaire was carried out - the enumerators used Kobo Collect software on tablets. Training involved REMA staff and the 8 Sector Experts. This was a project deliverable.

Selection of locations to conduct the survey – see Annex C. This information was included in the project Inception Report

Enumerators were deployed to the field and data were collected and transmitted daily to an in-country server. REMA staff monitored the evaluators in the field and was briefed on the pace of data coming in to the central server. Once the data was in, it was cleaned by ELCG’s survey coordinator.

A file of cleaned data was prepared for analysis by the data analyst. This was a project deliverable. The data analyst prepared a template for codification of the data, which laid out how all survey responses were to be transformed into numbers and which responses were to be grouped together and how, particularly the direction of numbers where a variety of responses were permitted choices (e.g., increased or decreased use of infrastructure). The template for codification is available on request.

All codified data was correlated to the household indicators.

2.4.3 Calculation of the Index

This assessment used an ‘index’ approach or methodology that takes data from a national HH survey, links the responses, i.e., the collected data, to the indicators in the framework of household vulnerability and then presents a picture of vulnerability - providing an index for each indicator in each district. The data were analyzed by Exposure, Sensitivity and Adaptive Capacity and rolled up into a national index. The use of the index methodology allows for comparison of the indices within a district and between districts.

The codified data was aligned to the HH vulnerability indicators – i.e., to the various indicators of Exposure (E), Sensitivity (S) and Adaptive Capacity (AC). All data for each indicator were averaged into one index for that indicator. This process was replicated until all indicators had an index in each district. These values are all between 0 and 1.0. The index was arranged by E, S and AC indicators. The E and S indicators account for around half of the indicators; the AC indicators account for the other half. More AC indicators strengthened the credibility of the AC index as more information was included. More AC indicators did not affect the ‘weight’, or the emphasis put on them.

Throughout this report these formulae have been used to prepare the index values.

$$\begin{aligned}\text{CCV1 (V1 or Impact)} &= (E+S)/2 \\ \text{CCV2 (or Vulnerability)} &= (\text{CCV1}+AC)/2\end{aligned}$$

Where CCV1 refers to the climate change vulnerability index that considers only the impact based on exposure and sensitivity, and CCV2 refers to the overall climate change vulnerability index. IAC refers to the inverted adaptive capacity index, which sometimes refers to ‘inability to adapt’.

Once the values for each indicator were prepared, an average was calculated for the values under S, then E, then AC indicators to prepare an index for each district under these same headings.

Simple averages were used in the calculations. The complicated process involved in assigning weights to any of the variables was not carried out in this assignment, i.e., there is no weighting of indicators in the index calculation. The calculation of the index was done simply to provide a basis for comparing the relative situations of the provinces and of the districts. In preparing the codification of data for analysis, the same approach was taken in 2025 as was taken in 2018. The process started with qualitative variables from the household survey, which were transformed into numerical figures. However, they did not become quantitative variables per se.

It is imperative to remember that the lower an index value the better it is. A lower index is good.

- A low index value for Exposure is better than a higher index value.
- A low index value for Sensitivity is better than a higher index value.
- A low index value for inverted Adaptive Capacity is better than a higher index value – with a low inverted value signalling high adaptive capacity.
- And a low index value for Total Vulnerability is good.

The following chart provides the number of vulnerability indicators for E, S and AC.

Sectors	Number of Indicators of Household Vulnerability		
	Exposure	Sensitivity	Adaptive Capacity
Human Settlements	1	1	1
Health	2	1	1
Agriculture and Livestock	-	3	4
Energy	-	1	3
Socio-Economic/ Livelihoods	-	2	7
Water	3	-	2
Forests	-	1	1
Transportation Infrastructure	-	1	1
Cross Cutting Considerations			
Meteorology and Disaster Management	3	1	1
Demographic	-	1	-
s/t = 42	9	12	21

Table 1 - Number of Indicators of Household Vulnerability by Sector

2.4.4 Preparation of vulnerability maps

The preparation of vulnerability maps is a key output of the CCVIA. It is the visualization of the distribution of vulnerability. In this report, 5 maps are provided: a Map of Total Vulnerability or Vulnerability-2, a map of Exposure, a map of Sensitivity, and a map of Adaptive Capacity. The fifth map combines E and S, illustrating Impact (also called Vulnerability1). Each of the maps shows all the districts and provides a legend that shows the index values grouped into bands with colour designations. On each map the colour assigned to a district is the same colour of its index value in the legend.

The maps are presented in Section 4.2.

3. Rwanda's Key Achievements and Ongoing Initiatives to Strengthen Resilience

Key Climate Change Resilience Achievement across Different Sectors

To enhance community livelihoods while strengthening resilience to the impacts of climate change, Rwanda has implemented a diverse range of initiatives across key sectors. These efforts aim not only to improve economic well-being and food security but also to promote sustainable natural resource management, climate-smart agriculture, renewable energy adoption, and ecosystem restoration. A detailed situation analysis has been conducted for each sector, outlining the most recent policies and strategies, identifying existing policy gaps and barriers, and assessing the progress of Ministries and Agencies particularly in alignment with NST2 in advancing climate adaptation and resilience. The analysis also highlights relevant programs and projects, district-level priorities, current monitoring and evaluation capacities based on available systems, and existing interdepartmental coordination mechanisms. Furthermore, it identifies key opportunities, challenges, and institutional gaps, while capturing lessons learned and best practices. The report concludes with actionable recommendations aimed at strengthening policy coherence, enhancing institutional capacity, and ensuring the long-term sustainability of Rwanda's climate resilience efforts.

The sections below summarize the key achievements and ongoing projects related to climate change resilience in various sectors.

3.1. Key Socio-economic achievements

Rwanda has achieved remarkable socio-economic progress in recent years, with significant strides in poverty reduction, education, infrastructure, and governance all of which contribute to the country's growing resilience to climate change. In 2024, for example, the national poverty rate declined to 27.4%, though rural areas still experienced higher rates (31.6%) compared to urban areas (16.7%), reflecting the heightened vulnerability of agriculture-dependent rural communities to climate shocks such as droughts and floods. The government's strong investment in social protection, particularly through the Vision 2020 Umurenge Program (VUP), has expanded coverage to 92% of eligible households, with women making up 54% of beneficiaries.¹ Climate-sensitive public works, cash transfers, and agricultural insurance schemes further support household resilience to climate-related risks.

Rwanda's Ejo Heza Program promotes long-term savings for vulnerable populations, fostering financial independence and resilience by enabling investments in retirement, healthcare, and climate-resilient livelihoods. The Subsidized Agriculture Insurance Scheme supports farmers by covering 40% of premiums, helping them recover from climate-related losses and adopt sustainable farming practices. Improved access to finance, especially for women empowers households to invest in drought-resistant crops, water-saving irrigation, and resilient infrastructure. Despite sectoral loan fluctuations in 2022, there was a shift toward long-term investments, particularly in agriculture and forestry. Together, these initiatives enhance household stability, economic growth, and adaptation to climate change.

¹ LODA Annual Activity Report, 2023.

For education, in 2024, 92% of the population had attended school, an improvement from 87% in 2017. Urban attendance rates (95.4%) were higher than rural (90.5%), while Kigali led with 96.7%. Secondary school enrolment, with a gender parity index of 1.31, shows that girls are now more likely than boys to attend, an important shift for inclusive climate resilience.²

Note that the government initiatives under NST-1 have expanded the number of classrooms by over 27,000 and increased technical and vocational schools from 200 to 396, supported by school feeding programs and improved teacher welfare. Such initiative is critical for building human capital for a changing climate.³

Housing and infrastructure improvements are further enhancing resilience. As of 2024, 67.9% of households live in planned Umudugudu settlements that enable efficient service delivery and emergency response, especially in rural areas. The shares of homes with modern roofing rose from 67% in 2017 to 76%, and 40% now have durable flooring. Access to improved sanitation reached 94%, and electricity access more than doubled to 72%, with 22% powered by solar energy a key step toward sustainable development. Mobile connectivity also expanded, with 88% of households owning a cellphone, facilitating access to early warning systems and climate information.⁴

Labour force participation increased to 59.3% in 2023 (up from 53.4% in 2017), and the workforce grew to 3.96 million, strengthening economic resilience. Rwanda's GDP grew by an average of 7% annually during the NST-1 period, with per capita income rising from \$729 in 2017 to \$1,040 in 2023. Stability, citizen-centered governance, and the expansion of e-governance platforms from 155 online services in 2017 to over 680 have underpinned these gains. Crucially, national strategies (NST1 and NST2) explicitly include climate adaptation targets, and institutions like NISR now integrate climate data (e.g., from Meteo-Rwanda) into socio-economic planning.⁵

Rwanda has also initiated the climate tagging in Rwanda which is a vital tool designed to track and promote the integration of climate considerations into national policies, programs, and investments. This approach enables the government and financial institutions to identify, monitor, and evaluate projects based on their contribution to climate change mitigation and adaptation. By tagging investments and projects according to their climate impact, Rwanda can ensure that resources are allocated to initiatives that help reduce greenhouse gas emissions, enhance climate resilience, and support sustainable development. Climate tagging also strengthens transparency and accountability in the financing of climate-related initiatives, helping Rwanda meet its climate targets under the Paris Agreement and its own national climate strategy. This system provides crucial data that guides decision-making, allowing for better planning and more effective implementation of climate policies and actions across various sectors.

² National Strategy for Transformation (NST2), 2024-2029, MINECOFIN

³ NST-1, MINECOFIN

⁴ EICV-7, NISR, 2024

⁵ National Strategy for Transformation (NST2), 2024-2029, MINECOFIN

A Success Story: EjoHeza: A Path to Financial Security for Every Rwandan

For millions of informal and low-income workers in Rwanda, saving for the future once felt out of reach. But in 2017, the launch of EjoHeza, a groundbreaking long-term savings and pension scheme, began to change that reality. Designed and managed by the Rwanda Social Security Board (RSSB), EjoHeza provides every Rwandan citizen the equal right and opportunity to accumulate micro-savings in a secure, well-regulated environment regardless of income level, formal employment status, or financial literacy.

What sets EjoHeza apart is its smart, inclusive design. It leverages Rwanda's robust digital financial infrastructure, making savings accessible through mobile phones and local agents even for people with irregular incomes or limited exposure to formal banking. Built on hard-won lessons from two decades of expanding community-based health insurance, EjoHeza has successfully bridged the gap between formal financial systems and underserved populations.

The results are significant. By May 2023, over 3.2 million Rwandans had subscribed, including 2.6 million active savers, 87% of whom come from the informal sector. Nearly half of the participants are women, signaling real progress toward gender equity in financial inclusion. For its innovation and impact, EjoHeza received international recognition, including a Merit Certificate from the International Social Security Association (ISSA).

EjoHeza is more than a savings program it is acting as a transformative force in Rwanda's journey toward inclusive, long-term social protection. It empowers individuals to take charge of their financial futures and shows that with the right tools and vision even the most vulnerable of people can build lasting security.

3.2 Summary of Rwanda's achievements and key ongoing projects related to resilience in the Water Resources sector

3.2.1 Summary of key achievements

Rwanda has made significant progress in strengthening its water infrastructure to ensure clean water access, improve agricultural productivity, and build resilience to climate change. These investments have focused on the construction of dams, irrigation systems, and treatment plants, alongside the promotion of climate-resilient practices such as rainwater harvesting and water conservation, especially through catchment restoration initiatives. These efforts are primarily led by the Rwanda Water Resources Board (RWB) and align with national goals to enhance livelihoods, create green jobs, and mitigate climate risks.

A key area of progress has been the integrated use of both surface and groundwater resources. Groundwater aquifers, especially in the western and central regions, have become vital sources of water for domestic use and agriculture, significantly reducing the burden of water collection and improving water availability for livestock. Although maintenance and functionality challenges remain, the expansion of the borehole network has had a transformative impact in rural areas.

According to the RWB's Water Storage Status Report, 2022/2023, Rwanda's total surface water storage is estimated at 225.25 billion cubic meters, with 99.96% stored naturally in lakes and wetlands. Artificial storage remains limited at 0.04%, but recent investments are increasing the artificial storage capacity. Major multi-purpose dam projects such as Nyabarongo II, Muvumba, and Warufu have been launched to deliver irrigation, flood control, hydropower, and domestic

water supply. These projects mark critical progress in building climate resilience and supporting the country’s green growth ambitions.

Complementing large-scale infrastructure, Rwanda has actively promoted small-scale water storage solutions in drought-prone areas. Thousands of plastic-lined underground ponds have been constructed in Eastern and Southern provinces to capture stormwater, with capacities ranging from 120 to 480 cubic meters. These ponds enable farmers to irrigate crops using gravity-fed or solar-powered systems, reducing reliance on unpredictable rainfall and boosting local food security.

Valley dams have also been developed in livestock-reliant districts such as Nyagatare, Kayonza, and Gatsibo, ensuring a steady water supply during dry seasons. Rehabilitation measures like clay lining are being implemented to enhance their effectiveness. With 42 dams in Nyagatare, 28 in Kayonza, and 12 in Gatsibo, dam building efforts have significantly improved livestock health and supported pastoral livelihoods.

In water and sanitation, Rwanda has established a strategic plan for 2024-2029, aligned with Vision 2050, which aims to improve living standards, infrastructure, and prosperity. The plan focuses on achieving 100% access to improved water sources and sanitation by 2029, increasing rural access within 500 meters from 47% to 100%, and urban access within 200 meters from 61% to 100%.

From 2019 to 2024, drinking water production steadily increased from 52.3 million to an estimated 78.3 million cubic meters. Major contributors include treatment centres like Kimisigara and Gihira, the latter experiencing a sharp rise to over 24 million cubic meters in 2023-2024. Other centres such as Nzove and Mutobo also showed consistent growth.⁶

Access to improved drinking water, nationally, rose from 85% to 87%, with urban access at 96% and rural access at 85%. Around 27% of households are within a 0–4-minute walk to water, and 61% within 0-14 minutes. Improved sanitation coverage increased from 83% to 86% across all income groups.⁷

The country invests in disaster management, and hydrological data systems such as early warning systems to ensure sustainable water use, flood effects reduction and informed decision-making.

3.2.2 Key ongoing / in pipeline projects

Project title	Brief description of the project
Community Resilience and Catchment Restoration Projects	
Green Amayaga Project	A \$32.7 million initiative aiming to restore 263,000 hectares in Southern Rwanda, with benefits for over 1.3 million people through biodiversity conservation, watershed rehabilitation, agroforestry and green job creation. It will see 1.4 million trees planted and reduce CO ₂ emissions by 13 million tons over 20 years.
Volcano Communities Resilient Project (VCRP)	Targets 113,000 hectares in the Mukungwa catchment to mitigate flood risks, improve watershed management, and enhance community livelihoods.
Upper Nyabarongo Catchment Restoration Project	Covers 3,348 km ² with interventions such as afforestation, agroforestry, and river buffer zones to reduce siltation and support agriculture.

⁶ EICV-7, NISR, 2024
⁷ EICV-7, NISR, 2024

Kigali Wetlands Restoration Project	Part of the Rwanda Urban Development Project Phase II, it aims to restore 500 hectares of wetlands in Kigali, benefiting over 220,000 people and improving flood control and water resource management.
Sebeya Catchment Restoration Project	Active since 2019 in Western Rwanda, this project restores degraded land, builds flood control structures, and supports over 6,000 people through agricultural inputs and village savings groups.
Suspension Bridges Construction	More than 24 suspension bridges have been constructed in remote areas to ensure access to essential services during the rainy season, especially for health, education, and markets.
Dams and Multipurpose Water Projects	
Nyabarongo II Hydropower Plant	A 59-meter-high dam generating 43.5 MW of electricity and irrigating 20,000 hectares, playing a key role in Rwanda's energy and agriculture sectors.
Muvumba Multipurpose Dam	Located in Nyagatare District, this 39-meter dam stores 54.77 million m ³ of water for irrigation, domestic supply, and 1,000 KW of hydropower generation.
Akanyaru Multipurpose Dam	A 52-meter-high transboundary dam with Burundi. It will provide water to 600,000 people, irrigate 12,474 hectares, and generate 14.5 MW of electricity.
Warufu and Bakokwe Dams	Warufu supports irrigation and domestic water supply in Gatsibo District, while Bakokwe facilitates the Kagaga Water Supply System in central Rwanda.
Urban and Regional Water Supply Projects	
Sake Water Supply System (Phases I & II)	Serving Ngoma District and parts of Kigali, the project will deliver 33,000 m ³ /day through an extensive pipeline system.
Kivu Belt Water Supply System	Targets Karongi and Rutsiro Districts, aims to ensure equitable, reliable, and sustainable water access in Western Rwanda.
Nyaruguru-Huye-Gisagara Water System	Covers 26 sectors across Southern Rwanda to improve water access and address regional water scarcity.
Nzove-Ntora Pipeline Reinforcement	Launched in 2024, this 9.3 km pipeline increases daily water delivery to Kigali to 53,000 m ³ , addressing urban water needs.
Kigali Mobile Water Delivery Service	WASAC's mobile tank system delivers 10,000 liters of water to 26 critical sites across Kigali during infrastructure upgrades.

3.2.3 Key challenges of water sectors

Rwanda's water and sanitation sector has advanced but faces major challenges threatening sustainability. Climate change, weather variability, and environmental degradation harm water resources and infrastructure. Limited technical capacity and financial constraints, especially in rural areas, hinder WASH program delivery and maintenance. Rapid urbanization and population growth increase water demand, stressing systems further. Additional issues include soil erosion, floods, droughts, and poor stormwater management. Inadequate data on water use complicates planning, while financial and technical gaps limit infrastructure development and management.

3.3 Summary of Rwanda's achievements and key ongoing projects related to resilience in the Agriculture and Livestock sector

3.3.1 Summary of key achievements

Rwanda's vision is to become an upper-middle-income country by 2035 and a high-income country by 2050, with agriculture playing a pivotal role in the socio-economic transformation. The focus on professionalizing farmers and commercializing value chains underscores the importance of modernizing the agriculture sector for sustainable economic growth where agriculture will become more productive.⁸

The agricultural sector remains a crucial catalyst for the country's comprehensive development, its socio-economic progression, and its stability. It employs 69.1% of the working population and contributes about 27% to the National GDP.⁹

The implementation of Vision 2050 is done through medium-term development strategies starting from NST1 (2016/17-2023/24). NST1 provided strategic interventions for achieving Vision 2050. Below is a summary of the progress made in the agriculture sector under NST1.

The table below shows the achievement rates of the agriculture sector with regard to climate change interventions with 71.3% for ha of irrigation developed (72,913 ha achieved vs target of 102,284 ha); 82% of land consolidation (ha) (804,400 ha consolidated vs target of 980,000 ha); 47% farm operations mechanized (47% vs target of 50%); 99.9% and 102.4% of radical terraces built (142,318.7 ha vs target of 142,500 ha) and progressive terraces built (1,031,283 ha vs target of 1,007,624 ha for land placed under erosion control, respectively.

In terms of the quantity of fertilizer applied (kg/ha/annum), the agriculture sector achieved 96% (72kg) against the target of 75kg.

Regarding metric tons of strategic reserves, the agriculture sector has registered very low achievement rates equivalent to 10.4% for beans (7,281 mt vs target of 69,917 mt) and 21% for maize (29,510 mt against target of 140,980 mt). Moving forward into NST2, the agriculture sector should pay more attention to overcoming barriers and achieve increases in metric tons of strategic reserves stored.

The sector of agriculture, regarding credit acquisition, has registered an achievement rate of 57.7% (6% against the target of 10.4%).

A good achievement rate of 116.4% was registered (87.3% against the target of 75%) for large-scale farmers (LSF) using quality seeds on consolidated sites. The problem remains with small-scale farmers (SSF) where data is missing on the use of quality seeds on consolidated sites.

Indicators	Baselines 2016/17	Target 2023/24	Achievements by 2023/24	Achievement rate
Ha of irrigation developed	48,508	102,284	72,913	71.3%
Area of consolidated land (ha)	635,603	980,000	804,400	82%
Percentage of farm operations mechanized	25%	50%	47%	47%

⁸ MINECOFIN, Vision 2050

⁹ MINAGRI (2024), Annual Report 2023/24

Area (ha) of land under erosion control	Radical terraces: 110,905	142,500	142,318.7	99.9%
	Progressive Terraces: 923,604	1,007,624	1,031,282.8	102.4%
Quantity of fertilizer applied (kg/ha/annum)	32	75	72	96%
MT of strategic reserves stored	Maize: 123,000	140,980	29,510	21%
	Beans: 61,814	69,917	7,281	10.4%
Credit to agriculture sector	5.20%	10.4%	6%	57.7%
Percentage of farmers using quality seeds on consolidated sites	LSF: 52	75	87.3	116.4%
	SSF: 4.8		38.4	-

Table 2 Summarized achievements in Agriculture and Livestock against NST1 Targets

Source: MINAGRI (2024), MINAGRI Annual Report 2023/24

3.3.2 Key ongoing / in pipeline projects

Project name	Project brief description
Agricultural Insurance Project (AIP) also known as the National Agriculture Insurance Scheme (NAIS)	MINAGRI launched the National Agriculture Insurance Scheme (NAIS) in April 2019 under the title 'Tekana Urishingiwe Muhinzi Mworozu' ('Smallholder farmer, feel safe, you are insured') with a total budget of Bn RWF 7.1 from 2019 to date. ¹⁰ By working with Rwanda's premier private insurance companies, NAIS is developing financially viable insurance products coupled with a 40% subsidy from MINAGRI to manage risks and losses in crops and livestock. ¹¹
National Strategic Grain Reserve System (NSGR)	Rwanda has set up the NSGR to respond to food shortages during emergencies, including droughts, disasters and epidemics. With a total budget of Bn RWF 43.9 from fiscal year 2023/24 to date, ¹² NSGR's reserves were projected to be 49,500 metric tonnes of maize and 18,600 metric tonnes of beans by 2024, according to the 4th Strategic Plan for Agriculture Transformation (PSTA4). However, the reserve is far from full capacity. PSTA5 indicates maize reserves for 2024/25 are at 16.5 MT and bean reserves are 11.2 MT.
Buffet Project (Nasho Irrigation)	Funded by the Howard G. Buffett Foundation, this project, worth USD 54 million or Bn RWF 55.2 from 2020 to date, was established to improve on-farm productivity by providing 3.3 MW of electricity (and 2.4 MW of battery storage) to pump water for irrigation, reducing the burden on 2100 farmers and strengthening or widening rural roads for the installation of irrigation systems and the transportation of agricultural inputs and produce.
Smart Agriculture Information System (SAIS)	With a total budget of Bn RWF 5.3 from 2018 to date, SAIS aims to modernize the agricultural sector. The Smart Nkunganire System (SNS) and the Rwanda Digital Soil Information System leverage digital technologies to improve access to agricultural inputs, enhance agronomic practices, and promote data-driven decision-making among farmers.
Crop Intensification Project (CIP)	The CIP has had a total budget of Bn RWF 178.9 since its launch in 2007. This national initiative has boosted agricultural productivity and food security by increasing yields of 6 priority crops - maize, wheat, rice, Irish potato, beans, and cassava - through land consolidation, improved inputs, extension services, and better post-harvest handling. While CIP has shown positive impacts on farm yields and incomes, it also faces challenges related to sustainability and environmental impact.

¹⁰ Key Informant Interview at MINAGRI, January 29, 2025. (see Agriculture Sector Situation Report, ELCG Ltd., 2025)

¹¹ <https://www.minagri.gov.rw>

¹² Key Informant Interview at MINAGRI.

Government-funded Modern Irrigation (GFI)	The Government-funded Irrigation (GFI), with a budget of Bn RWF 50.0 since its launch in 2010, aims to increase agricultural productivity and reduce poverty by providing modern irrigation infrastructure to farmers, particularly in marshland areas. The Giseke Irrigation Project is supported by a Chinese concessional loan, and the Nyagatare and Kirehe GFI projects are examples of large-scale irrigation projects. The government also provides subsidized small-scale irrigation facilities to individual farmers, cooperatives, and groups of farmers. Local economies are supported through commercialization of agricultural production.
Export Targeted Modern Irrigation (ETI)	ETI is developing an irrigation system in Kirehe District (Mpanga, Mahama 1 and Mahama 2 irrigation schemes) and Mechanization Centre of Excellence, funded from 2015 to 2022 through a Bn RWF 99.3 loan from Exim Bank of India.
Small Scale Irrigation Technology (SSIT)	Rwanda's Small-Scale Irrigation Technology (SSIT) program, with a budget of Bn RWF 4.7 from its launch in 2015 to date, aims to support smallholder farmers to overcome financial and knowledge-related constraints associated with small-scale irrigation. It aims to develop 25,000 ha of irrigated land by 2024. It provides a partial subsidy (75% for solar-powered systems and 50% for other systems) for smallholder farmers to acquire irrigation kits (water distribution technologies). The idea is that subsidized access to affordable irrigation technologies will alleviate the impacts of climate change-induced droughts and increase agricultural productivity. During 2023/24, 1,327.6 ha were irrigated through SSIT.
Aquaculture and Fisheries Development	The Rwandan government is actively promoting aquaculture and fisheries development, with a budget of Bn RWF 5.8 for FY 2023/24, funded by Enabel (Belgium), Government of Luxembourg, and European Union. Rwanda aims to significantly increase fish production, shifting from subsistence farming to commercial aquaculture while improving food security and nutrition. In 2022-2024, Rwanda's aquaculture and fisheries sector saw increased fish production to 48,133 tonnes in 2024, though the ambitious target of 112,000 metric tonnes by 2024 (from a baseline of 26,730 MT) wasn't met. While the sector is shifting towards commercialization, challenges like limited access to quality feed and fingerlings, and the need for improved skills development persist. The government is actively working to address these issues through research, infrastructure development, and promoting private sector investment.
One Cow per Family	Rwanda's Girinka or "One Cow per Family" program is a government initiative, with a total budget of Bn RWF 39.7 since its launch in 2006. It aims to address poverty and malnutrition through livelihood improvements by providing dairy cows to poor families. Recipients are required to pass on the first female calf (heifer) to another poor family, multiplying the program's impact.
Rwanda Agriculture and Animal Resources Development Board (RAB) Competitive Research Project (CRP)	RAB's CRP, with a total budget of Bn RWF 15.3 from 2024 to 2029, includes initiatives that aim to enhance agricultural productivity, market access, and food security through research and innovation. Initiatives often involve international collaborations and aim to address challenges like climate change, pests, and diseases. E.g.: - Rwanda Agricultural Biotechnology Program, supported by the Gates Foundation and others, supports the use biotechnology to increase yields and reduce crop losses, reducing reliance on imports. - DeSIRA Land, Soil and Crop Information Services, funded by the EU's DeSIRA program, aims to develop a soil/crop information system to support climate-smart agriculture.

Sustainable Agriculture Intensification and Food Security Project (SAIP), implemented by Rwanda Agriculture and Animal Resources Development Board (RAB)	SAIP is a RAB initiative, funded by the World Bank with a total budget of Bn RWF 26.5 from 2019-2024. It has seen increased agricultural production and diversification and enhanced nutrition and food security by strengthening farmer organizations, promoting value addition, improving irrigation and water use efficiency, and enhancing market linkages for selected value chains. SAIP operates in eight districts covering four provinces: Rulindo (North), Rwamagana, Kayonza and Gatsibo (East), Rutsiro and Nyabihu (West) and Nyanza (South). SAIP-Phase 2 (SAIP II) aims to benefit smallholder farmers, Water Users Associations (WUAs), Self-Help Groups (SHGs), cooperatives, agro-SMEs, and over 65,000 households—with 42% expected to be women—through nutrition-sensitive agriculture and value chain support. It focuses on these key crops: vegetables, fruits, maize, Irish potatoes, and beans and aims to enhance domestic and international market access. ¹³
Kayonza Irrigation and Integrated Watershed Management Project (KIWMP) phase 1 and 2, implemented by Rwanda Agriculture and Animal Resources Development Board (RAB)	Kayonza Irrigation and Integrated Watershed Management Project (KIWMP) Phase I sought to contribute to poverty reduction in drought-prone Eastern Province. The objective was to sustainably improve the food security and income of 50,000 rural households and boost their climate resilience. ¹⁴ The project targeted poor and food insecure rural households with measures targeting the poorest people, and women and youth. According to the RAB, ¹⁵ the first phase of KIWMP has been implemented from June 2019 to end of 2023 at the cost of USD 20.93 million (about Bn Rwf18.7). RAB launched KIWMP-Phase 2 in June 2022, in Ndego Sector of Kayonza District to rescue drought-affected residents from hunger and cost USD 59 million, or Bn Rwf 53, over 6 years and is funded by IFAD.
Development of Efficient and Inclusive Markets Systems for Value Chains of Poultry and Pig Industries under Agriculture.	This project, with a total budget of Bn RWF 15.1 from 2019 to 2024, aims to strengthen farmer's capacity, improving infrastructure, and enhancing market linkages. This involves increasing production, improving access to quality inputs like feed and vaccines, ensuring access to finance and insurance, and strengthening coordination among stakeholders including government agencies, private sector actors, and farmers. Specific Initiatives have included.¹⁶ • The Partnership for Resilient and Inclusive Small Livestock Markets (PRISM) project, an IFAD-funded project has focused on strengthening the poultry and pig value chains by empowering rural communities in 15 districts. • The Tropical Agriculture Platform Framework (TAP-AIS) project: This FAO-led project assessed the policy and enabling environment for innovation related to small livestock, mainly poultry and pigs. • The Enabel-PRISM 5 year-project achieved several key milestones in the development of resilient and inclusive small livestock markets. These include the establishment of Outgrower Service Companies (OSCs) to link farmers with markets, increased productivity and profitability in poultry and pig value chains, and the strengthening of farmers' organizations.
Rehabilitation of Bugesera Irrigation Schemes	The rehabilitation of Bugesera Irrigation Schemes aims to enhance agricultural productivity and resilience to climate change impacts in Bugesera District. This involves restoring ecosystems, improving water management, and promoting climate-smart agricultural practices. Key initiatives include solar-powered irrigation systems, hillside irrigation techniques, and improved water harvesting methods. The budget is Bn RWF 0.49.
Commercialization and De-Risking for Agricultural Transformation Project (CDAT)	With a budget of Bn RWF 300 from 2022 to date, CDAT is a World Bank-funded initiative aimed at boosting agricultural productivity and commercialization. Implemented by the Development Bank of Rwanda (BRD), it focuses on increasing the use of irrigation and facilitating access to finance and markets for farmers and agribusinesses. Implemented across Rwanda, it is designed to directly benefit many households, including women and youth. The project focuses on 6 climate sensitive value chains: maize, rice, horticulture, Irish potatoes, cassava, and beans. A key component promotes the use of climate-smart agriculture (CSA) practices and agriculture insurance.

¹³ See: <https://www.rab.gov.rw>

¹⁴ See: <https://www.ifad.org/en/w/projects/2000002229>

¹⁵ See: <https://www.rab.gov.rw/1-1/news-details/rab-launches-kiwmp-phase-2>

¹⁶ See <https://www.agriterra.org>

Rwanda Dairy Development Project, Phase II (RDDP II)	RDDP II will be implemented by RAB over six years (2024–2029) for a total budget of US\$100.37 million, supported by IFAD and Heifer International. It has 2 key components: increasing the productivity and resilience of dairy smallholder production systems; increasing dairy value chain efficiency, supported by policy development, Project Management, Monitoring & Evaluation, and Knowledge Management systems. It will promote the use of digital technologies, increase access to finance, and create a conducive policy environment for the dairy sector while promoting the adoption of climate-smart practices, improving access to feed, water, health, and breeding services, and introducing advanced digital technologies and nature-based solutions. The project aims to support 175,000 rural households–700,000 people, (female-headed households, youth, and vulnerable groups). RDDP-II will be implemented in 27 districts (beyond the City of Kigali) ¹⁷ – the 14 districts where RDDP-I was implemented, and 13 new districts with a) high incidence of poverty, food insecurity, malnutrition; b) high impact of climate change; c) high potential for women and youth to get involved in the dairy value chain; d) high concentration of schools and a high density of school children; and e) potential for dairy value chain development, and markets for dairy products. In the City of Kigali (Gasabo, Kicukiro, and Nyarugenge districts), it will support activities related to milk processing and marketing.
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Positive Results: How Irrigation and Valley Dams are improving the livelihood conditions and resilience to climate change in eastern province of Rwanda

In a powerful response to the challenges of climate change and food insecurity, the Government of Rwanda working closely with development partners and local districts, has prioritized irrigation development as a key strategy to boost agricultural productivity and build climate resilience. By extending irrigation equipment to as many affected areas as possible, including offering subsidies of up to 75% on irrigation machinery, the government has made it easier for farmers to access life-changing technologies although there is still significant investment to be made.

Farmers are also encouraged to consolidate land and work in groups, helping to reduce individual costs and expand access to these critical tools.

One of the most impactful innovations arising from this effort has been the construction of valley dams, designed to harvest and store runoff water in low-rainfall regions. These dams now serve as vital lifelines, supplying water not only for irrigation but also for livestock and domestic use transforming once-vulnerable communities.

In the Murundi Sector of Kayonza District, the results are already profound. Farmers who once faced heartbreaking livestock losses during dry spells now speak of renewal and hope.

“We used to lose cows because of the lack of water. Sometimes we had to walk long distances just to find enough for them”, said one local farmer. “But since the valley dam was built, we no longer worry. Our animals have water, and we can even irrigate our crops throughout the year.”

The story of Murundi is just one example of how strategic investments in water infrastructure and irrigation are empowering farmers, protecting livelihoods, and driving sustainable development across Rwanda’s rural landscapes.

¹⁷ See: <https://www.ifad.org/projects>

3.3.3 Key challenges to Agricultural sector

MINAGRI has identified key gaps and challenges related to climate change that need to be addressed for increasing the level of adaptation or resilience.¹⁸ They include:

- delays in implementation of some programs or projects,
 - inadequate budget for some programs,
 - limited data and information,
 - inadequate climate risk assessment,
 - inadequate capacity building of staff, especially at decentralized level,
 - inadequate extension services,
 - barriers to market access and value chain development,
 - land fragmentation,
 - financial constraints of farmers/beneficiaries, and
 - very low achievements on strategic food reserves.
- In addition, the 2025 CCVIA has identified the following two top challenges for this sector:
- Low access of farmers to irrigation system in the 10 most vulnerable districts, and
 - Low farmer adoption of training provided on resilient farming methods in the same districts.

Insight: Climate Change Threats to Community Livelihoods: The Vulnerability of Agriculture to Climate Impacts

The community of the eastern province of Rwanda have faced the problem of persistent drought since 1990, affecting agricultural and livestock production. Today, 30% of the land in this province is affected by drought. March 2024 Last year Ndutiye Gaspard, a 56 years old farmer from the Gatsibo District, said Ndutiye Gaspard, a 56 years old farmer from the Gatsibo District, quoted that “Our agriculture has been affected by a lot of drought which started before independence war (1989-1990), it threatened our lives and those of our families, now the production has been low, the hope of agriculture to go to the market is nothing, we pray to God that we will have food, but we don’t have any other way to help us than to wait for the rains” .



Maize affected by drought in eastern province

Overall, the climate change has reduced the production of Agriculture and the lack of some foods in the market increased prices in markets of Rwanda. Figures from the National Institute of Statistics (INSR) showed that food costs rose by 13.9% October 2022. November 2022 came out on top in terms of prices for Rwandan households with prices increasing by 21.7%. The first month of 2023 ended with prices at a rate of 20.7% compared to the same month in 2022.

¹⁸ MINAGRI Annual Report 2023/24

3.4 Summary of Rwanda's achievements and key ongoing projects related to resilience in the Health Sector

3.4.1 Summary of achievements

Rwanda has made significant strides in improving health outcomes and is actively integrating climate resilience into its health sector. Achievements include reduced child and maternal mortality, increased health insurance coverage, and expansion of health infrastructure. Ongoing projects focus on building a resilient health workforce, modernizing healthcare infrastructure, and enhancing the quality of primary healthcare services. Rwanda is also prioritizing climate change adaptation and mitigation measures to safeguard public health against climate-sensitive diseases,¹⁹ including a major strategic focus on sustainable land use, water resource management and disaster risk reduction and disaster risk management.

A particular achievement of Rwanda in the health sector is worth highlighting. Rwanda's Community Based Health Insurance (CBHI) scheme, known as Mutuelle de Sante, has achieved significant milestones in improving healthcare access and financial protection for its citizens, including:

- **Increased Health Insurance Coverage:** CBHI has significantly expanded health insurance, reaching 90.4% of the population in 2023,
- **Reduced Out-of-Pocket Spending:** CBHI has contributed to improved health outcomes, including increased access to and utilization of health care services,
- **Improved Health Outcomes:** The scheme has contributed to improved health outcomes, including increased access to and utilization of healthcare services,
- **Reduced Catastrophic Healthcare Spending:** By providing a safety net, CBHI has helped to reduce the catastrophic impact of high health costs, particularly for poorer households,
- **Increased Equity in Healthcare Access:** The CBH scheme has played a role in making healthcare access more equitable across different socioeconomic groups in Rwanda
- **Improved Efficiency:** The scheme has also brought about improvements in the efficiency of healthcare delivery, with faster processing of medical claims and reduced billing discrepancies.

3.4.2 Key ongoing / in pipeline projects

Project title	Brief description of the project
Malaria Prevention	The Ministry of Health (MoH), in collaboration with the Rwanda Biomedical Center (RBC), is implementing various adaptation and resilience programs to combat malaria in vulnerable districts, including Gisagara and Gatsibo. These programs focus on prevention, early diagnosis, prompt treatment, and vector control. RBC and Zipline have introduced drone delivery of malaria medicines, particularly targeting hospitals and health centers in Gisagara, Nyamasheke and Nyagatare districts. This initiative ensures rapid and equitable distribution of medicines, including second-line treatments, to prevent severe malaria shown to be high in these districts. ²⁰
Access to Health Posts	MoH is implementing strategies to improve healthcare access and reduce walking distances to health facilities, specifically to health posts. This includes upgrading existing health posts, adding new health posts, and ensuring access to essential services at health posts. Efforts are also being made to improve transportation for patients, facilitated by the donation of ambulances to local health centres.

¹⁹ Health Sector Strategic Plan V, 2024-2029, MOH

²⁰ Annual Health Sector Performance Review Fiscal year 2024-2025, MOH.

Reducing Stunting

Rwanda is implementing climate adaptation and resilience programs, specifically targeting vulnerable districts, to reduce malnutrition and stunting, particularly among children under 5. These programs focus on food security, water access, and improved agricultural practices, while also promoting social and behavioral change. With World Bank support, MOH implemented the Stunting Prevention and Reduction Project (SPRP) to tackle stunting and chronic malnutrition with an enhanced package of multi-sectoral interventions. This has resulted in a significant uptake in growth monitoring, micronutrient supplementation, expanded access to early childhood development services, and reforms to community-based delivery platforms.²¹

3.4.3 Key challenges in the health sector

- **Insufficient Funding:** Climate change adaptation and resilience measures in health often require significant resources for infrastructure improvements, research and training. Securing consistent funding for these initiatives is a major hurdle, especially in resource-constrained times and with multiple priorities.
- **Inadequate Workforce Capacity:** Healthcare professionals need specialized training on climate change impacts, disaster preparedness, and implementing adaptation strategies. Addressing workforce capacity gaps through training and capacity-building programs is essential and has been identified as a constraint by MoH.²²
- **Lack of Data and Research:** Accurate data on climate-related health risks and the effectiveness of adaptation intervention is crucial. Investing in research and data collection is necessary to inform decision-making and track progress, and MoH has been exploring the integration of climate change health data monitoring into its current health programs monitoring systems.²³
- **Limited Stakeholder Engagement:** Effective climate adaptation in the health sector requires collaboration among various stakeholders, including government agencies, community organizations, and health care providers. Engaging these stakeholders in planning and implementation is crucial for success in integrating climate change adaptation into the health sector and is needed as part of the review of the current health strategy implementation.
- **Challenges in Aligning Climate Policies with Health Outcomes:** Climate policies and health interventions, outputs and the relevant strategic outcomes of the National Health Policy (MOH, 2015) need to be integrated effectively to maximize their impact. Bridging the gap between these 2 sectors is crucial for achieving holistic climate resilience. So far, the integration is still a vision that needs to be actualized.

²¹ Health Sector – National Situation Analysis Report (2024), MOH

²² National Strategy for Health Professions Development, 2020-2030, MOH

²³ Health Sector – National Situation Analysis Report (2024), MOH

Success Story: Community Health Workers drive Rwanda's Malaria Reduction

Rwanda has made remarkable progress in reducing malaria, largely due to the dedication of Community Health Workers (CHWs) and strong government leadership. In 2023, CHWs diagnosed and treated 60% of all reported malaria cases, highlighting their essential role in frontline healthcare. They also support key prevention efforts, including needs assessments, distribution, and Indoor Residual Spraying (IRS).



Figure: Rwanda Community-based management of malaria.

This community-driven approach is bolstered by the National Malaria Strategic Plan 2020–2024, which provides a coordinated framework for malaria control. As a result, Rwanda has achieved significant milestones. According to the Rwanda Biomedical Center (RBC) Malaria Annual Report 2022/23, malaria incidence fell sharply from 409 cases per 1,000 people in 2016/17 to just 47 per 1,000 in 2022/23. Overall malaria cases dropped from nearly 5 million to 600,000, while malaria-related deaths declined by over 89%.

The World Health Organization's World Malaria Report 2023 recognized Rwanda as one of 5 African countries making outstanding progress toward meeting the Global Technical Strategy (GTS) 2025 targets. These achievements are especially significant in malaria “hot zones” where mosquito breeding is worsened by climate factors. Rwanda's success showcases the power of community health engagement and climate-aware policy in disease control.

3.5 Summary of Rwanda's achievements and key ongoing projects related to resilience in the Forest sector.

3.5.1 Summary of Rwanda's achievements

Rwanda has made significant progress in forest conservation, restoration, and sustainable management over the past two decades to address climate change impacts. One of the most notable milestones was achieving 30.4% forest cover by 2019 (MoE, 2019),²⁴ surpassing the national target set in Vision 2020, which aimed for 30% forest cover. This represents a remarkable increase from around 10% forest cover in the 1990s and 18% in 2010, demonstrating Rwanda's commitment to reversing deforestation and land degradation.

Through initiatives such as the Forest Landscape Restoration (FLR) and community-based agroforestry, Rwanda has restored over 900,000 hectares of degraded land since 2011, contributing significantly to the Bonn Challenge pledge and the African Forest Landscape Restoration Initiative (AFR100), where Rwanda pledged to restore 2 million hectares of degraded landscape by 2030 (IUCN & WRI, 2021).²⁵

Rwanda Forest governance has garnered international acclaim, notably through its National Forestry Policy, which was honored with the 2011 Future Policy Award for its innovative and inspiring approach (WFC, 2011).²⁶ This policy, initiated in 2004 and updated in 2010 and 2018, aims to make forestry a cornerstone of the economy while ensuring ecological balance and sustainable benefits. In 2024, Rwanda revised and published its Forest Law to regulate the country's forest sector. The establishment of forest governing institutions included the National Forestry Authority (NAFA) in 2008, which was subsequently moved to the Rwanda Natural Resources Authority in 2011, later becoming part of the Rwanda Water and Forestry Authority in 2017, and which has operated since 2021 as the Rwanda Forestry Authority (RFA). These governance structures have been central in coordinating national forest management.

Rwanda's commitment to expanding and sustainably managing its forests has been evident in several key projects. Past projects that significantly and successfully contributed to improving Rwanda's forest cover and building resilience to climate change include, but not limited to, Project d'Appui à la Reforestation (PAREF), Project d'Appui à l'Aménagement des Forêts au Rwanda (PAFOR), Sustainable Woodland Management and Natural Forest Restoration Project (PGReF), the Landscape Approach to Forest Restoration and Conservation (LAFREC), and the LCDF Project, entitled 'Building resilience of communities living in degraded forests, savannahs and wetlands through an Ecosystem-based Adaptation (EbA) approach'.

Recently, key successful projects include the Green Gicumbi Project launched in 2019, focusing on climate resilience through watershed protection, sustainable agriculture, and forest management, which restored over 1,700 hectares of degraded private and public forests and distributed nearly 20,000 clean cookstoves all aimed at reducing deforestation. The Green Amayaga project contributed to forest landscape restoration in the Amayaga region (Gisagara, Kamonyi, Nyanza, and Ruhango districts), where about 16,000 ha were restored via forest woodlots, agroforestry, and protective forestry.²⁷ The establishment of Gishwati-Mukura National Park in 2015 marked a vital step in protecting ancient rainforests and endangered species like chimpanzees. Community-led initiatives have been instrumental in reforestation efforts, leading to a 67% increase in the size of Gishwati Forest and a resurgence of native wildlife.

²⁴ Ministry of Environment (2019). Rwanda Forest Cover Mapping Report. https://www.environment.gov.rw/fileadmin/user_upload/Moe/Publications/Reports/Forest_cover_report_2019.pdf

²⁵ IUCN & WRI (2021). Bonn Challenge progress tracker: Rwanda country report. International Union for Conservation of Nature.

²⁶ World Future Council, FAO, & UNCCD. (2011). Forests for people: The 2011 Future Policy Award. Hamburg: World Future Council. <https://www.futurepolicy.org/future-policy-award/2011-forests-for-people/>

²⁷ Rwanda Environment Management Authority (REMA). (2022). Green Amayaga Project overview. <https://rema.gov.rw/projects/green-amayaga-project>

Rwanda has also promoted the management of private forests through establishment of Private Forests Management Units (PFMUs), an approach that enhances the sustainable management of private forests by grouping smallholder forest owners in cooperatives. Also, public-private partnerships were promoted for sustainable management of state forests, where about 60% of state forests are managed under concession and co-management agreements.

Community engagement has been central to Rwanda's forestry success. The annual Forest Planting campaign has led to the planting of millions of trees, with 36 million planted in 2022 alone, focusing on native species to restore landscapes and promote biodiversity. Additionally, the national tree planting campaigns (since the 2000s) have been central to increasing Rwanda's forest cover. These initiatives underscore Rwanda's holistic approach to forest conservation, integrating environmental stewardship with community development and climate resilience.

3.5.2. Key ongoing / in pipeline projects

Project Name	Brief Project Description
Transforming Eastern Province through Adaptation and Mitigation. 2021-2027	The 6-year project is being implemented in all districts of Eastern Province; it aims to shift forest areas from degraded to resilient landscapes and the people from fragile to sustainable livelihoods - by restoring 60,000 ha of degraded landscapes through afforestation and agroforestry, and dissemination of clean cookstoves to 100,000 households.
Building Resilience of Vulnerable Communities to Climate Variability in Rwanda's Congo Nile Divide through Forest and Landscape Restoration	The Congo–Nile Divide Restoration Project in Rwanda (2024–2029), funded by the Green Climate Fund (GCF), aims to restore and sustainably manage around 250,000 hectares of forest in the Congo–Nile watershed, focused on areas like Nyungwe and Gishwati–Mukura. The project promotes indigenous reforestation, agroforestry, erosion control, and reduced fuelwood dependency. It also aims to enhance climate resilience, protect biodiversity, and directly benefit over 1.2 million people through improved livelihoods and green job creation in Nyamagabe, Karongi, Nyamasheke, Ngororero, Nyabihu, and Rusizi districts. ²⁸
Volcanoes Community Resilience Project (VCRP) 2023-2028	VCRP is a World Bank–funded initiative worth over \$50 million aimed at reducing flood and landslide risks, strengthening watershed management, and boosting community livelihoods in the Volcanoes Region. It combines “grey” infrastructure (like flood defenses and early warning systems) with nature-based solutions (reforestation, erosion control, catchment management), expands Volcanoes National Park, and supports climate-smart agriculture and “smart green villages.” The project also fosters income diversification through green jobs, eco-tourism (e.g., mountain gorillas), and sustainable land management while enhancing biodiversity and reducing human-wildlife conflict. The project will contribute to the ecological restoration of Priority Conservation Areas and the expansion of the Volcano National Park through planting native trees and bamboo on 732.5 hectares.
Forest Investment Program (FIP) 2024-2028	FIP is a 5-year initiative designed to restore 50,000 hectares of degraded agricultural landscape through agroforestry in 8 districts: Gisagara, Huye, Kamonyi, Nyanza, Nyaruguru, Muhanga, Ruhango, and Gakenke.
Building resilience to climate change and sustainable agriculture value chains in agro systems around Mukura Forest and Lake Kivu Catchment Landscape, in Western Province	This 32-year long-term carbon capture project with adaptation co-benefits is being implemented by the ARCO Network and aims to restore 21,000 hectares of degraded land managed by 160,000 smallholder farmers in Rutsiro and Ngororero districts.

²⁸ Green Climate Fund. (2023). Project FP217: Building Resilience of Vulnerable Communities to Climate Variability in Rwanda's Congo–Nile Divide through Forest and Landscape Restoration.

Sustainable Forestry and Efficient Renewable Energy for improved livelihood (SFERE) 2024-2029	The Sustainable Forestry and Efficient Renewable Energy for Improved Livelihood (SFERE) project is a 5-year, EUR12 million initiative funded by the Government of Luxembourg and implemented by LuxDev. This project aims to enhance the resilience of forest landscapes and improve the livelihoods of communities in northwestern Rwanda (Rutsiro and Rubavu districts).
Scaling Urban Nature-based Solutions for Climate Adaptation (SUNCASA)	The SUNCASA project (2024–2026), is a CAD9 million initiative funded by Global Affairs Canada and led by IISD and WRI. Implemented across the Kicukiro, Gasabo, and Nyarugenge districts of Kigali city, it uses gender-responsive nature-based solutions including afforestation, reforestation, agroforestry, and urban tree planting to restore micro-catchments in the lower Nyabarongo watershed, mitigating flood, landslide and soil erosion risks for 975,000 residents.

3.5.3 Key challenges to Forest sector

- **Deforestation and Forest Degradation:** Persistent pressure from agriculture expansion and settlement, particularly in high-risk areas, continues to drive deforestation and land degradation. High dependence on fuelwood for cooking also results in the over-cutting of forests, exacerbating forest degradation.²⁹
- **High Dependence on Biomass Energy:** Rwanda suffers from a strong dependence on the consumption of wood for the manufacture of charcoal. Household fuelwood consumption accounts for 75%, while charcoal is used at 18.8% (NISR, 2025),³⁰ implying an overexploitation of already sparse forests.
- **Forest encroachment:** is a major threat to forests in Rwanda and an environmental challenge that threatens biodiversity, climate resilience, and sustainable land use. As the population grows and land demand increases, forests are converted into farmland and settlements, affecting both protected and community forests.³¹
- **Inadequate Research in the Forest Sector:** Rwanda's forest sector faces critical gaps in research, limiting informed decision-making and climate-resilient forest management. Funding and technical capacity for forest research remain low, with few trained specialists and limited access to modern tools like remote sensing.
- The use of low-quality tree germplasm remains a major problem in the Rwandan forestry sector, affecting the success and sustainability of afforestation and reforestation activities (MINILAF, 2018).³² Many of the planting materials used in tree nurseries and reforestation projects are not sufficiently genetically selected, resulting in low survival rates, slow growth, low resistance to pests and diseases and low adaptability to changing climatic conditions (REMA, 2022).³³ This limits the productivity and ecological resilience of natural and plantation forests. The lack of certified seed sources and inadequate regulation of nursery practices further exacerbate the problem, leading to inconsistent tree quality and a waste of resources in forestry programmes (WB, 2020).³⁴

²⁹ Li, C.; Yang, M.; Li, Z.; Wang, B. How Will Rwandan Land Use/Land Cover Change under High Population Pressure and Changing Climate? *Appl. Sci.* 2021, 11, 5376. <https://doi.org/10.3390/app11125376>

³⁰ NISR (2025). 7th Integrated Household Living Conditions Survey 2023-2024.

³¹ Rukundo, C., et al. (2018). "Impacts of demographic pressure on forest cover in Rwanda, 1990–2010," *Integrated Valuation of Ecosystem Services and Trade-offs model*.

³² Ministry of Lands and Forestry (2018). *National Forestry Policy*.

³³ REMA (2022). *State of Environment and Outlook Report: Forest Resources Section*.

³⁴ World Bank (2020). *Rwanda Country Forest Note*.

Success story: Building Resilience in Rwanda's Agroforestry Through Pest Management



Rwanda's agriculture sector has faced increasing challenges from both native and non-native pests, which threaten the health of valuable indigenous and introduced tree species especially during dry seasons. These pests once posed serious risks to the profitability of agroforestry, reducing the benefits that trees bring to farmers and discouraging tree planting efforts across the country.

Pests such as mealybugs were found damaging species like *Markhamia lutea*, mango, and cassava. *Grevillea robusta* was under threat from canker and termites, while citrus trees were attacked by aphids, and tree tomatoes suffered from whiteflies and potyviruses. Banana plantations, a key agricultural resource for Rwandan families, were particularly hard-hit by a variety of pests and diseases including Banana *Xanthomonas Wilt* (BXW), banana weevils, bunchy top disease, *Fusarium* wilt, and Sigatoka.

Recognizing the urgency of the problem, the Rwanda Agriculture and Animal Resources Development Board (RAB) stepped up with a proactive response. Through the introduction of pest-resistant banana varieties and the rollout of wide-reaching farmer education and training campaigns, RAB empowered farmers to take preventative action and implement more resilient agricultural practices.

The adoption of pest-resistant varieties has significantly reduced the spread and impact of major diseases in banana plantations, while increased awareness and improved management practices have strengthened the health of other key tree species.

3.6 Summary of Rwanda's achievements and key ongoing projects related to resilience in the Energy sector

3.6.1 Summary of Rwanda's achievements

Rwanda has made significant strides in strengthening its energy infrastructure through a comprehensive and integrated approach that emphasizes clean energy development, economic productivity, and climate resilience. This transformation is the result of strategic investments, progressive policy reforms, and strong international partnerships aimed at positioning the energy sector as a cornerstone of the country's sustainable development agenda.

Clean energy access has been at the heart of Rwanda's energy strategy. The government has prioritized increasing electricity access, particularly in rural and remote areas, using renewable energy sources (REG, 2025). Key initiatives such as the National Electrification Plan and targeted collaborations with private sector companies have accelerated the rollout of solar home systems, mini-grids, and clean cooking solutions. These efforts have led to a significant increase in electricity access nationwide, with off-grid solar technologies playing a crucial role in reaching underserved communities. By expanding access to clean energy, Rwanda is not only improving living standards but also reducing its dependence on fossil fuels and biomass, which are major contributors to indoor air pollution and deforestation.

Infrastructure development, especially the construction of dams and power plants, has played a vital role in Rwanda's energy transition. The development of major hydropower facilities like Nyabarongo I has boosted the country's electricity generation capacity and enhanced energy security (MININFRA, 2025). The hydropower projects are part of a broader plan to diversify Rwanda's energy mix and establish a stable, reliable supply. Beyond hydroelectric power, Rwanda has tapped into unique resources such as methane gas from Lake Kivu through projects like KivuWatt, and has also invested in solar energy, notably with the Gigawatt Global solar field - one of East Africa's pioneering utility-scale solar plants (MININFRA, 2025).

Boosting productivity across sectors is a key outcome of improved energy access in Rwanda. In agriculture, electricity enables modern irrigation systems, agro-processing units, and cold storage facilities, helping farmers boost productivity and reduce post-harvest losses. In the industrial and service sectors, reliable energy access is fostering business expansion, job creation, and technological innovation. Enhanced electricity infrastructure is also improving public services, notably in education, health care, and ICT, thereby contributing to inclusive socio-economic development across the country.

Climate resilience and sustainability are deeply embedded in Rwanda's energy policies and practices. The country has committed to low-carbon development by investing in renewable technologies and designing infrastructure that is resilient to climate variability. Hydropower systems, for instance, are developed with careful attention to environmental flow management and sediment control. Guided by the Green Growth and Climate Resilience Strategy, Rwanda ensures its energy investments align with both national priorities and international climate goals. Additionally, grassroots initiatives support the uptake of clean cooking technologies and promote reforestation, helping to cut greenhouse gas emissions and conserve biodiversity.

Key achievements

Project title	Brief description of the project
Electricity Access and Coverage	As of February 2025, the cumulative connectivity rate is 82.2% of Rwandan households, with 57.4% connected to the national grid and 24.8% accessing electricity through off-grid systems (mainly solar). Electricity access across Rwanda's districts is generally high, with several exceeding 90%. Gakenke leads at 99.7%, followed by Muhanga, Nyamasheke, Kicukiro, and Nyarugenge. Most districts, like Gasabo and Rwamagana, fall within the 75%–90% range. However, disparities remain, with Gisagara at just 63.9%, and Gatsibo and Nyabihu also lagging. (REG, 2023) These gaps highlight the need for targeted efforts in underperforming regions. Overall, Rwanda shows strong progress toward national electrification.
Off-Grid Energy Development	The use of off-grid solutions has already reached more than 400,000 households. Off-grid electricity solutions are vital in Rwanda's rural and remote areas. Gakenke leads with 50.3% off-grid access, followed by Nyamagabe, Nyaruguru, and Karongi. Several districts show over 35% reliance on decentralized systems (REG, 2025). In contrast, urban areas like Nyarugenge and Kicukiro have minimal off-grid use due to stronger grid coverage. Two mini-grid solar plants are currently operational in Rwanda: • NESELTECK (Kirehe, 30kW) • RENERG (Nyamasheke, 30kW)
Hydropower Expansion	Over the past decade, Rwanda's hydropower sector has grown significantly, now contributing 39.6% of the 390.04 MW total power generation capacity. This progress is largely due to private sector involvement, especially Independent Power Producers (IPPs). A supportive legal and regulatory framework has encouraged private investment. There are 37 grid-connected hydropower plants producing 109.7 MW, managed by REG/EUCL or private entities. Additionally, 11 off-grid micro hydropower plants are operated by private investors to improve efficiency. Pico hydropower systems (1–10 kW), run by communities or private owners, support rural energy access. Two mini-grid hydropower plants are in operation: ECOS (Muhanga, 11kW); Rushaki (Gicumbi, 40kW). (REG, 2025)
Methane-to-Power Innovation	Utilization of Lake Kivu methane gas for electricity generation. • KivuWatt (26 MW) operational since 2015. • Shema Power Lake Kivu Ltd. currently produces 37.5 MW, with a target of 56 MW. (REG, 2025)
Solar Energy Development	12.08 MW of on-grid solar capacity is installed in the country. SHS subsidies provided via the Renewable Energy Fund (REF) help to increase adoption. (REG, 2025)
Clean Cooking Progress	The Clean Cooking Results-Based Financing (CC-RBF) is operating in partnership with BRD and EDCL. The goal was to reduce reliance on firewood from 79.9% (2017) to 42% (by 2024) (REG, 2025). • Subsidies helped low-income households adopt clean cookstoves and bio-gas digesters. • 500,000 households targeted, including 25% female-headed households. • 20,000 households supported under the Green Gicumbi Project.

Green Investment Initiatives	In partnership with the government of Rwanda, Ireme Invest was established as a one-stop green investment facility. (Ireme Invest, 2025) • It is supported by the Green Climate Fund (GCF). • It promotes private sector investment in clean energy, smart mobility and sustainable urban development
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3.6.2 Key ongoing projects/ in pipeline

Project name	Project brief description
Electricity Distribution	Among the projects aimed at increasing access to electricity country-wide, new distribution lines currently under construction will soon connect around 66,000 households to the grid (REG, 2024). • The Arab Bank for Economic Development in Africa (BADEA) will fund the connection to the grid of around 18,000 households in Nyagatare and Burera Districts. • A World Bank-funded project will provide electricity to more than 13,000 households in the Eastern Province, 10,000 in the Southern Province, 8,000 in the Northern Province and more than 5,700 in the Western Province. • As per REG information, there is another project funded by the African Development Bank (AfDB) that will provide electricity to at least 6,280 households in Ngororero District and at least 4,835 in some Districts of the Northern Province. • In addition to these projects, which are co-funded by the Government of Rwanda and various donors, there are other projects being undertaken that are co-financed by District budgets.
Hydropower Development	• The Regional Rusumo Falls Hydropower plant will generate 80 MW to be shared between Rwanda, Tanzania and Burundi. It is valued at USD \$340 million and was recently completed. • The Rusizi III hydropower plant, a joint project between Rwanda, Burundi and the Democratic Republic of Congo, will generate about 230 MW. • The Nyabarongo II hydropower plant will generate about 43.5 MW by October 2025 at a cost of around USD \$625 million. (REG, 2025)
Methane-to-Power	This project supports the building of a methane gas power plant on Lake Kivu with a capacity to generate 56 MW. It will cost USD \$200 million and is a public-private partnership between Shema Power Lake Kivu Ltd. (SPLK Ltd) and the Government of Rwanda. (REG, 2025)
Clean Cooking Initiatives	• The Clean Cooking Results-Based Financing (CC-RBF) scheme has a target of 500,000 households (25% female-headed). It promotes clean cookstoves and biogas digesters. It is co-financed by the World Bank's Clean Cooking Fund. It is supported under Rwanda's Energy Access and Quality Improvement Project (EAQIP). • The Green Gicumbi Project, a separate project, has already helped nearly 20,000 households with clean cook stoves. (REG, 2025)
Green Investment Initiatives	Ireme Invest in partnership with the Government of Rwanda has established as a one-stop green investment facility, supported by the Green Climate Fund (GCF); Promotes private sector investment in clean energy, Smart mobility and Sustainable urban development. (Ireme Invest, 2025)

3.6.3 Key challenges to energy sector

Rwanda's energy sector faces several critical challenges that hinder its resilience to climate change. A major concern is the country's heavy reliance on hydropower, which is highly sensitive to climate variability such as erratic rainfall, droughts, and flooding - conditions that disrupt electricity generation. This vulnerability is worsened by environmental degradation, including deforestation and catchment damage, which lead to sedimentation that clogs turbines and reduces efficiency. Although Rwanda is gradually investing in solar and methane gas, its energy mix remains insufficiently diversified, leaving the system exposed during hydropower shortfalls. Many energy infrastructures were not

built with climate resilience in mind and are susceptible to flood damage, landslides, and extreme temperatures. Additionally, high upfront costs for resilient technologies and a heavy dependence on external financing constraints progress. Weak integration of climate risk into planning, combined with limited climate data and early warning systems, further reduces the sector's capacity to adapt. Off-grid systems, while expanding energy access, often lack protection from extreme weather and suffer from inadequate maintenance, undermining their reliability in the face of climate threats.

A Success Story: Expanding Access to Energy-Saving Cookstoves through Distribution and Local Manufacturing Innovation

As part of its bold commitment to climate change mitigation and sustainable development, Rwanda is taking ambitious strides to reduce firewood consumption and promote clean energy solutions. One of the most impactful areas of intervention has been the widespread promotion of energy-efficient cookstoves, which are transforming lives at the household level particularly for women and youth.

Through projects like “Empowerment of Women and Youth for Climate Change Resilience and Environmental Protection,” implemented by Generations Organization (SGO) with support from the Rwanda Green Fund (FONERWA), communities across 5 sectors in Nyagatare District have gained access to cleaner, safer, and more efficient cooking technologies. The project reduces biomass use and creates income-generating opportunities especially for women and youth, who are central to local climate action.



In parallel, initiatives such as LDCF3, led by REMA in collaboration with Rwanda Housing Authority, Meteo Rwanda, and the districts of Gakenke and Kirehe, have distributed energy-saving cookstoves with funding from the Global Environment Facility (GEF) through UNDP. Thanks to many similar combined efforts, nearly every household in Rwanda has now received an improved cookstove and the impact is being felt across the country.

“Receiving the improved cookstove has been a game-changer for our family,” says one beneficiary. “Not only does it cook our meals faster and with less fuel, but it has transformed the air we breathe. My children and I no longer inhale harmful smoke daily, and I feel a sense of relief knowing that our health is no longer compromised.”

Another community member shares, “We no longer face respiratory difficulties and eye irritation caused by the traditional three-stone fire. The smoke was affecting our health, especially for children and the elderly.”

3.7 Summary of Rwanda's achievements and key ongoing projects related to resilience in the Transportation Infrastructure sector.

3.7.1 Summary of Rwanda's achievements

Rwanda has made notable strides in modernizing and expanding its transport infrastructure with an emphasis on sustainability and resilience to climate change. Investments have focused on improving road networks, promoting climate-resilient rural access, integrating non-motorized transport in urban planning, and expanding public transportation systems.

A major milestone is the development of green and climate-resilient roads under programs such as the Rural Feeder Roads Program, which enhances connectivity and reduces rural isolation. These roads are designed using climate-adaptive engineering standards to withstand extreme weather events like floods and landslides.

Urban mobility improvements, particularly in Kigali, have incorporated bus rapid transit (BRT) systems, pedestrian-friendly walkways and bicycle lanes, reduced greenhouse gas emissions and encouraged sustainable commuting. Additionally, Rwanda has promoted electromobility, including the deployment of electric motorcycles and charging infrastructure, aligned with national climate mitigation goals.

Key policy frameworks include the National Transport Policy and Strategy (2021) and the Green Transport Roadmap (2020–2030), which support low-emission transport systems, resilient infrastructure, and integration of environmental impact assessments into all transport planning. Facing challenges from severe storms and rainfalls that have severely damaged or closed roads, and damaged bridges and culverts, MININFRA has developed comprehensive guidelines for Disaster and Climate Resilient Roads, Infrastructure and Disaster Management, as of early 2025.³⁵

3.7.2 Key ongoing projects/ in pipeline

Project Title	Brief Description
Feeder Roads Development Project	A nationwide initiative to rehabilitate and climate-proof over 3,000 km of rural roads using environmentally friendly methods to reduce erosion and ensure year-round accessibility, especially for farmers. Funded by the World Bank and implemented by MINAGRI.
Kigali Bus Rapid Transit (BRT) Project	Part of the Smart Kigali Plan, the BRT system aims to improve urban mobility and reduce emissions. It includes dedicated lanes, modern terminals, and electric buses. Lead by the Ministry of Infrastructure and the City of Kigali.
Electromobility Promotion Program	Led by RURA and MININFRA, this project expands electric motorcycle use and infrastructure. Over 1,000 e-motos have been deployed, and partnerships with private companies are scaling up charging stations.
Green Transport Solutions, Ireme Invest	Funded by the Green Climate Fund, this initiative supports investment in electric vehicles, bicycles, and low-emission buses across urban centres.
Resilient Bridge and Culvert Program	Upgrades to more than 50 vulnerable road crossings in flood-prone districts will use climate-resilient engineering, preventing disruptions during rainy seasons. Lead by MININFRA
Air Transport Modernization Project	Includes climate-proofing Bugesera International Airport with green building standards, improved stormwater management systems and using electric and hybrid ground support equipment.

³⁵ Guidelines On Disaster and Climate Resilient Road Infrastructure & Disaster Management, MININFRA, 2025. See: <https://www.mininfra.gov.rw/index.php?eID=dumpFile&t=f&f=117857&token=8178dd30d70311b24bfe318bed6580adf30ff37c>

Rwanda Urban Mobility Improvement (Rumi) Project	Supported under the Rwanda Urban Development Project (RUDP), this initiative supports dedicated bus lanes, electric buses and Non-Motorized Transport (NMT) Infrastructure in Urban Areas by builds pedestrian and cycling infrastructure in Kigali and secondary cities. Funded by the World Bank and implemented by the City of Kigali, and supported by Global Green Growth Institute, GGGI.
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3.7.3 Key challenges to transport sector

Despite the progress, Rwanda's transport sector faces several challenges that affect its resilience to climate impacts:

- **Climate-sensitive infrastructure:** Many existing roads, especially in hilly and rural areas, are prone to erosion, landslides, and flooding.
- **Limited maintenance capacity:** Inadequate funding and technical capacity for the timely maintenance of climate-damaged infrastructure.
- **Urban congestion and emissions:** Rapid urbanization in Kigali has increased traffic congestion and air pollution, calling for accelerated transition to green public transport.
- **Low uptake of electric vehicles:** Although policies support e-mobility, challenges remain in terms of cost, charging infrastructure, and consumer awareness.
- **Coordination gaps:** Limited cross-sectoral coordination for integrating climate risk assessments into transport planning and implementation.

3.8 Summary of Rwanda's Achievements and key ongoing projects in Human Settlements Sector

3.8.1 Summary of Rwanda's Achievements

The Government of Rwanda's Human Settlements program aims at improving living conditions of citizens in both urban and rural areas through:

1. Construction of IDP Model Villages in Rural and Peri-Urban Areas across the whole country,
2. Upgrading of Unplanned Settlements Sites in Urban Areas, mainly in the City of Kigali, satellite cities and secondary cities, and
3. Landscape Restoration in Degraded Urban Areas focusing on Urban Wetlands, Flood Risks Management and relocation of households away from hilly high-risk zones in Kigali.

Currently, the Ministry of Infrastructure (MINIFRA) and Rwanda Housing Authority (RHA) have reported 253 IDP model villages constructed countrywide. Beneficiaries were members of 30,000 households. (RWA Updates, 2023).³⁶

The informal urban settlement upgrading and basic service provision initiatives are being implemented in the City of Kigali, satellite cities and the 6 secondary cities of Huye, Muhanga, Musanze, Nyagatare, Rubavu, and Rusizi under the Rwanda Urban Development Project (RUDP, Phase 1 and 2), funded by the World Bank (2020).³⁷ Urban upgrading has also begun in multiple unplanned settlement sites of Gatenga in Kicukiro District, Nyagatovu and Nyabisindu in Gasabo District, and Mpazi in Nyarugenge District, all in the City of Kigali.

³⁶ Rwanda Housing Authority (RHA), 2023 (www.rha.gov.rw)

³⁷ MINIFRA, Rwanda Urban Development Project (RUDP), Implementation Completion Report (ICR), 2021.

3.8.2. Key ongoing / in pipeline projects

For continuity purposes, the programs that are reflected in the updated version of the National Urbanization Policy (2025)³⁸ for the Human Settlement Sector are prioritized here:

1. Provision of access to basic and social services,
2. Built environment to preserve the local culture and promote green urbanization,
3. Green city initiatives that contribute to preserving the natural ecosystems, and
4. Safe and healthy cities, built on strong social cohesion.

According to the National Land Use Development Master Plan (NLUDMP: 2020-2050) ³⁹ approved by the Government of Rwanda in 2020, the Human Settlement Sector will prioritize sustainable urbanization growth with a focus on:

1. The City of Kigali (CoK): the 3 districts of Nyarugenge, Gasabo and Kicukiro,
2. The satellite cities: comprising 3 cities: Rwamagana, Bugesera and Bugesera District,
3. The secondary cities: comprising 8 Urban Areas: Rusizi, Karongi, Rubavu, Musanze, Huye, Kirehe, Kayonza and Nyagatare Districts.

The public sector, the private sector and civil society are requested to share responsibility for achieving adequate and good urban development and urbanization growth in line with the prioritized urban areas.

Relevant recent and ongoing projects in the Human Settlements Sector are presented below:

Project name	Project brief description
Rwanda Urban Development Project, Phase 2 (RUDP-2) ⁴⁰	1. The objective of RUDP2 is to improve access to basic services, enhance resilience and strengthen integrated urban planning and management in the City of Kigali (CoK) and the 6 secondary cities of Rwanda. RUDP-I was completed in 5 years (2016-2021), and RUDP-II (2021-2025), with a budget allocated of USD175.45 million, is to be completed in 2025. RUDP-II has 4 components: (a) Support the City of Kigali to comprehensively upgrade the flood risk management of 4 unplanned settlements, reduce flood risks at selected locations identified as flood hotspots, pilot an integrated approach to sustainable wetland management and carry out a series of technical assistance (TA) initiatives to develop tools for evidence based, integrated urban planning and provide institutional capacity development and support to the CoK. (b) Support secondary cities to provide basic infrastructure in 6 cities in 2 phases, financing feasibility studies, detailed design and construction supervision activities and supporting the functioning of newly established CMOs. (c) Institutional Capacity Development and Project Management component will support institutions at the national level, with coordination by the Ministry of Infrastructure supporting project management across implementation agencies at the national level, in the CoK and in secondary cities. (d) Contingency and Emergency Response component will support the rapid reallocation of project funds in the event of a natural or man-made crisis during implementation of the project to address eligible emergency needs under the conditions established in the Project Implementation Manual.

³⁸ MININFRA, National Urbanization Policy, 2025

³⁹ Ministry of Environment (MoE), National Land Use Development Master Plan (NLUDMP), 2020

⁴⁰ MININFRA, Rwanda Urban Development Project (RUDP), Project Appraisal Document (PAD), 2021

The Green City Kigali Pilot Project⁴¹	This is a new sustainable neighborhood for low and middle-income residents being developed by the Rwanda Green Fund (FONERWA) with the financial support from the German Development Cooperation through KfW and Green Climate Fund (GCF). The project was initiated during 2018-2022 at the cost of EUR 3 million with its implementation phase starting from 2024. It is to be completed in 2029 with the implementation budget of EUR 35 million. The project is being implemented in the City of Kigali, Gasabo District in the Kinyinya Sector, with the purpose of integrating green building and design, efficient and renewable energy, recycling and inclusive living as well as homegrown solutions and local construction materials. The pilot project covers 600 hectares in City Extension and is expected to serve as a model for Sustainable Urban Development that can be replicated across Rwanda and the wider region.
The Rwanda Housing Finance Project⁴²	The objective of Rwanda's Housing Finance Project is to expand access to housing finance for households and to support capital market development in Rwanda. It has 2 project components. (1) Provision of Long-term Finance to Expand Housing Finance including a Line of Credit (LoC) to support the provision of housing loans by Rwandan financial institutions; and (2), Technical Assistance and Implementation Support (capacity building) to strengthen the enabling environment for affordable housing and financing). The project implementation period ran from 2019; to 2025 with a total budget of USD \$150 million.
The Promoting Employment through Climate-responsive Construction (PROECCO)⁴³	The PROECCO program and the Mpazi Rehousing Strategy of Skat Consulting is a program of Swiss Development Cooperation (SDC) implemented by Skat Consulting (Switzerland, Rwanda, Burundi, South Kivu in RDC). It supported the creation of decent jobs and promotes the use of climate-responsive construction materials and technologies all along the housing supply value chain. The target groups engaged were young labourers and entrepreneurs willing to pioneer environmentally friendly modern production of clay-based building materials. It targeted other actors across the supply chain that can help improve housing affordability such as producers, service providers, design professionals, financial advisors. It engaged collaborators who have successfully introduced and demonstrated efficient brick production technologies and improved affordable housing solutions that are being used in private and public developments and urban upgrading processes across the region. (The project closed Oct 2024.)
The Kigali Informal Settlement Upgrading Project (KISUP)⁴⁴	The objective of KISUP is to improve the living conditions of people in the 3 informal settlements of Kagugu, Rwezamenyo and Nyakanbanda, while reducing the displacement of low-income households. The project period of 5 years is structured into 4 components: (1) Implementation of settlements improvement plans in building/rehabilitation of resilient, inclusive and safe infrastructure, the creation/rehabilitation of socio-collective facilities (including public spaces) and co-construction of micro projects through the Urban Fabric Initiatives, (2) Transformation of public action through capacity building focused on change, (3) Pilot housing projects tested in the settlements, and (4) Project Management structured by the single project implementation unit (SPIU). This project is funded by the European Union under AFD (French Development Agency).

3.8.3 Key challenges to the Human Settlements sector

Among the key challenges in Human Settlements and Urbanization Sector are:

1. Lack of synergy in coordination and prioritization of public and non-public investments and national and district levels,
2. Limited capacities to make available climate resilient data associated with the capacity limitations in analyzing resilience data,
3. Lack of cross-sectoral integration of planning and M&E systems, and
4. Financial constraints for effective implementation programs.

⁴¹ www.greenfund.rw

⁴² www.brd.rw

⁴³ <https://skat.ch/portfolio-item/the-proecco-programme/>

⁴⁴ www.kigalicity.gov.rw

Good Practice: Building Resilient Communities Through Model Villages in Rwanda

Rwanda has improved the lives of over 30,000 vulnerable families through its Integrated Development Program (IDP) Model Villages provide modern, climate-resilient housing and essential services. Approximately 250 villages have been constructed to resettle people from high-risk or remote areas into well-planned communities with access to education, healthcare, clean water, and electricity.



Figure: (left) A segment of a residential area of Myembe in Kimihurura that is a high-risk zone in Kigali, and (right) Kinigi IDP Model Village.

A notable example is Rweru Model Village in Bugesera District, where 288 families relocated from isolated islands now benefit from modern infrastructure, including schools, roads, and markets. In Kigali, Karama and Gikomero Model Villages support over 400 urban poor families with ICT-equipped schools, Early Childhood Development Centres, and improved housing.

Other impactful projects include Gishuro in Nyagatare, which offers homes, healthcare, and income-generating opportunities, and Horezo in Muhanga District, which spans 156 hectares and features integrated housing, recreational facilities, and even airstrips. Kinigi Model Village in Musanze and Munini in Nyaruguru provide similar benefits, such as vocational training, livestock programs, and modern schools.

These model villages not only reduce vulnerability to disaster risks but also foster social cohesion and community empowerment through agriculture, handcrafts, and vocational programs. Collectively, they serve as a blueprint for sustainable rural and urban development in Rwanda.

4. Presentation of Index Findings and Vulnerability Maps

4.1 National CCV Index

This section reveals and examines the national index emerging from the CCVIA

$$\text{Total Vulnerability} = ((\text{Exposure} + \text{Sensitivity}/2) + \text{Adaptive Capacity})/2^{45}$$

The **national index** is the highest-level assessment value emerging from the CCVIA process. Its main purpose is to present the national vulnerability assessment in one index for the purpose of comparing the 2025 assessment to previous or future assessments that use a similar index methodology. There is 1 national index for the country for 2025.

The Rwanda national index on climate change vulnerability represents a value that contains all the 'ingredients' that went into making it. It is derived from data collected using the household survey - the responses of 2,568 households to the many questions who were asked about their situation, what they faced, their living conditions, including many questions about their perceptions, all related to factors that are seen as important to include in a climate vulnerability assessment.

The data collected was analyzed and grouped or linked to over 40 indicators of vulnerability (V) – a framework of household vulnerability indicators – that was developed and used starting in 2015. The indicators cover factors measuring the **exposure** (E) of people to climate change (e.g., amount of rainfall), the **sensitivity** (S) of those factors to the effects of climate change (e.g., in a flood prone valley) and the **adaptive capacity** (AC) of people enabling them to cope with climate change factors (e.g., access to early warning system; well-maintained drainage along the roads used to move away from a flooding area). Exposure, sensitivity and adaptive capacity are used to assess the vulnerability of a household or a community/group of households or a district. In this report, all households surveyed or sampled in one district represent the district. See Annex C for a list of villages across all districts where samples were taken.

The definitions of E, S, and A.C are adapted from the 2018 CCVIA Report.

Exposure (E): The effects of significant climate change on natural system...independent of socio-economic context, e.g., heavy rain events, increase in temperature, shifts in the period of peak rain, and periods of extreme heat.

Sensitivity (S): Change in natural systems in response to climate change exposure, e.g., hazards, such as flooding or landslides from excessive rainfall, or drying soils from periods of extreme heat or drought.

⁴⁵ There are various ways the express the mathematical calculation of $VI = f(E, S, AC)$. For AC to contribute to reduction of climate impact (E+ S), the value of AC must be inverted. In this study all Index values (for E, S and AC) were prepared with the objective of having lower index values contributing to a lower vulnerability index, representing a better situation. In this study, the direction of all AC data from the survey has been codified so that AC has been inverted, thus adhering to the objective. Consequently, the AC index is added to Impact (E+S). The formula used is therefore $VI = ((E+S) * 0.5 + AC) * .5$ or $VI = ((E+S)/2 + AC)/2$. The formula $VI = (E+S+AC)/3$ has been used in other index assessments in Rwanda. A key consideration in adopting the formula uses in this study is consistency with the formula used previously to allow for historical comparisons to be made.

Adaptive Capacity (AC): The ability of systems to anticipate, generate and implement adaptation measures, to adapt to climate change, including climate variability and extreme weather events. The availability of resources and capacities of human systems.
Index values

Index values

Index values vary from 0 to 1 and it needs to be understood that high index values mean a more difficult situation, and low index values mean a better situation.

A framework of indicators, covering E, S and AC, has been used. There are more than 40 indicators – more than 10 for Exposure, more than 10 for Sensitivity and more than 20 for Adaptive Capacity. A complete list of the indicators, by type, is provided in Annex A.

Each indicator is tied to a set of responses provided by households to questions in the survey questionnaire. A chart that shows how the survey questions are linked to the indicators is available on request. The linking of survey questions to the indicator framework is consistent – the same methodology was used in the previous CCVIA. In 2025 some additional questions were inserted into the survey questionnaire and some new indicators were included as well. The changes were an update to ensure relevant data was collected.

It is important to remember that the survey questionnaire has been used 3 times; the framework of vulnerability indicators and the HH questionnaire were used in 2015, in 2018 and again in 2025. Further, the index preparation methodology has been used twice. This consistency has been maintained so comparisons can be made between the time periods of the assessments.

4.1.1 Addressing the Change in National Index from 2018 to 2025

This section addresses the overall vulnerability facing Rwanda now compared to 2018, identifying change in vulnerability based on change in the index assessment. It will indicate the change in vulnerability between the provinces and districts from a statistical perspective.

The comparison is provided at the national level and more importantly at the provincial level and the district level.

Comparison of Nation Index Assessment – 2018 and 2025

The vulnerability of Rwanda deteriorated statistically and significantly from 0,394 in 2018 to 0,524 in 2025.

The results of the Vulnerability Assessment, 2025, provided an Index of National Vulnerability that was compared to the same index developed in 2018. This comparison was done to indicate whether the situation of vulnerability in Rwanda has improved, deteriorated or remained stable. A test was also undertaken to see if any change was statistically significant. To do this, the results of vulnerability in 2025 were compared to those in 2018.⁴⁶

⁴⁶ The comparison between 2018 and 2025 was done using the General Linear Model/Repeated measures. The test for significance of the change was done using the Mauchly test for sphericity.

Overall Vulnerability Index at the National Level	
2018 ⁴⁷	2025
0.394	0.524

Table 3 - Comparison of National-level Vulnerability Index, 2018 and 2025

Comparison of Index Assessment for Provinces – 2018 and 2025

The statistical analysis shows that in 2025, vulnerability deteriorated, and it deteriorated the most in:

- Eastern Province (from 0,379 in 2018 to 0,541), followed by
- Southern Province (from 0,377 to 0,534), followed by
- City of Kigali (from 0.356 to 0,484), followed by
- Western Province (from 0,416 to 0.528) and followed by
- Northern Province (from 0,432 to 0,514), where it deteriorated the least.

On the overall change (increased vulnerability) of the situation between provinces, the analysis shows that the deterioration of the situation between provinces was the same between City of Kigali (CoK) and Eastern Province, between City of Kigali and Southern Province, while it is statistically significant between City of Kigali and Northern Province and between City of Kigali and Western Province. The deterioration of the situation is the same between the provinces.

the analysis further indicates that when each district is compared to another, the evolution of the vulnerability was the same, meaning that the situation of vulnerability evolved the same way between any pair of districts. The value of the vulnerability may be different, but the way it evolved (the difference between the situation of 2018 and 2025) is quite similar.

For a review of the statistical significance of the deterioration, see Annex D.

The change in index value from 2018 to 2025 is provided in Table 4, below. Values in the right-hand column show change between 2018 and 2025. In all cases the situation of vulnerability has deteriorated. The higher the index value, the more the change.

Table 4 – CCVIA Index values from 2018 and 2025 for all Districts and Provinces – showing change in Overall Vulnerability

4.2 Index for Provinces and Districts

The comparison between the provinces is provided for Exposure (E), Sensitivity (S) and Adaptive Capacity (AC).

4.2.1 Distribution of Vulnerability – Provinces

Comparison of Provinces by index ranking for E, S, AC and Overall Vulnerability, 2025.

	Exposure	Sensitivity	Impact (V1)	Adaptive Capacity	Total Vulnerability
City of Kigali	0.473	0.435	0.454	0.514	0.484
Southern Province	0.463	0.474	0.468	0.599	0.534
Western Province	0.468	0.477	0.472	0.585	0.528
Northern Province	0.451	0.460	0.456	0.572	0.514
Eastern Province	0.501	0.474	0.487	0.594	0.541
Average	0.472	0.466	0.469	0.579	0.524

⁴⁷ Please note the national index for 2018 was revised during the 2025 CCVIA to make a computational correction.

Lowest Index for Exposure
Northern Province 0.451

Highest Index for Exposure
Eastern Province 0.501

Lowest Index for Sensitivity
City of Kigali 0.435

Highest Index for Sensitivity
Western Province 0.477

Lowest Index for Adaptive Capacity
City of Kigali 0.514

Highest Index for Adaptive Capacity
Southern Province 0.599

Lowest Index for Total Vulnerability
City of Kigali 0.484

Highest Index for Total Vulnerability
Eastern Province 0.541

Table 5 – Comparison of Provincial Index for E, S AC and Overall Vulnerability, 2025

4.2.2 Distribution of Vulnerability – Districts

This is a comparison of Districts by Index ranking for E, S, Vulnerability (or Impact) and AC.

This section provides the index values for E, S, Vulnerability and AC for all the 30 Districts, in Table 5.

	Exposure Index	Sensitivity Index	Impact (V1) Index	Adaptive Capacity Index	Total Vulnerability Index
Nyarugenge	0.428	0.461	0.445	0.515	0.480
Gasabo	0.482	0.415	0.449	0.522	0.485
Kicukiro	0.510	0.429	0.470	0.505	0.487
City of Kigali	0.473	0.435	0.454	0.514	0.484
Nyanza	0.459	0.498	0.478	0.583	0.531
Gisagara	0.510	0.475	0.493	0.556	0.525
Nyaruguru	0.449	0.510	0.480	0.586	0.533
Huye	0.410	0.455	0.433	0.557	0.495
Nyamagabe	0.462	0.480	0.471	0.663	0.567
Ruhango	0.496	0.459	0.477	0.576	0.527
Muhanga	0.425	0.407	0.416	0.611	0.514
Kamonyi	0.489	0.460	0.474	0.602	0.538
Southern Province	0.463	0.474	0.468	0.599	0.534
Karongi	0.456	0.469	0.462	0.637	0.550
Rutsiro	0.514	0.498	0.506	0.567	0.537
Rubavu	0.422	0.461	0.442	0.582	0.512
Nyabihu	0.482	0.507	0.495	0.569	0.532
Ngororero	0.464	0.499	0.481	0.590	0.536

Rusizi	0.469	0.454	0.462	0.551	0.506
Nyamasheke	0.469	0.449	0.459	0.596	0.528
Western Province	0.468	0.477	0.472	0.585	0.528
Rulindo	0.476	0.437	0.457	0.549	0.503
Gakenke	0.412	0.479	0.446	0.594	0.520
Musanze	0.424	0.413	0.418	0.568	0.493
Burera	0.444	0.451	0.448	0.583	0.515
Gicumbi	0.501	0.519	0.510	0.565	0.538
Northern Province	0.451	0.460	0.456	0.572	0.514
Rwamagana	0.458	0.434	0.446	0.581	0.513
Nyagatare	0.563	0.515	0.539	0.638	0.588
Gatsibo	0.552	0.496	0.524	0.605	0.565
Kayanza	0.544	0.468	0.506	0.576	0.541
Kirehe	0.452	0.454	0.453	0.591	0.522
Ngoma	0.480	0.529	0.505	0.605	0.555
Bugesera	0.457	0.420	0.438	0.564	0.501
Eastern Province	0.501	0.474	0.487	0.594	0.541
Average	0.472	0.466	0.469	0.579	0.524

Table 6 – Districts, showing index for E, S, V1, AC, and total Vulnerability

This table also shows the 2025 national vulnerability index of .524. It is the average of all the index values.

This section is supported by 5 maps – one for each of E, S, and Vulnerability (joining E and S), AC and total Vulnerability – showing the national distribution of each, based on the district level data and indicator values. The maps show 5 Index levels (very high to very low, comparatively).

The focus is on how the maps help us understand the index values visually by showing where the different levels of vulnerability are located. The focus of this section continues to be on a comparison of districts.

The maps and district rankings show which district have:

- high total Vulnerability (high index values)
- high Exposure, high Sensitivity and high Impact (combining E and S) (high index values)
- high Adaptive Capacity (low index values, inverted)

4.3. Illustrative Maps

Reference is made to the five maps that follow - one for V (or total Vulnerability), E, S, Impact, and AC, and a table indicating the relative district rankings.

The Vulnerability Index allows for the comparison of Districts. On the five maps, graduated shading of colour is used to illustrate the ranking of high to low index numbers.

For the illustrative maps of Exposure, Sensitivity, Vulnerability 1 (combining Exposure and Sensitivity) and Total Vulnerability (combining Impact and Adaptive Capacity):

- Lightest shade of a colour is very low index – compared with the other districts, meaning low exposure, low sensitivity, low impact and low overall vulnerability
- Darkest shade of a colour is very high index – compared with the other districts., meaning high exposure, high sensitivity, high impact and high overall vulnerability

For the map of Adaptive Capacity, the shading is reversed for better visual effect:

- Lightest shade of a colour is very high index – compared with the other districts meaning low adaptive capacity
- Darkest is very low index – compared with the other districts, meaning high adaptive capacity.

In all cases, a low index value is better

Total Vulnerability by District

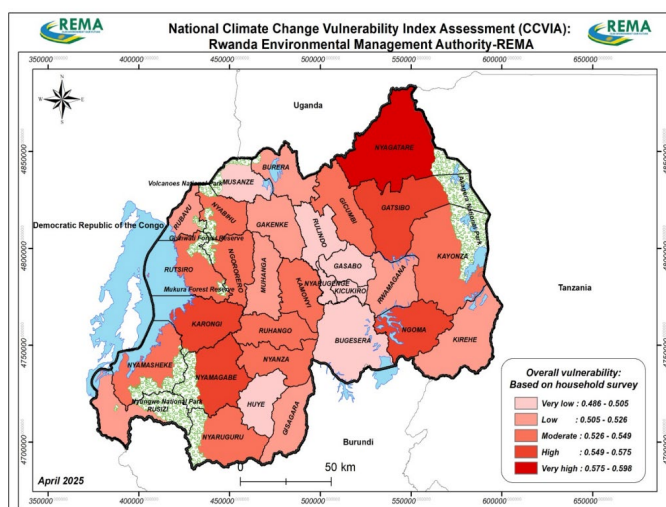


Figure 1 - Distribution of total Vulnerability by District

This map indicates the districts, and their total vulnerability to climate change based on the climate change vulnerability index assessment, which is derived from the household questionnaire, including quantitative and qualitative data. The districts with the darkest shade have the highest overall vulnerability.

District	Ranking
Nyarugenge	0.480
Gasabo	0.485
Kicukiro	0.487
Musanze	0.493
Huye	0.495
Bugesera	0.501
Rutindo	0.503
Rusizi	0.506
Rubavu	0.512
Rwamagana	0.513
Muhanga	0.514
Burera	0.515
Gakenke	0.520
Kirehe	0.522
Gisagara	0.525
Ruhango	0.527
Nyamasheke	0.528
Nyanza	0.531
Nyabihu	0.532
Nyaruguru	0.533
Ngororero	0.536
Rutsiro	0.537
Gicumbi	0.538
Kamonyi	0.538
Kayanza	0.541
Karongi	0.550
Ngoma	0.555
Gatsibo	0.565
Nyamagabe	0.567
Nyagatare	0.588

Table 7 – Ranking of Districts – total Vulnerability

Observation 1:

Districts with a high Total Vulnerability index are disadvantaged when it comes to overcoming their vulnerability. This due to a low Adaptive Capacity (high AC index) in addition to a high to medium high index for Exposure and/or Sensitivity.

Observation 2:

An overview of the 10 Districts with the highest Total Vulnerability Index:

1. The assessment of Total Vulnerability in districts across Rwanda reveals that districts are not equally exposed to risks as some face significantly higher challenges than others.
2. The districts with the highest Total Vulnerability index (with indicator score > 0.700) largely exhibit low Adaptive Capacity (AC), pointing to high vulnerability in infrastructure and household readiness indicators. (see Table 8)
3. For the three most vulnerable districts, Nyagatare, Nyamagabe, and Gatsibo, there is strong evidence of low adaptive capacity. These 3 districts have a high index for 11 up to 14 indicators; these are almost all Adaptive Capacity indicators. (see Table 8)
4. The vulnerability of these districts is rooted in a complex and interconnected set of challenges spanning multiple sectors at the household level mainly related to very high index scores for Adaptive Capacity indicators. These include challenges in energy, transportation, infrastructure, access to irrigation and water storage facilities, low adaptive capacity building and low access to information about climate variability for decision making. (see Table 8)
5. The other 7 of the most vulnerable districts have a high index for 6, up to 10 indicators. Again, these are mainly for Adaptive Capacity indicators. (see Table 8)
6. Most of the 10 districts with the highest Total Vulnerability also have high exposure and high sensitivity rankings. For example, Nyagatare and Gatsibo have a very high vulnerability ranking due to very high Exposure (E), very high Sensitivity (S), and low Adaptive Capacity (AC); and Nyamagabe's high Total Vulnerability ranking is mainly due to a very low Adaptive Capacity (AC). Additionally, 6 of the 10 most vulnerable districts are among the poorest districts.

1. Analysis of Total Vulnerability within Districts.

The assessment of vulnerability indicators across Rwanda reveals that districts are not equally exposed to risks as some face significantly higher challenges than others. A closer examination of their vulnerability profiles reveals a complex and interconnected set of challenges spanning multiple sectors, including energy, transport, health, socio-economic livelihoods, water, agriculture, human settlements, and meteorological and disaster management factors.

The highest vulnerability scores (indicator score > 0.7)⁴⁸ are largely linked to adaptive capacity (AC) indicators, pointing to widespread limitations in infrastructure and household readiness. Almost all these districts, except Gisagara and Ngoma, demonstrate significant infrastructure deficits. Many of them face serious transport challenges, with limited access to reliable transportation hindering mobility and emergency response capabilities (see Table 8).

In terms of energy vulnerability, the data shows that most districts rely heavily on traditional biomass fuels for cooking. Only Ruhango and Kamonyi have relatively low vulnerability scores for the Clean Cooking Energy Access indicator among the top 10 vulnerable districts, though they continue to have a high dependency on wood fuel, exacerbating environmental degradation and health risks (see Table 8).

⁴⁸ Numbers are indicator values throughout the text

In the agriculture sector, districts such as Nyamagabe, Gisagara, and Karongi stand out with the highest vulnerability levels. These districts struggle with limited irrigation infrastructure and low adoption of resilient farming practices. Nyamagabe, for instance, records a striking 0.957 in access to clean cooking energy and 0.833 in resilient farming methods, indicating substantial exposure. Gatsibo and Nyagatare also show elevated vulnerability due to high demand of fuel wood energy and irrigation challenges. Conversely, Ruhango and Kamonyi demonstrate slightly better resilience in agricultural and cooking energy access among top 10 vulnerable districts (see Table 8).

Water-related vulnerabilities among the top 10 vulnerable districts are also widespread. Karongi, Ngororero, Ruhango, and Kamonyi score particularly high in household water storage vulnerability (over 0.87), indicating weak water infrastructure and storage capacity. Gatsibo and Gicumbi follow closely, with similar risks. Gisagara and Ngoma show compounded vulnerability, with high scores in both drinking water access and storage, highlighting a pressing need for water infrastructure investment, especially in household-level storage systems.

Health sector data further underscores systemic vulnerability. Gatsibo has the highest malaria prevalence score (0.856), while Gisagara and Nyamagabe face dual threats of disease burden and limited healthcare access. Kamonyi and Nyagatare also exhibit health-related vulnerabilities, pointing to gaps in service accessibility and disease prevention.

Socio-economic and livelihood indicators show that several districts face chronic vulnerabilities due to limited social capital, poor adaptive capacity, and minimal access to climate information at the household level. Nyamagabe and Ruhango are particularly at risk, with scores exceeding 0.86 in climate information access. Karongi also presents high vulnerability across all socio-economic indicators, while Nyagatare and Gatsibo show clear weaknesses in preparedness for climate shocks, revealing a need for targeted investments in community resilience and information systems.

Lastly, in the meteorological and disaster management sector, Gatsibo emerges as highly vulnerable with extreme variability in temperature (0.799) and heat (0.752), increasing the risk of climate-related disruptions. Nyagatare and Gisagara also show elevated vulnerability due to similar climate stressors and limited access to early warning systems.

Overall, the data highlights a clear need for tailored, multisectoral interventions across these 10 districts. Enhancing adaptive infrastructure, expanding access to clean energy, improving water and health services, and strengthening climate preparedness systems will be essential to reducing vulnerability and building long-term resilience in Rwanda's most at-risk areas.

Table 8 - Ten Indicators with Index values greater than 0.700 dominate the Total Vulnerability Index for the 10 Most Vulnerable Districts.

Highest Vulnerability Districts	Energy	Transport		Human settlement	Agriculture		Water		Health		Socio-Economic/Livelihoods/Income Assets			Meteorological/Disaster management		
Indicators>>>>>	E Cook Light Energy	AC Transport Means	AC Infrastructure Vulnerability	AC HH Assets	AC Access to Irrigation	AC Resilient Farming Method	AC Drinking Water	AC Proportion of HH with Water Storage	E Malaria Proportion	AC Proximity Health	AC Social Capital	AC Building Capacity	AC Climate Info HH	E Temp Variability	E Heat Variability	AC Early Warning System
1. Nyagatare	0.891	0.809	0.832		0.895	0.752		0.816		0.729		0.823	0.827	0.726	0.712	
2. Nyamagabe	0.957	0.783	0.812	0.730	0.859	0.833	0.773	0.842	0.729	0.841	0.776	0.866	0.864			0.720
3. Gatsibo	0.903	0.725	0.788		0.847	0.775		0.852	0.856		0.725	0.823	0.741	0.799	0.752	
4. Ngoma	0.890		0.768		0.864		0.802	0.878				0.776	0.788			
5. Karongi	0.942	0.900	0.730	0.741	0.838			0.900			0.815	0.855	0.796			

6. Kayonza	0.835		0.746	0.768	0.768	0.784		0.862				0.766	0.766			
7. Kamonyi		0.786	0.809	0.721	0.890	0.854		0.877		0.700	0.746	0.786	0.724			
8. Gicumbi	0.884	0.722	0.781		0.792			0.868			0.726					
9. Rutsiro	0.848	0.845	0.759		0.858			0.882	0.866		0.799	0.719	0.781			
10. Ngororero	0.877	0.888	0.758	0.725	0.826			0.885			0.757	0.776	0.760			
Frequency of Index Value > 0.7	9/10	8/10	10/10	5/10	10/10	5/10	2	10/10	3	3	7/10	9/10	9/10	2	2	1

Exposure by District

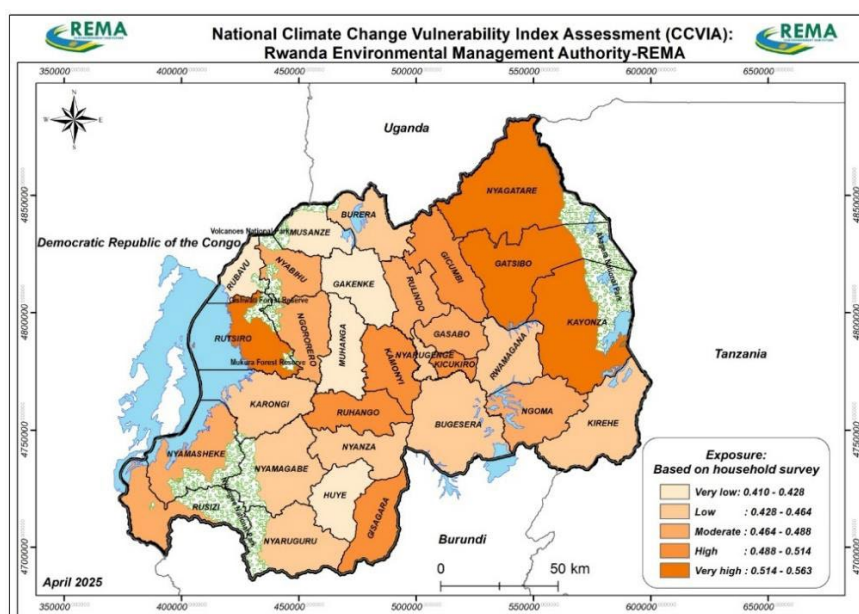


Figure 2 - Distribution of Exposure by district

This map indicates the districts, and their exposure to climate change based on the climate change vulnerability index assessment, which is derived from the household questionnaire, including quantitative and qualitative data.

District	Ranking
Huye	0.410
Gakenke	0.412
Rubavu	0.422
Musanze	0.424
Muhanga	0.425
Nyarugenge	0.428
Burera	0.444
Nyaruguru	0.449
Kirehe	0.452
Karongi	0.456
Bugesera	0.457
Rwamagana	0.458
Nyanza	0.459
Nyamagabe	0.462
Ngororero	0.464
Nyamasheke	0.469
Rusizi	0.469
Rulindo	0.476
Ngoma	0.480
Nyabihu	0.482
Gasabo	0.482
Kamonyi	0.489
Ruhango	0.496
Gicumbi	0.501
Kicukiro	0.510
Gisagara	0.510
Rutsiro	0.514
Kayonza	0.544
Gatsibo	0.552
Nyagatare	0.563

Table 9 - Ranking of Districts – Exposure

2. Analysis of Climate Change Exposure in Districts

As previously indicated, this analysis examined the exposure of selected Rwandan districts to 8 critical risk indicators: Temperature Variability, River Water Change, Borehole Water Change, Forest Wood Change, Malaria Proportion, General Health Status, Physical Vulnerability of Housing, and Combined Rainstorm/Flood/Drought Impact. These indicators reflect the combined effects of environmental stress, climate variability, and public health risk.

According to the data in Table 6, the 10 most exposed districts, based on their overall exposure index, are: Gasabo (0.482), Kamonyi (0.489), Ruhango (0.496), Gicumbi (0.501), Kicukiro (0.510), Gisagara (0.510), Rutsiro (0.514), Kayonza (0.544), Gatsibo (0.552), and Nyagatare (0.563).

Among the indicators, the most prevalent high exposure scores exceeding 0.7 were observed for Temperature Variability, Heat Variability, and Malaria Proportion, pointing to significant climate and health-related vulnerabilities.

According to the data presented in the Table 6 and elaborated in the Table 10, below, Gatsibo emerges as the most exposed district overall. It registers extremely high scores in Temperature Variability (0.799), Heat Variability (0.752), and Malaria Proportion (0.856), indicating a strong susceptibility to both climate extremes and disease burden.

Gisagara also exhibits high exposure levels across all categories, with one of the highest Malaria Proportions (0.805), coupled with elevated temperature (0.716) and Heat Variability (0.655), underscoring both health and environmental stress.

Kicukiro, Gatsibo, and Rutsiro show notably high exposure to malaria, with indices of 0.835, 0.866, and 0.856 respectively the highest across all districts suggesting significant public health risks, even where climate variability is moderate.

Nyagatare reflects pronounced climate-related stress, with high temperature (0.726) and Heat Variability (0.712), though it records a relatively lower malaria index (0.615), indicating that climatic extremes are the dominant exposure concern.

Gasabo presents a more balanced yet elevated exposure profile, scoring high across temperature (0.719), Heat Variability (0.538), and Malaria Prevalence (0.735).

Ruhango, Kamonyi, and Gicumbi show moderately high but consistent exposure values across all indicators, placing them among the more exposed districts, though not as extreme as the top tier.

Table 10 There far fewer Exposure Indicators with high values >0.700

No		Temp Variability	Heat Variability	Hazard Variability	River Water Change	Borehole-Water Change	Forest Wood Change	Malaria Proportion	Health Status	Physical Vulnerability House	Rainstorm Flood Drought
1	Gasabo	0.719	0.538	0.419	0.437	0.422	0.465	0.735	0.455	0.150	0.484
2	Kamonyi	0.654	0.603	0.497	0.428	0.477	0.556	0.591	0.378	0.242	0.461
3	Ruhango	0.694	0.651	0.529	0.431	0.484	0.454	0.535	0.420	0.246	0.515
4	Gicumbi	0.558	0.553	0.622	0.415	0.487	0.174	0.632	0.444	0.470	0.649
5	Kicukiro	0.677	0.593	0.431	0.450	0.375	0.490	0.835	0.644	0.156	0.447
6	Gisagara	0.716	0.655	0.534	0.463	0.486	0.282	0.805	0.483	0.144	0.531

7	Rutsiro	0.485	0.545	0.516	0.442	0.550	0.480	0.866	0.473	0.274	0.512
8	Kayanza	0.848	0.802	0.547	0.461	0.505	0.582	0.337	0.571	0.266	0.519
9	Gatsibo	0.799	0.752	0.529	0.588	0.365	0.563	0.856	0.464	0.116	0.493
10	Nyagatare	0.726	0.712	0.619	0.460	0.574	0.598	0.615	0.422	0.277	0.629
		5/10 districts						5/10 districts			

Sensitivity by District

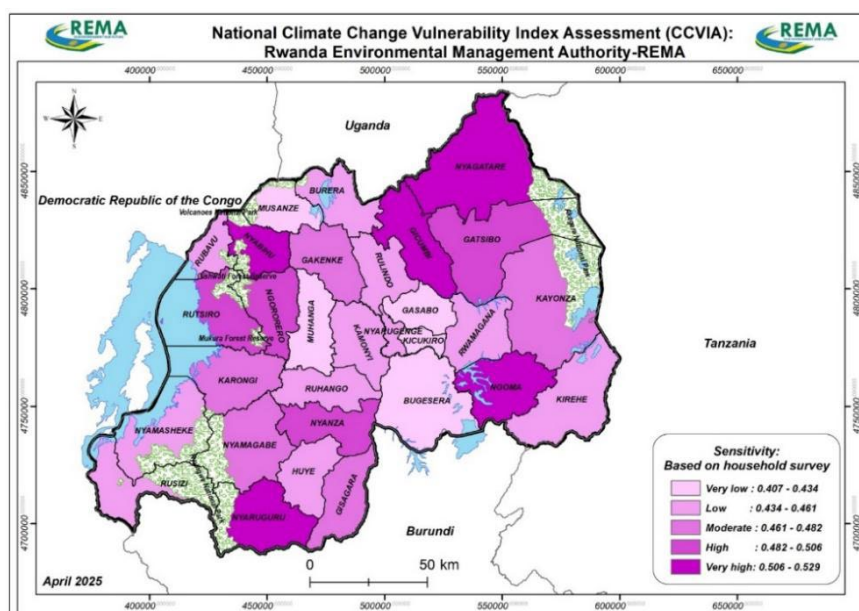


Figure 3 - Distribution of Sensitivity by District

This map indicates the districts, and their **sensitivity** to climate change based on the climate change vulnerability index assessment, which is derived from the household questionnaire, including quantitative and qualitative data.

District	Ranking
Muhanga	0.407
Musanze	0.413
Gasabo	0.415
Bugesera	0.420
Kicukiro	0.429
Rwamagana	0.434
Rulindo	0.437
Nyamasheke	0.449
Burera	0.451
Rusizi	0.454
Kirehe	0.454
Huye	0.455
Ruhango	0.459
Kamonyi	0.460
Rubavu	0.461
Nyarugenge	0.461
Kayanza	0.468
Karongi	0.469
Gisagara	0.475
Gakenke	0.479
Nyamagabe	0.480
Gatsibo	0.496
Nyanza	0.498
Rutsiro	0.498
Ngororero	0.499
Nyabihu	0.507
Nyaruguru	0.510
Nyagatare	0.515
Gicumbi	0.519
Ngoma	0.529

Table 11 - Ranking of Districts – Sensitivity

3. Analysis of Sensitivity of Districts to Climate Change

As previously described, the sensitivity was evaluated using a composite of key development indicators, including Social Safety, Weather Hazards, Diversified Agricultural Production, Household Insecurity, Household Hazard Exposure, Animal Disease, Farm Vulnerability, Transport-to-Market Infrastructure, Infrastructure Vulnerability, Climate Impact, and Access to Clean Cooking and Lighting Energy. The data summarized in Table 6 show that some districts exhibit high overall sensitivity, indicating multiple, overlapping vulnerabilities that pose significant risks to sustainable development. Ngoma records the highest sensitivity index (0.529), followed by Gicumbi (0.519), Nyagatare (0.519), Nyaruguru (0.515), Nyabihu (0.510), Ngororero (0.507), Rutsiro (0.499), Nyanza (0.498), and Gatsibo (0.496). In contrast, the 5 districts with the lowest sensitivity scores indicating relatively greater resilience are Muhanga (0.400), Musanze (0.413), Gasabo (0.415), Bugesera (0.420), and Kicukiro (0.429), followed by Rwamagana (0.434).

Table 12: Sensitivity indicators and index values for the top 10 districts

#	District	ADR	Social-Safety	Weather Hazards	Diversify Agri Production	HH Inse-cure	HH Haz-ards	Animal Disease	Farm Vulnera-bility	Transport To Market Infrastr-cture	Infra-structure Vulnera-bility	Impact Climate	Cook Light Energy	Avg.
1	Nyamaga-be	0.529	0.488	0.425	0.161	0.265	0.383	0.117	0.539	0.666	0.812	0.423	0.957	0.480
2	Gatsibo	0.728	0.504	0.493	0.187	0.212	0.525	0.104	0.373	0.636	0.788	0.499	0.903	0.496
3	Nyanza	0.555	0.521	0.477	0.309	0.275	0.340	0.147	0.438	0.678	0.752	0.513	0.971	0.498
4	Rutsiro	0.582	0.491	0.552	0.286	0.277	0.421	0.167	0.360	0.689	0.759	0.543	0.848	0.498
5	Ngororero	0.788	0.481	0.488	0.317	0.246	0.272	0.125	0.510	0.624	0.758	0.500	0.877	0.499
6	Nyabihu	0.662	0.497	0.460	0.302	0.317	0.461	0.100	0.384	0.668	0.795	0.506	0.934	0.507
7	Nyaruguru	0.714	0.513	0.540	0.147	0.318	0.408	0.196	0.380	0.599	0.764	0.559	0.983	0.510
8	Nyagatare	0.742	0.502	0.456	0.370	0.257	0.552	0.129	0.320	0.625	0.832	0.505	0.891	0.515
9	Gicumbi	0.648	0.503	0.471	0.303	0.251	0.579	0.229	0.368	0.654	0.781	0.559	0.884	0.519
10	Ngoma	0.893	0.498	0.486	0.370	0.321	0.581	0.136	0.292	0.629	0.768	0.490	0.890	0.529
		5/10									10/10		10/10	

Among the indicators, those with index values exceeding 0.7 such as Age Dependency Ratio (ADR), Transport-to-Market Infrastructure, Infrastructure Vulnerability, and Cook/Light Energy emerge as the most critical contributors to overall sensitivity. For instance, Ngoma district shows the highest ADR (0.893). This is compounded by notable vulnerabilities in infrastructure (0.768) and cooking energy access (0.890). Similar patterns are evident in Nyagatare, Nyabihu, and Nyaruguru, which all score highly on Infrastructure Vulnerability and limited access to clean energy. Nyagatare in particular has the highest infrastructure vulnerability index (0.832). Gatsibo and Ngororero also demonstrate high sensitivity, primarily driven by agricultural dependency and insufficient infrastructure and energy systems.

Agricultural dependency remains a dominant factor influencing sensitivity in rural districts, especially in Ngoma, Gisagara, and Nyagatare, where livelihoods rely heavily on subsistence farming. Infrastructure vulnerability is persistently high across all districts, emphasizing a pressing national need for investment in resilient, climate-adaptive infrastructure. Additionally, access to clean cooking and lighting energy presents a widespread challenge, with most districts scoring above 0.88 indicating heavy reliance on traditional, inefficient energy sources. These findings highlight the need for targeted, region-specific policy interventions aimed at reducing vulnerability and enhancing resilience to support Rwanda's sustainable and inclusive development.

Impact (E + S) by District

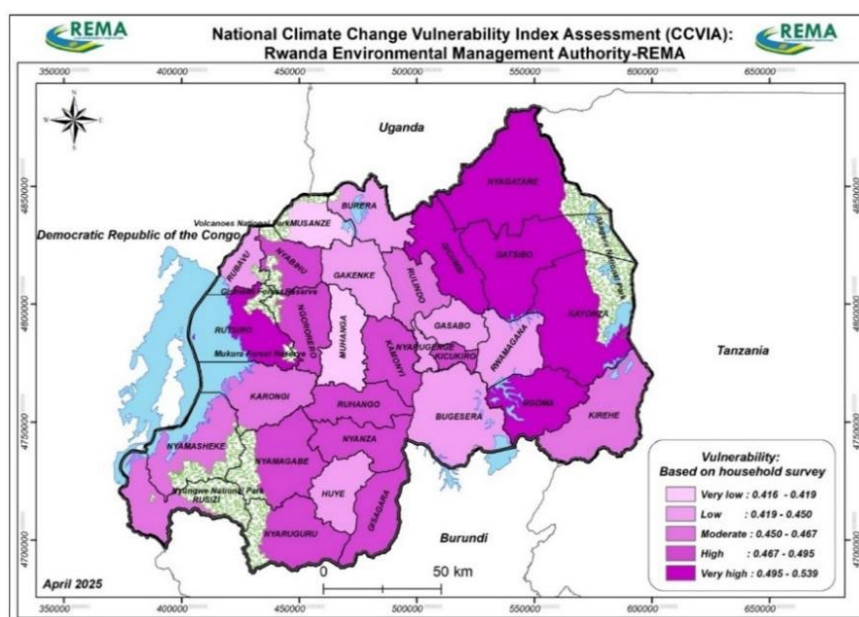


Figure 4 - Distribution of Impact or Vulnerability¹ by District

This map indicates the districts, and the relative **impact** from climate change – or **Vulnerability¹** – based on the climate change vulnerability index assessment, which is derived from the household questionnaire, including quantitative and qualitative data.

District	Ranking
Muhanga	0.416
Musanze	0.418
Huye	0.433
Bugesera	0.438
Rubavu	0.442
Nyarugenge	0.445
Gakenke	0.446
Rwamagana	0.446
Burera	0.448
Gasabo	0.449
Kirehe	0.453
Rulindo	0.457
Nyamasheke	0.459
Rusizi	0.462
Karongi	0.462
Kicukiro	0.470
Nyamagabe	0.471
Kamonyi	0.474
Ruhango	0.477
Nyanza	0.478
Nyaruguru	0.480
Ngororero	0.481
Gisagara	0.493
Nyabihu	0.495
Ngoma	0.505
Kayonza	0.506
Rutsiro	0.506
Gicumbi	0.510
Gatsibo	0.524
Nyagatare	0.539

Table 13: Impact ranking

Adaptive Capacity

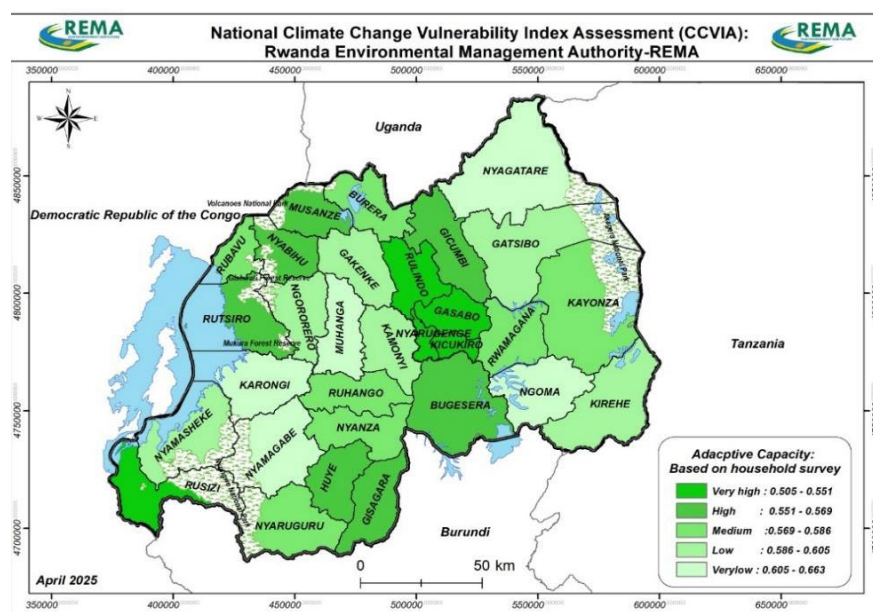


Figure 5 - Distribution of Adaptive Capacity by District

This map indicates the districts, and their **Adaptive Capacity** based on the climate change vulnerability index assessment, which is derived from the household questionnaire, including quantitative and qualitative data.

District	District Ranking
Kicukiro	0.505
Nyarugenge	0.515
Gasabo	0.522
Rulindo	0.549
Rusizi	0.551
Gisagara	0.556
Huye	0.557
Bugesera	0.564
Gicumbi	0.565
Rutsiro	0.567
Musanze	0.568
Nyabihu	0.569
Kayanza	0.576
Ruhango	0.576
Rwamagana	0.581
Rubavu	0.582
Burera	0.583
Nyanza	0.583
Nyaruguru	0.586
Ngororero	0.590
Kirehe	0.591
Gakenke	0.594
Nyamasheke	0.596
Kamonyi	0.602
Gatsibo	0.605
Ngoma	0.605
Muhanga	0.611
Karongi	0.637
Nyagatare	0.638
Nyamagabe	0.663

Table 14 - Ranking of Districts – Adaptive Capacity

4. Analysis of Adaptive Capacity of Districts

This analysis evaluated the adaptive capacity of various districts using a composite of 12 socio-economic and infrastructure-related indicators. These include Women's Education, Social Capital, Building Adaptive Capacity, Early Warning Systems, Access to Climate Information at Household Level, Access to Irrigation, Use of Resilient Farming Methods, Proximity to Health Services, Access to Drinking Water, Proportion of Households with Water Storage, Household Assets, and Access to Transport Means

The data reveal significant disparities across districts. **Nyamagabe** exhibits the lowest adaptive capacity, with an average index of 0.788, reflecting weaknesses across nearly all indicators particularly in early warning systems, health service access, and resilient agricultural practices. Similarly, **Karongi (0.741)**, **Nyagatare (0.740)**, and **Muhanga (0.738)** also show high levels of vulnerability, indicating systemic limitations in education, infrastructure, and climate resilience.

Kamonyi (0.711) and **Kirehe (0.708)** follow closely behind, with high index values pointing to limited access to irrigation, climate information, and health services. This indicates that these districts may be less prepared to cope with and adapt to environmental shocks and long-term climate changes.

Nyaruguru (0.657) demonstrates an alarming adaptive capacity. This district scores better in early warning systems and water access, indicating a more favorable position for managing risks. **Gatsibo (0.677)** and **Gakenke (0.680)** also show relatively low performance, although challenges remain, particularly in resilient farming methods and access to transport.

Overall, across those less adaptive districts, the common weaknesses include low access to irrigation, limited use of resilient farming techniques, and inadequate household water storage. These factors constrain local adaptive responses, especially in agriculture-dependent communities.

On the other end of the spectrum, **Kicukiro**, **Nyarugenge** and **Gasabo**, all in the City of Kigali as well as **Rulindo**, demonstrate a higher AC with the index values 0.505, 0.515, 0.522 and 0.549 respectively.

The data underscores the need for targeted policy interventions to enhance adaptive capacity in the most vulnerable districts. Investments in climate-smart agriculture, education, early warning systems, and infrastructure especially in **Nyamagabe**, **Karongi**, and **Nyagatare** will be critical to building long-term resilience and supporting equitable development across Rwanda.

Table 15 - Nine indicators determine the low AC ranking of the 10 districts with the lowest AC

	Wom- en's Educa- tion	Social Capi- tal	Build- ing AC	Early Warn- ing System	Cli- mate Info	Ma- nure Fertil- izer	Access Irriga- tion	Resilient Farm Method	Prox- imity Health	Drink- ing Water	Elec- tricity Ener- gy	Propor- tion of HH w/ Water Stor- age	In- come Saving Debt	Access Fi- nance	Ac- cess Land	Occu- pation	HH Assets	Tree Plant- ing Train- ing	Light Energy	Cook stove Type	Trans- port means	aver- age
Kirehe	0.704	0.737	0.587	0.261	0.883	0.389	0.879	0.76	0.717	0.586	0.349	0.858	0.57	0.509	0.124	0.635	0.686	0.507	0.19	0.629	0.842	0.591
Gakenke	0.637	0.753	0.6	0.444	0.789	0.348	0.763	0.629	0.48	0.591	0.581	0.89	0.461	0.67	0.137	0.63	0.712	0.495	0.343	0.644	0.877	0.594
Nya- masheke	0.548	0.703	0.739	0.637	0.663	0.423	0.763	0.642	0.771	0.573	0.392	0.86	0.55	0.552	0.208	0.641	0.698	0.519	0.305	0.56	0.764	0.596
Kamonyi	0.485	0.746	0.786	0.605	0.724	0.377	0.89	0.854	0.7	0.354	0.494	0.877	0.512	0.482	0.252	0.623	0.721	0.532	0.311	0.525	0.786	0.602
Gatsibo	0.599	0.725	0.823	0.641	0.741	0.401	0.847	0.775	0.481	0.224	0.611	0.852	0.528	0.506	0.341	0.64	0.694	0.558	0.426	0.568	0.725	0.605
Ngoma	0.621	0.67	0.776	0.4	0.788	0.346	0.864	0.681	0.668	0.802	0.554	0.878	0.599	0.517	0.166	0.639	0.695	0.5	0.371	0.639	0.538	0.605
Muhanga	0.571	0.751	0.799	0.353	0.888	0.405	0.884	0.884	0.74	0.575	0.543	0.847	0.449	0.359	0.297	0.551	0.739	0.538	0.279	0.559	0.828	0.611
Karongi	0.603	0.815	0.855	0.576	0.796	0.272	0.838	0.682	0.564	0.626	0.635	0.9	0.582	0.63	0.123	0.657	0.741	0.507	0.41	0.674	0.9	0.637
Nyaga- tare	0.64	0.697	0.823	0.616	0.827	0.447	0.895	0.752	0.729	0.593	0.497	0.816	0.578	0.604	0.333	0.659	0.686	0.559	0.325	0.505	0.809	0.638
Nya- magabe	0.57	0.776	0.866	0.72	0.864	0.536	0.859	0.833	0.841	0.773	0.524	0.842	0.585	0.407	0.253	0.58	0.73	0.529	0.387	0.668	0.783	0.663
# of districts with Index >0.7		8/10	8/10		0/10		10/10	6/10	6/12			10/10					5/10				9/10	

5. Discussions of Findings

5.1. Sensitivity

As described above, the sensitivity analysis reveals multiple, overlapping vulnerabilities that pose significant risks to sustainable development. Among the districts analyzed, Ngoma records the highest sensitivity index (0.529), followed by Gicumbi (0.519), Nyagatare (0.519), Nyaruguru (0.515), Nyabihu (0.510), Ngororero (0.507), Rutsiro (0.499), Nyanza (0.498), and Gatsibo (0.496).

Indicators with index values exceeding 0.7 such as the Age Dependency Ratio (ADR), Transport-to-Market Infrastructure, Infrastructure Vulnerability, and Cook/Light Energy emerge as the most critical contributors to overall sensitivity.

These districts are predominantly rural, with most roads remaining unpaved and highly vulnerable to climate-related hazards such as floods, landslides, and soil erosion. Inadequate transport and market infrastructure severely limits rural communities' access to markets, healthcare, and emergency services, particularly during extreme weather events. This physical isolation intensifies their exposure to climate shocks, undermining economic resilience and restricting access to essential resources such as fertilizers, improved seeds, etc.

Infrastructure vulnerability further exacerbates the situation, as rural areas typically depend on basic infrastructure that is ill-equipped to withstand climate impacts. Additionally, the Cook/Light Energy indicator in these districts highlights widespread reliance on traditional biomass fuels such as firewood and charcoal for cooking and lighting. This dependency contributes to deforestation, environmental degradation, and increased exposure to indoor air pollution and energy insecurity.

It is important to highlight that the livelihoods of these districts are heavily reliant on rain-fed agriculture, which heightens their sensitivity to climate variability and extreme weather, putting both food security and income stability at risk.

Note that most of these higher-ranking sensitive districts were already ranked among the poorer. For instance, among the 6 districts with poverty rates exceeding 40%, 4 (Gisagara, Nyamagabe, Nyanza, and Rutsiro) also ranked among the top 10 districts with the highest sensitivity in the CCVIA. The remaining 3 districts Nyagatare, Ngoma, and Ngororero have poverty rates between 30% and 40%, according to the EICV7 report. It is important also to note that poverty is a key factor contributing to vulnerability. According to EICV7, the Southern and Western provinces remain significantly poorer than other regions.

As presented above, some districts of Rwanda have highlighted the exposure related to growing climate and health-related vulnerabilities, as reflected in the increasing variability in temperature and heat, alongside trends in malaria incidence.

In fact, there are reports that highlighted record abnormal temperatures in recent years. For example, the Rwanda Meteorology Agency announced that January 22 that 2024 was the hottest year on record for the country, with average temperatures 1.1°C above pre-industrial levels (based on the 1850–1900 average). This marks a 0.3°C increase compared to 2021, previously the second hottest year, which was reported at 0.8°C above pre-industrial levels.⁴⁹ Note that the most vulnerable districts – Gasabo (0.482), Kamonyi (0.489), Ruhango (0.496), Gicumbi (0.501), Kicukiro (0.510), Gisagara (0.510), Rutsiro (0.514), Kayonza (0.544), Gatsibo (0.552), and Nyagatare (0.563) – are located in eastern part of Rwanda where with severe sun radiations, while others are located in Kigali where the

⁴⁹ <https://www.newtimes.co.rw/article/23480/news/environment/rwanda-says-2024-hottest-year-on-record>

magnitude of heat is increased by larger amounts of man-made surface areas (e.g., roofs, roads). For malaria incidences, a recent comparative analysis of malaria data (Arlette et al, 2025) captures the spatial-temporal distribution of malaria cases from the 2018 to 2023 is revealing. Comparing its analysis to the results from the current CCVIA shows that among the 10 most climate-exposed districts in the CCVIA, each has recorded malaria incidence rates exceeding 100 cases per 1,000 people at least once from the 2018 CCVIA to the 2025 CCVIA., a rate that far exceeds the national average.

Despite the recent temporal localized spikes, Rwanda has made substantial progress in reducing nationwide malaria incidence. Cases have generally dropped significantly from 345 per 1,000 people in 2018 to just 40 per 1,000 in 2023 a testament to effective malaria control interventions. Note that in 2018, 23/30 districts recorded incidence rates above the national average of 100 cases per 1000 population. The Eastern province had the highest burden, with Ngoma and Kayanza districts reporting incidences exceeding 100 cases per 1000 population (1270 and 1469, respectively), while the western province.

5.2. Adaptive Capacity

The 10 districts with low adaptive capacity face limited access to irrigation, with irrigation index values exceeding 0.7. These areas are particularly vulnerable because shorter and increasingly unpredictable rainy seasons adversely affect crops that mainly require longer growing periods and precipitation. In response, the government has initiated the development of irrigation infrastructure across these regions to strengthen climate resilience. Measures include the construction of water ponds, valley dams, and other water storage facilities. Notably, 8 districts: Kirehe, Bugesera, Nyanza, Ruhango, Gisagara, Gatsibo, Kayanza, and Rwamagana which accommodate significant share of these interventions rank among the 10 districts with the lowest adaptive capacity.

In addition to conventional infrastructure, in most of the top 10 districts, innovative irrigation projects have been launched. One key example is the Gabiro Agribusiness Hub Project (GAHP), which aims to establish a comprehensive and commercially viable agricultural ecosystem. Spanning approximately 15,600 hectares of arable land, GAHP incorporates advanced water infrastructure, modern irrigation systems, high-value agro-processing, and agricultural technology innovations. Another example is the Bugesera solar-powered irrigation project, implemented under the Rwanda Environment Management Authority (REMA) as part of its broader climate adaptation strategy.

Note that the concentration of these infrastructure and project sites was heavily influenced by their historical exposure to severe droughts, water scarcity, and livestock losses. However, despite these efforts, existing initiatives do not yet reach all vulnerable communities. Most irrigation schemes are concentrated in marshlands or lowland areas, leaving hillside farms which are common in Rwanda largely excluded from irrigation access. This geographical limitation remains a major barrier to equitable climate adaptation and agricultural resilience in these high-risk districts.

This limited irrigation hinders the effective implementation of Climate-Resilient Farming Methods as identified across different districts (all of them have an overall high index (> 0.62) despite numerous efforts put in place such as terracing, agroforestry, use of drought-tolerant seed varieties, and conservation agriculture practices. In addition, smallholder farmers are being encouraged to diversify crops and integrate livestock to reduce climate-related risks. Government-led initiatives, such as the Sustainable Agricultural Intensification Program (SAIP) and Land Husbandry, Water Harvesting, and Hillside Irrigation (LWH), have supported the adoption of these techniques. Moreover, on April 23, 2019, the Ministry of Agriculture and Animal Resources (MINAGRI) officially launched the National Agriculture Insurance Scheme (NAIS) in Nyanza District. The scheme, dubbed “Tekana Urishingiwe Muhinzi Mworozi,” aims to mitigate risks and losses incurred by farmers due to unpredictable natural disasters, pests, and diseases affecting their livestock and crops. The Government of Rwanda subsidizes 40% of the insurance premium, with farmers contributing the

remaining 60%, facilitating easier access to financial services and promoting credit flow within the agricultural sector. This process of transformation of the agriculture to the resilient agriculture is still facing several challenges in addition to limited irrigation such as the lack of improved seeds, the availability of fertilizers, the financial capacity of the local community to afford their respective prices. Regarding the Proximity to Health Services, households in Kirehe, Nyamasheke, Kamonyi, Muhanga and Nyamagabe districts have indicated that low proximity is a big concern, with an index value greater than 0.7. According to EICV 7, the average time to reach a health centre has steadily decreased from 95.1 minutes in 2005/06 to 47.4 minutes in 2019/20, and then 32.7 minutes in 2022, which reflects improved healthcare infrastructure. While the WHO doesn't state a recommended proximity to a health facility, it emphasizes that health services should be accessible and close to people at the primary care level. This means services should be readily available and easily reached, minimizing barriers like distance, cost, etc.

Access to safe drinking water is one of the major challenges that was indicated by households in the top 10 vulnerable districts. This is not far from EICV 7 data, which highlighted that Rwanda still has a small number of people accessing treated water, with a higher portion of Rwandans having access to water from improved drinking water sources. According to EICV7, access to improved drinking water sources has increased nationally from 87% in 2016/17 to 90% in 2023/24, with higher rates in urban areas (97%) than rural areas (87%). Kigali leads with 97.9% of households using improved sources, mainly piped water. The Northern Province follows with 91.0%, relying on protected wells (39.4%) and boreholes (36.8%). Southern Province reports 90.8%, with protected wells (51.7%) and boreholes (24.4%) as main sources. Eastern Province depends heavily on boreholes (46.5%) but also has the highest surface water use (8.8%) and limited piped access (7.3%). Western Province has the lowest access (84.8%), with 36.6% using protected wells and 12.6% still relying on unprotected springs the highest nationally. Despite the improvements, the number of people using safe water from the public water supply is very small which is a potential source of waterborne diseases.

In addition to lack of access to safe drinking water, a great proportion of households do not have the capacity to store water due to the lack of financial capacity to install water storage facilities such as tanks.⁵⁰

Another relevant issues among the top 10 districts with low AC was Transportation with the Transportation Access index exceeding 0.7 in most of these Districts. This issue is also highlighted by statistics of EICV 7 survey. According to the survey, only 16% of rural households in Rwanda own bicycles, whereas 12% of households own bicycles in urban areas. Bicycle ownership is notably higher among low-income earners. On the other hand, the private car ownership is also very limited. EICV 7 data shows that just 6% of households in Kigali own a private car, while nationwide, about 2% of the population owns one. While access to all-weather roads is nearly universal (99%), and 95% of rural households can reach a road within 20 minutes, satisfaction with road quality stands at only 62%. Public transport access is also uneven: in urban areas, 54% of residents live within 20 minutes of public transport, compared to just 17% in rural areas, which is the dominant reality in the top 10 low AC districts. Rwanda commitment to invest in sustainable transport systems, resilient road infrastructure, and the development of green rural livelihoods will require extra efforts to improve the suitability of rural roads. These efforts need to be guided by the Green Growth and Climate Resilience Strategy (GGCRS) and focus on integrating climate considerations into rural planning, rural land use planning, and natural resource management.

⁵⁰ https://waterportal.rwb.rw/sites/default/files/2022-07/03-12-2020_Final%20Report_Water_Users_Assessment.pdf

Other indicators that have a large effect on Adaptive Capacity, Household Assets (all of districts have a high index >0.68), Women's Education (Kirehe has a high index), Social Capital (all districts have a high index except Nyagatare and Ngoma).

Access to Climate-Resilient Infrastructure (Kirehe and Gakenke have a high index), Early Warning Systems (Nyamagabe alone has a high index), and Access to Climate Information at the Household Level (all districts have a high index except Nyamasheke and Nyaruguru),

Effective Initiative: Saving Harvests, Assets and Lives: How Rwanda's Flood Early Warning Systems are Protecting Communities

In recent years, Rwanda has taken decisive action to protect its people and livelihoods from the growing threat of floods. Through the implementation of advanced early warning systems including river monitoring technologies, the country is building a stronger, more climate-resilient future.

This system uses real-time river level monitoring and cutting-edge technology to provide timely alerts to both local authorities and residents. The early warnings are shared through a newly developed smartphone app and other communication channels, allowing communities to act before disaster strikes.



Early warning system installed at Sebeya River

Across Rwanda, such systems have been installed along rivers, sending water level data every 15 minutes to a central hub managed by the Rwanda Water Resources Board (RWB). These systems empower decision-makers to issue alerts in time to prevent loss of life, property, and crops.

For Alphonse Nsanzabera, a farmer in the flood-prone Akanyaru Valley, the system has already made a life-changing difference.

“We now understand the role of this system after receiving thorough explanations,” Alphonse shared. “Last year, we were warned that the water levels in the river were rising rapidly just before harvest time. We harvested immediately, and soon after, the river overflowed, flooding the gardens.”

This success story from the Akanyaru Valley is just one example of how early warning systems are turning the tide against natural disasters in Rwanda. With continued innovation and investment, it is believed that access to information and the utilisation of early warning systems will reach the community and will drive the main activities that will help people cope with the disaster risk reduction side of climate change.

5.3. Exposure to climate change

According to the 2022/2023 annual report from the Rwanda Biomedical Centre (RBC), several sectors recorded malaria incidence rates exceeding 100 cases per 1,000 people and, notably, saw these rates increase in 2023 rather than decrease. These sectors are located within the districts of Gasabo, Rulindo, Gisagara, Bugesera, Nyaruguru, Nyamagabe, Rusizi, Nyamasheke, Rutsiro, Gakenke, Muhanga, Gicumbi, and Musanze, as indicated on the referenced map.

Among these, the highest incidence rates were reported in Gisagara, Nyaruguru, Nyamagabe, Gasabo, Gicumbi, Rulindo, and Rutsiro. Particularly alarming are Gicumbi, Gasabo, and Rulindo,

where malaria incidence surpassed 450 cases per 1,000 people in 2023.

These districts also rank among the most exposed in the country, with malaria exposure index values exceeding 0.6, indicating a strong correlation between high malaria incidence and overall environmental and health vulnerability. The rising trend underscores the urgent need for targeted, climate-informed malaria interventions in these high-risk areas.

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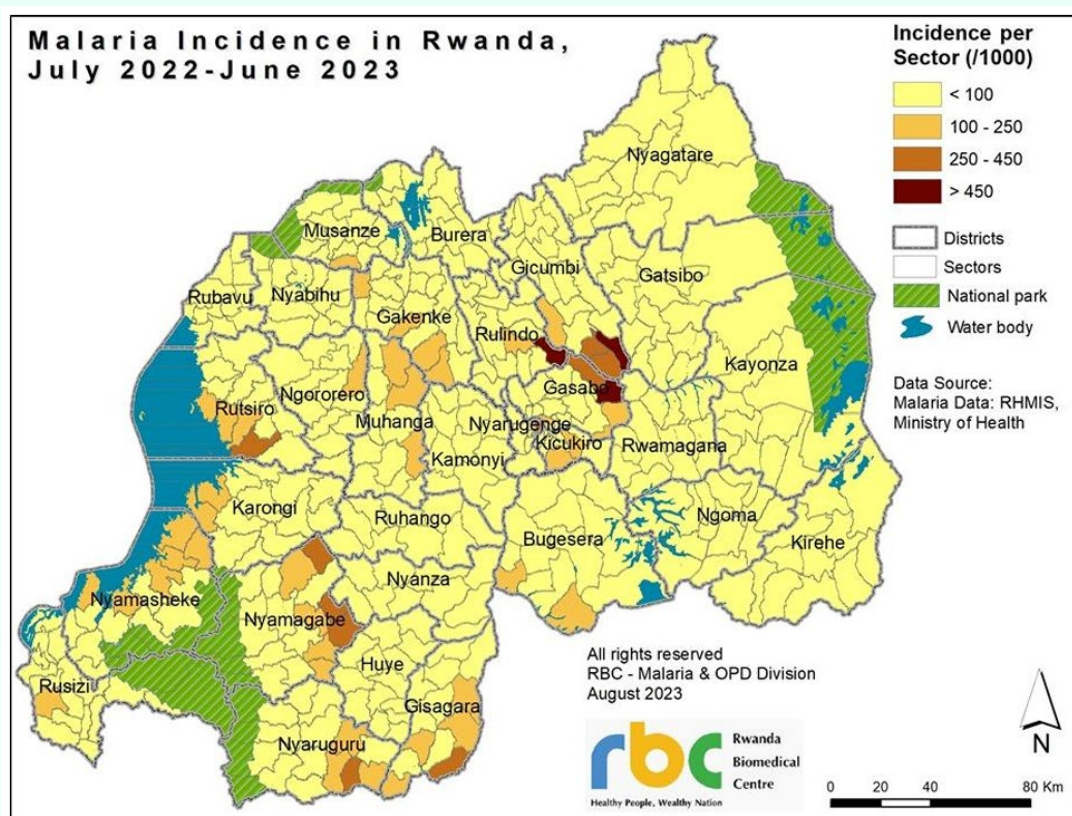


Figure: Malaria incidence in Rwanda per sector/1000.51 (Source: RBC)

Linking Temperature Variability to Malaria Prevalence in Rwanda highlights a critical relationship between temperature variability reported by the community (increase) comparison to the past and malaria incidence. Temperature fluctuations are known to influence mosquito breeding cycles, parasite development, and transmission dynamics, making malaria more difficult to control in areas experiencing climate extremes.⁵²

Districts such as Kayonza (0.848), Gatsibo (0.799), Nyagatare (0.726), Gasabo (0.719), and Gisagara (0.716) recorded the highest temperature variability indices, signalling heightened environmental stress. These areas also report elevated malaria incidence, as seen in sectors like Raiko (Gicumbi), Mukindo (Gisagara), and Kairu (Gasabo) all of which surpassed 100 malaria cases per 1,000 people during FY 2022–2023.

51 RBC (2024) Rwanda malaria and neglected tropical <https://newmoh.prod.risa.rw/index.php?eID=dumpFile&t=f&f=115948&token=4ea0ccd22a06bbb-17b538af71791eb156121ec63>

52 Lisbeth Amarilis Hurtado, José E. Calzada, et al, (2018) Climatic fluctuations and malaria transmission dynamics, prior to elimination, in Guna Yala, República de Panamá, available at: <https://malariajournal.biomedcentral.com/articles/10.1186/s12936-018-2235-3>

This correlation reinforces findings from Malaria Strategic Plan, which emphasize climate change as a key driver of vector-borne diseases. Districts with significant temperature shifts are more susceptible to prolonged transmission seasons and increased vector survival, especially in low-altitude or semi-arid areas like Nyagatare and Kayonza.

Therefore, malaria control efforts in these regions must integrate climate-sensitive strategies, such as real-time surveillance, adaptive vector control, and climate-resilient health infrastructure to effectively address the dual challenge of rising temperatures and disease burden.

5.4. Total Vulnerability

As described previously, the 10 most vulnerable districts identified are Nyagatare, Gatsibo, Gisagara, Nyamagabe, Ngoma, Karongi, Gicumbi, Kamonyi, Ngororero, and Ruhango. A deep analysis of the indicators behind their vulnerability shows that most of them are adaptive indicators. This shows how generally these districts are less adaptive to the change of climate. Most of these districts are in drought and water scarcity zones of western and southern province while others are in the zones which are sometimes affected by heavy rain related effects such as the landslides. The challenges of these districts to adapt to the threats related to these indicators were already known by the government of Rwanda as some of them have been benefiting from large-scale projects that were/are aiming to address the identified issues. For example, Nyagatare and Gatsibo districts are the focus of major water infrastructure projects aimed at enhancing water security, agricultural productivity, and local livelihoods. In Gatsibo District, the proposed Warufu Dam, to be constructed upstream of Karehe village, is designed to store approximately 25 million cubic metres of water. This reservoir will provide a reliable irrigation supply for 2,500 hectares and supply clean water to the Nyagahanga, Ngarama, and Gatsibo sectors. It will also support downstream environmental flows and supplementary irrigation, while offering potential for fisheries development to boost food security and income generation for local communities. Meanwhile, in Nyagatare District, the Rwanda Water Resources Board, with support from the African Development Bank, is implementing the Muvumba Multipurpose Water Resources Development Program (MMWRDP). The dam will have a gross storage capacity of 54.8 million cubic metres. It is set to provide stable water resources for domestic use, agriculture, and hydropower. The project will supply 50,000 cubic metres of water per day for people and livestock, irrigate 8,820 hectares, and generate 5.2GWh of firm energy annually with an average output of 6.9GWh. Together, these developments in Nyagatare and Gatsibo represent significant strides toward sustainable water resource management and socio-economic development in the region.

Multi-sector initiatives: Building resilience in drought prone areas: Solar powered irrigation



Nasho irrigation scheme using solar powered system, and a vegetable farmer.

Solar-powered irrigation is transforming agriculture in Rwanda's Eastern Province, with projects like the Nasho Solar-powered Irrigation Project and others in Kirehe District driving notable gains in productivity and livelihoods. These initiatives enable farmers to expand their farms, diversify crops, and boost incomes by providing reliable, sustainable water sources. The impact on community resilience is clear: in Bugesera District, one farmer expanded her land from 0.5 to 3 hectares through support from the Sustainable Agricultural Intensification and Food Security Project (SAIP); in Ngoma District, a woman-led cooperative increased seasonal earnings from under RWF 200,000 to over RWF 2 million from solar-irrigated produce; and in Rulindo District, a female farmer praised the system's ease and independence, noting she can now irrigate her crops without male assistance.

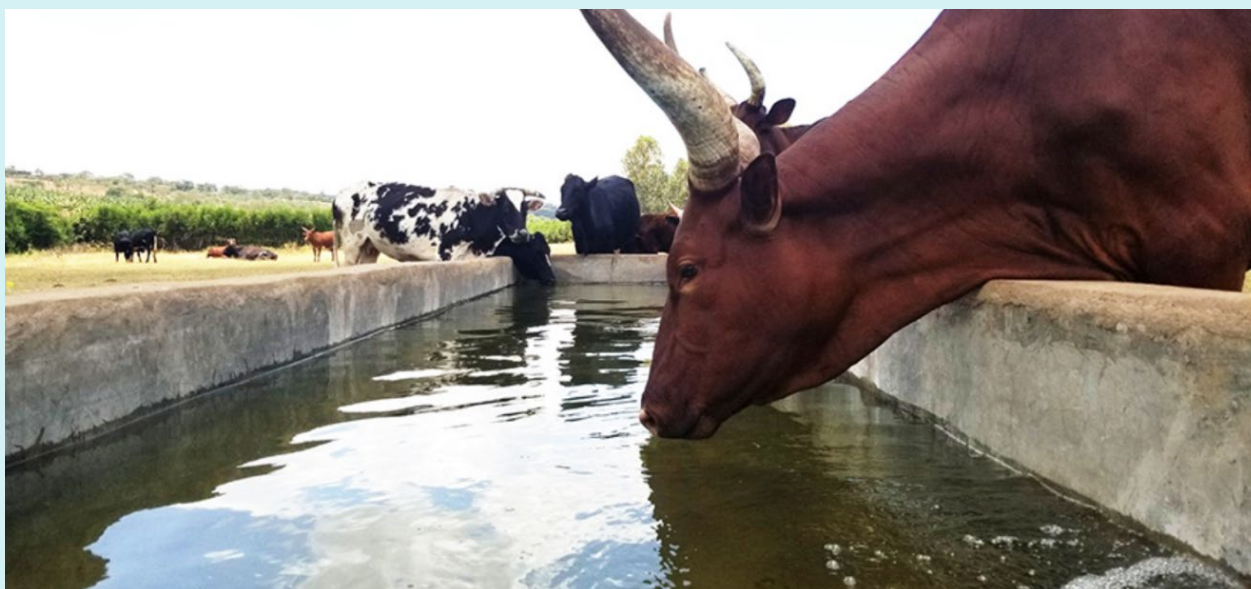


Photo: Cows drink water from a trough supplied with water by a solar-powered borehole in Eastern Province. Access to clean water is expected to increase milk production especially in the dry season.

The remaining districts have been benefiting from wide scope project that are being implemented either at catchment level or at regional level. For example, Gisagara and Kamonyi are part of Green Amayaga project which aims to restore 263,000 hectares across four districts (Ruhango, Gisagara, Kamonyi and Nyanza), benefiting 1.3 million people and creating 150,000 green jobs. It promotes

watershed rehabilitation, biodiversity conservation, and sustainable agriculture. Key activities include forest restoration, clean energy distribution, livestock support, and large-scale carbon emission reduction.

Ngororero district is part of Sebeya project, a project that is covering the areas of different districts which are part of Sebeya Catchment. These districts include: Nyabihu, Rubavu, Rutsiro, and Ngororero.

In these districts the Sebeya project restored thousands of hectares through terraces, afforestation, and agroforestry across four districts. Major flood control infrastructure was built, including dikes, dams, and diversion channels. Households and schools benefited from rainwater harvesting tanks, livestock, kitchen gardens, and improved cooking stoves. The project also created over 36,000 jobs and supported income-generating activities to strengthen community resilience. All those activities have been conducted under a community-based planning and implementation framework (community-based, participatory approach).

Ruhango and Gicumbi are part of Green Amayaga and Green Gicumbi projects, respectively. These projects aim to combat climate change, restore ecosystems, and uplift rural livelihoods. Green Amayaga targets 263,000 hectares, benefits 1.3 million people, creates 150,000 green jobs, and includes forest restoration and clean energy access. Green Gicumbi has restored 1,240 hectares, created 38,000 jobs, and supported over 140,000 people through climate-resilient agriculture and housing in Gicumbi district. Meanwhile, Ngoma district, located in Western province, is going to benefit from the new Sake Water Supply System which will deliver 33,000 m³/day of clean water to 14 sectors and parts of Kigali City through a modern distribution network, to be constructed by WASAC.

Positive Interventions: Building Climate Resilience in Rural Rwanda

Rwanda's mountainous terrain, limited community financial resources, and increasingly unpredictable climate continue to affect rural livelihoods, making it difficult for communities to adapt to climate change. The impacts such as floods, landslides, droughts, and crop losses have become more frequent and severe, threatening food security and economic stability.

To tackle these challenges, Rwanda has launched several multi-sectoral projects aimed at addressing the root causes of vulnerability while improving living conditions. One the key initiative is Green Gicumbi, officially titled "Strengthening Climate Resilience of Rural Communities in Northern Rwanda." Launched in 2019 with USD 32 million in funding from the Green Climate Fund (GCF), the project was designed to build long-term climate resilience through sustainable, community-led solutions.



Implemented by the Rwanda Green Fund (FONERWA), this six-year initiative aims to reduce climate vulnerability and enhance adaptive capacity in nine sectors within the Muvumba B sub-catchment. The project targeted 150,000 direct and 380,000 indirect beneficiaries across approximately 252 villages.

The project achieved significant milestones in climate resilience and sustainable development. A total of 12,000 hectares of land were placed under erosion control, including 600 hectares of radical terraces and 850 hectares of progressive terraces. 7,410 hectares were planted with agroforestry trees, and 1,075 hectares were restored with protective forestry along rivers, roadsides, and steep slopes. A further 1,107 hectares of degraded forest were rehabilitated, and 3.3 million seedlings planted. While in high-elevation areas, 40 hectares were established with coffee plantations and 50 hectares with tea.

The project created 23,000 green jobs, distributed 245 cows to vulnerable families through the Girinka Program, and supported 14 cooperatives with RWF 694 million in financial assistance from the Community Adaptation Fund. Clean energy initiatives reached 19,900 households with cookstoves, along with 10 biogas units and 40 institutional stoves.

Climate monitoring improved with 3 automated weather stations installed. Other infrastructure included 135 rainwater harvesting systems, 33 underground tanks, 32 hectares of infiltration ditches, and 4,642 check-dams. Overall, these interventions helped reduce 5,746 tons of CO₂ emissions, while 7,215 people received climate adaptation training.

Many areas across Rwanda still require similar investments to reduce community vulnerability to climate change and strengthen their adaptive capacity. Expanding such initiatives can help build resilient communities, improve livelihoods, and ensure long-term sustainability in the face of environmental challenges.

Moreover, Kamonyi and Gisagara are among the target districts under the Forest Investment Program (FIP), which aims to enhance climate-resilient development and livelihoods in Rwanda. This is being achieved through the restoration and stabilization of landscapes using agroforestry systems that support sustainable agriculture and green growth.

In addition, the Congo Nile Divide Project, launched in 2024, targets 10 districts across the Southern and Western Provinces including Nyamagabe and Ngororero for forest and landscape restoration efforts.

In the Eastern Province, the districts of Ngoma, Gatsibo, and Nyagatare benefit from the TREPA and COMBIO projects. These initiatives aim to reduce climate vulnerability by restoring degraded landscapes through activities such as reforestation, agroforestry, erosion control, biodiversity restoration, and community-based conservation.

Based on the scope of these interventions and the findings from this assessment, several important questions arise:

- Is the status in these districts a result of limited geographical coverage due to funding constraints?
- Are these initiatives still in their early stages, and therefore not yet operating at full capacity to deliver impactful climate adaptation outcomes for communities?
- Or are the impacts of climate change accelerating at a pace that exceeds the positive outcomes of ongoing interventions?

These questions highlight the need for continuous evaluation of both the scale and effectiveness of climate resilience initiatives to ensure they are meeting their intended goals.

However, what is known is that Rwanda is experiencing a clear trend of climate change, with rising temperatures and increased rainfall variability, leading to more frequent and intense extreme weather events like droughts and floods. Temperatures have risen, and are projected to continue rising, especially during the dry seasons, while rainfall patterns are becoming more erratic, and with shorter, more intense rainy seasons and longer, drier period.

The Global temperatures in 2024 were above the 1991-2020 average across most of the planet. The 2024 global temperature anomaly (or “difference from average”) is 0.18 degrees F (0.10 degrees C) warmer than the previous record, set the year before, in 2023. The ten warmest years in the 175-year record have all occurred during the last decade (2015–2024). Since 2000, the first year to set a new

high-temperature record was 2005. Now, 2005 is the 13th warmest year on record.⁵³

The prevalence of drought has been associated with the recent outbreaks of pests and invasive plant species that are generally observed during the dry period.

6. National Vulnerability Indicators - update

National Climate Change Vulnerability Assessment Framework

This section updates the national vulnerability assessment framework with new data, for the third time, building on assessments prepared in 2015 and 2018.

The national vulnerability assessment framework was developed in 2015 to use national data to assess vulnerability in Rwanda using a framework that is similar in approach to the household vulnerability assessment framework.

This assessment uses NISR data and other sources - data that are highly credible in Rwanda and internationally.

For a background on each of the indicators used in 2018, see the report issued that year. This 2025 report updates the framework of indicators with newly available data, trying to get the most recent data available. The recent release of new data from NISR, based on the 2022 census, was timely to be able to incorporate the newest data.

The report provides data from the 2018 report as well as new data and provides a comparison in terms of whether the situation improved, remains the same or deteriorated. It is this comparison that provides the analysis - to identify the change for each indicator and to see the direction of the change.

The national vulnerability assessment framework has been updated in 2025 with new data, for the third time, building on assessments prepared in 2015 and 2018.

The national vulnerability assessment framework was first developed in 2015. Its aim was to use national data to assess national vulnerability in Rwanda, using a framework of national vulnerability indicators modelled on the ND-GAIN Vulnerability Index assessment. The national vulnerability indicators provided the model for the household vulnerability assessment framework, and it's set of indicators which are used in the Index Assessment.

This national vulnerability assessment uses NISR data and other national sources consistent with its aim of using data that are highly credible in Rwanda and internationally.

For a background on each of the indicators used in 2018, see the report issued that year.⁵⁴ This 2025 report updates the framework of indicators with newly available data, trying to get the most recent data available. The recent release of new data from NISR, especially EICV-7 reports, based on the 2022 census, was timely to allow the use of the newest data.

⁵³ *Monthly Climate Reports | Global Climate Report | Annual 2024 | National Centers for Environmental Information (NCEI)*

⁵⁴ https://www.climatechange.gov.rw/fileadmin/user_upload/Rwanda_Climate_Change_Vulnerability_Report__2019_.pdf

The report provides data from the 2018 report as well as new data and provides a comparative analysis - indicating whether the situation has improved, remains the same or has deteriorated. It is this comparison that provides the analysis - to identify the change for each indicator and to see the direction of the change.

The Updated Report can be found in Annex E, in this document.

7. Conclusion

The vulnerability of Rwanda has deteriorated statistically and significantly from 0,394 in 2018 to 0,520 according to the vulnerability index assessment based on responses of Household Heads to survey questions. The increased vulnerability is well indicated based on responses to the household survey. Using maps, the Assessment has sought to visibly represent the findings and show the location of the vulnerability.

The assessment of vulnerability indicators across Rwanda reveals that districts are not equally exposed to risks as some face significantly higher challenges than others. A closer examination of their vulnerability profiles reveals a complex and interconnected set of challenges spanning multiple sectors. Ten indicators with an Index value greater than 0.700 dominate the Vulnerability Index assessment for the ten most Vulnerable Districts. Districts with a low Adaptive Capacity are highly disadvantaged when it comes to overcoming their vulnerability represented by a high index for Exposure and/or Sensitivity.

Ten indicators were used as a basis to rank the top 10 districts with high or very high vulnerability in 2025. These indicators are mostly related to low adaptive capacity and drove the perceptions about high vulnerability in the ten districts. The Eastern province has the highest vulnerability index of 0.541, followed by the Southern province with 0.534, followed by the Western province with 0.528, followed by the Northern province with 0.514 while the City of Kigali has a vulnerability index of 0.484.

The change in the national CC vulnerability index between 2018 and 2025 can be for a plethora of reasons. The statistical assessment, using various tests, indicates the change is significant and that the provinces have changed in a similar way. A pair-wise test was done between all the districts to provide more information. Test results are provided in the report.

There have been changes in the national and rural economy between 2018 and 2025. There have been changes in the actual conditions of peoples' lives from climate change, mainly from increased climate variability, which is increasing.

Not all communities have benefitted from each of the government interventions. And communities respond differently to the opportunities made available to them when programs or interventions are implemented or provided.

Local conditions faced by households can be different from broader conditions, i.e., national conditions, which are better known to national planners in central and sector Ministries and agencies. Overall, the data highlights a clear need for tailored, multisectoral interventions across the most vulnerable districts. Enhancing adaptive infrastructure, expanding access to clean energy, improving water and health services, and strengthening climate preparedness systems will be essential to reducing vulnerability and building long-term resilience in Rwanda's most at-risk areas.

8. Recommendations

In the context of increasing climate variability and environmental stressors, Rwanda continues to demonstrate a strong national commitment to resilience and sustainable development. However, recent assessments have revealed persistently poor indicators across several critical sectors particularly in the most climate-vulnerable districts. These indicators highlight significant gaps in access to basic services, infrastructure resilience, and adaptive capacity, posing risks to livelihoods, health, and economic stability.

To address these challenges, targeted and context-specific recommendations have been developed to guide interventions in sectors where performance remains low. These recommendations aim to accelerate progress toward climate resilience, social equity, and sustainable development by focusing on the root causes of vulnerability and enabling more inclusive, adaptive solutions at the community and district levels.

This section outlines actionable strategies across key sectors including water, agriculture and livestock, energy, health, transportation, forestry, and socio-economic resilience. It emphasizes the importance of localized planning, community engagement, and inter-sectoral coordination to ensure that adaptation measures are not only effective but also equitable and sustainable.

The proposed recommendations are grounded in principles of climate resilience, participatory development, and long-term impact.

1. Water Sector

1.1 Household with access to drinking water (AC):

- Expand and maintain resilient water infrastructure to ensure year-round access to safe drinking water, especially in climate-vulnerable and remote communities. (Especially benefit Nyamagabe, Rutsiro, Nyagatare, Gatsibo, Kayanza & Ngoma districts which have a low adaptive capacity.)

1.2 Household with water storage capacity:

- Expand the installation of household-level rainwater harvesting and storage systems to enhance resilience during periods of water scarcity. (May especially benefit all districts with the lowest adaptive capacity ranking, see Table 14.)

2. Agriculture and Livestock Sector

2.1 Household access to and use of irrigation (AC):

- Expand the climate-resilient water storage and irrigation infrastructure, such as solar-powered systems, to ensure efficient and reliable water access for smallholder farmers. (May especially benefit all districts with the lowest adaptive capacity ranking, see Table 14.)
- Support community-based water management initiatives to optimize the use and maintenance of shared irrigation resources under changing climate conditions. (May especially benefit all districts with the lowest adaptive capacity ranking, see Table 14.)

2.2 Farmers' knowledge of climate-resilient farming methods (AC):

- Increase targeted training programs to improve farmers' awareness and adoption of climate-resilient practices like drought-tolerant crops and soil conservation. (May especially benefit six districts with low adaptive capacity: Kirehe, Nyamasheke, Gatsibo, Muhanga, Nyagatare and Nyamagabe.)

3. Energy Sector

3.1 Proportion of households reliant on consumption of fuel wood (S)

- Keep empowering the adoption of affordable, clean cooking technologies such as improved cookstoves or solar cookers to reduce dependence and simultaneously promote agroforestry.

- Provide more support for local energy private operators to reach underserved communities in the high vulnerability districts.
- Increase technical capacity of district planners (especially in high vulnerability districts) to mainstream climate resilience into district level energy access plans.
- (May especially benefit all districts with the lowest adaptive capacity ranking, see Table 14.)

4. Health Sector

4.1 Proportion of Households Experiencing Malaria (E):

- Empower and reinforce community-based malaria prevention programs, including distribution of insecticide-treated bed nets and local health education on climate-sensitive disease risks. (May especially benefit Gasabo, Gicumbi, Gisagara, Gatsibo and Rutsiro districts.)

5. Transportation Infrastructure Sector

5.1 Means of HH transportation (variety of vehicles used) - to school, market, clinic, etc. (AC)

- Improve road drainage systems and water flow management: build and rehabilitate drainage canals, culverts, and storm-water channels along major and feeder roads to reduce waterlogging and erosion during intense rainfall in the most vulnerable districts. (May especially benefit all districts with the lowest adaptive capacity ranking, see Table 14.)

5.2 Physical vulnerability of local infrastructure (roads and bridges) in their district (AC)

- Continue to upgrade and climate-proof rural and district roads: use climate-resilient materials (e.g., reinforced concrete, retaining walls, Gabions, geogrids) and raise road elevation levels to reduce vulnerability to flooding and landslides, in the most vulnerable districts. (May especially benefit all districts with the lowest adaptive capacity ranking, see Table 14.)

6. Socio Economic

6.1 Extent of Social Capital in households (AC)

- Increase and strengthen the formation and reinforcement of community groups, cooperatives, and local support networks to build social cohesion and mutual aid systems in the face of climate shocks. (May especially benefit all districts with the lowest adaptive capacity ranking, see Table 14.)
- Simultaneously, prioritize the creation of green jobs that directly support climate adaptation and resilience efforts. These jobs could include, for example, technicians for rainwater harvesting systems, community wells/borehole repair, and climate-resilient irrigation infrastructure; solar panel installation and maintenance specialists; compost production workers; beekeeping and pollination entrepreneurs; nursery workers in seedlings preparation; pottery workers; new members of cultural troops. (May especially benefit all districts with the lowest adaptive capacity ranking, see Table 14.)

6.2 Use of climate information in household decision making (AC)

- Increase access to localized, easy-to-understand climate information through community outreach, radio, and mobile platforms. (May especially benefit all districts with the lowest adaptive capacity ranking, see Table 14.)

7. Forestry

- Expand community forestry, and Private Forest Management Units (PFMU),
- Scale up forest restoration by prioritizing climate-resilient native species,
- Increase promotion of agroforestry systems to restore ecological balance.
- (May especially benefit all districts with the lowest adaptive capacity ranking.)

8. Human Settlements

- Continue to strengthen community resilience to climate change by prioritizing the development and upgrading of human settlements particularly in high-risk rural and peri-urban areas, including the extension of crucial infrastructure, such as electricity, water, health centres and rural roads, in the most vulnerable districts.
- Continue the gradual and participatory relocation of vulnerable households currently living in floodplains, steep slopes, and deforested hills to safer, planned, well-serviced areas.
- Ensure all relocations plans support livelihood opportunities necessary for community acceptance and long-term sustainability.

Annexes

Annex A - National Vulnerability Indicators: Household level assessment

No.	Sector	This table provides Household level Indicators for the 2024-25 National Climate Vulnerability Index Assessment, arranged by Sector (new indicators in red)
1	Energy 4 indicators	Access to electricity in the household (AC) Proportion of households reliant on consumption of fuelwood (S) Energy source use for lighting (AC) Type of cookstoves used (AC)
2	Transport 2 indicators	Means of HH transportation (variety of vehicles used) - to school, market, clinic, etc. (AC) Physical vulnerability of local infrastructure (roads and bridges) in their District (S)
3	Human Set- tlements 3 indicators	Physical vulnerability of houses and farm plots at household level in their district (E) Household Assets and Change in HH assets (AC) Household use of critical infrastructure to access markets, clinics and schools (S)
4	Forestry 2 indicators	Local or community forest and woodlot size (ha) (E) Participation in agro-forestry tree planting training, number of trees planted (AC)
5	Agriculture and Livestock 7 indicators	Diversification of household agricultural production (S) Frequency of animal diseases at household level (S) Proportion of HH that are food insecure and requiring food assistance (S) Extent of organic manure used by household (AC) Household access to and use of irrigation (AC) Farmers knowledge of climate resilient farming methods (AC) Proportion of household with access to farmland (AC)
6	Water 5 indicators	Perceived change or variability in rainfall (E) Perceived change in level of river water (E) Perceived change in level of borehole/groundwater (E) Household access to drinking water (AC) Household with water storage capacity (AC)
7	Health 4 indicators	Proportion of households experiencing malaria (E) Health Status of household members (E) Proximity of household to health posts (AC) Social Safety net effectiveness (health Insurance) (S)

8	Socio-Eco- nomic / Livelihoods/ Income and Assets 8 indicators	Extent of Social Capital in household (AC) Education levels attained by women (AC) Participation in building Adaptive Capacity (AC) Use of climate information in household decision making (AC) Change in household income, savings and debt (AC) HH access to financial institutions and savings groups (AC) Change in occupation of household members (AC) Impact of climate change affecting household livelihoods (S) Age Dependency Ratio (ADR) (S)
9.	Meteorologi- cal/ Disaster Management 5 indicators	Perceived variability in temperature (change) (E) Perceived variability in heat (heat waves) (E) Perceived variability of rainfall, rainstorm intensity, floods and droughts (E) Access to disaster early warning system for extreme events (AC) Proportion of households experiencing loss due to weather hazards (S)
	t=41	

Annex B – National Vulnerability Indicators, 2025: National level assessment

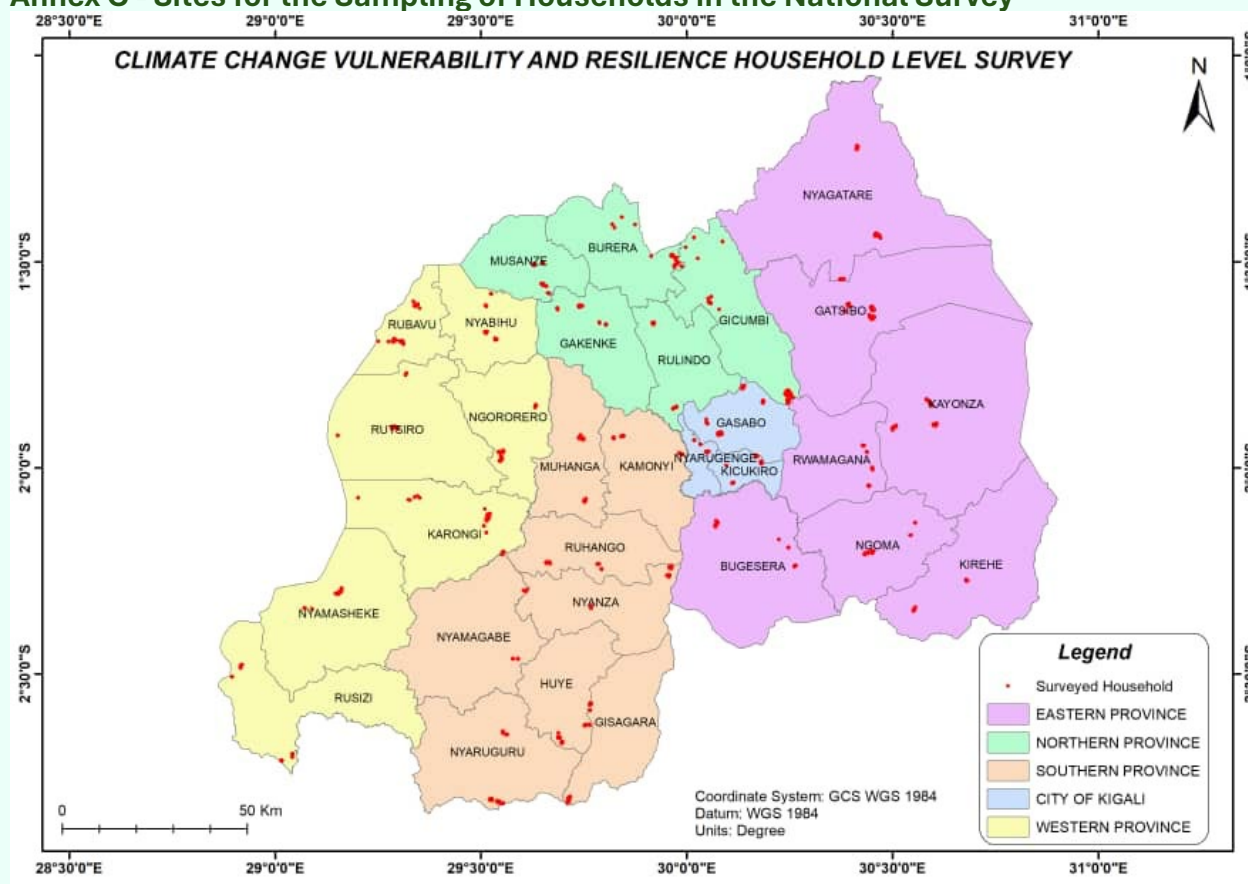
Rwanda - Climate Change National Vulnerability Indicators, 2025, by Sector (new indicators, 2025, in red)	
1. Energy	
1.1	Change of Hydropower Generation Capacity
1.2	Level of Dependency on Imported Fuel
1.3	Proportion of Population with Access to Electricity for Lighting
1.4	Proportion of National Energy Mix from Renewable Sources
2. Transportation Infrastructure	
2.1	Quality of Trade and Transportation Infrastructure
2.2	Length of Paved National Roads
2.3	Condition and Maintenance Status of Critical Infrastructure
2.4	Frequency and Duration of Infrastructure Disruptions
2.5	Proportion of Infrastructure Equipped with Flood and Erosion Control Systems
2.6	Availability of Public Transportation in Climate-Vulnerable Areas
3. Human Settlements	
3.1	Rural Population as % of Total Population
3.2	Proportion of Urban Population Living in Slum Areas
3.3	Proportion of Population Living in IDP Model Villages in Rural Areas
3.4	Upgraded Human Settlement Sites in Urban Areas
3.5	Restored Landscapes Sites from Degraded Human Settlement Zones
3.6	Proportion of Green Spaces and Vegetation Coverage in Urban Areas
4. Forests	
4.1	Change in % of National Forest Cover
4.2	Change in Size (ha or km ²) of Natural Habitat or Critical Ecosystems

4.3	Proportion (%) & Extent (ha) of Land Area Protected to Maintain Biodiversity & Natural Ecosystem
4.4	Number of Forest-Dependent Communities
4.5	Extent of Habitat Fragmentation vs Connectivity
5. Agriculture and Livestock	
5.1	Change in Agricultural Production
5.2	Extent of Fertilizer Use in Agricultural Production
5.3	Number of Hectares of Irrigated Land
5.4	Extent of Severe Slopes Terraced
6. Water	
6.1	Annual Precipitation Run-off Rate
6.2	Annual Groundwater Recharge Rate
6.3	Freshwater Withdrawal Rate
6.4	Change in Future Water Demand
6.5	Capacity of Dams and Lakes to Store Water
6.6	Access to Reliable Drinking Water
6.7	Land Recognized as Natural Water Retention Areas (Wetlands)
7. Health	
7.1	Level of Severe Child Malnutrition
7.2	Change in Number of Deaths from Diarrhea Diseases and Malnutrition
7.3	Change of Malaria Hazard
7.4	Rwanda's Dependency on External Resource for Health Services, i.e., Dependency of Health system on donor funds
7.5	Change in Access to Health Care Facilities
7.6	Access to Improved Hygiene Sanitation Facilities
7.7	Prevalence of Injury or Death Related to Disasters Linked to Climate Change
7.8	Health Insurance Coverage by HH
8. Socio-Economic / Livelihoods / Income and Assets	
8.1	Projected Growth in Population to 2030 and 2035
8.2	Age-Dependency Ratio
8.3	Total Urbanized Population
8.4	Effectiveness of Rwanda's Social Safety-Net/Social Protection System
8.5	Level of Education Attained by Women
9. Cross cutting - Meteorological / Disaster Management	
9.1	Strength of Government Capacity and Coordination to Mainstream Climate Change
9.2	Annual Frequency of Continuous Warm Days Above 30°C

9.3	Current Annual Mean Temperature and Annual Change in Temperature
9.4	Annual Loss Due to Damage Caused by Multi-Hazards
9.5	Number of People with Access to Improved Climate-Related Early Warning Information
9.6	Percentage of the Area of Rwanda Covered by the Meteo Rwanda
9.7	Extent of Use of Climate Information Products & Services in Decision-Making
9.8	Amount of Climate Finance Mobilized Annually from All Sources

t = 53 Indicators

Annex C - Sites for the Sampling of Households in the National Survey



Annex D, Table1: Sites (Sample Distribution) for the National HH Survey - Listing locations across all domains/districts

Province/ District	Population			Sample (PPS)			Sample		
	Total	Urban	Rural	Total	Urban	Rural	Urban	Rural	Total
Rwanda	3312743	964287	2348456	100	0.29	0.71	707	1730	2437
City of Kigali	488868	432432	56436	0.15	0.88	0.12	322	44	366
Nyarugenge	103985	91603	12382	0.21	0.88	0.12	68	9	77
Gasabo	249420	206614	42806	0.51	0.83	0.17	155	32	187
Kicukiro	135463	134215	1248	0.28	0.99	0.01	101	1	102
Southern Province	760173	108719	651454	0.23	0.14	0.86	78	482	560
Nyanza	93007	9087	83920	0.12	0.10	0.90	7	60	67

Gisagara	101145	3395	97750	0.13	0.03	0.97	2	71	73
Nyaruguru	73805	1902	71903	0.10	0.03	0.97	2	54	56
Huye	96037	17208	78829	0.13	0.18	0.82	13	60	73
Nyamagabe	92052	8888	83164	0.12	0.10	0.90	7	60	67
Ruhango	94508	10576	83932	0.12	0.11	0.89	7	60	67
Muhanga	93241	21089	72152	0.13	0.23	0.77	17	56	73
Kamonyi	116378	36574	79804	0.15	0.31	0.69	26	58	84
Western Province	671506	148659	522847	0.20	0.22	0.78	107	380	487
Karongi	91444	8794	82650	0.14	0.10	0.90	7	61	68
Rutsiro	86802	4951	81851	0.13	0.06	0.94	4	59	63
Rubavu	124080	69462	54618	0.18	0.56	0.44	49	39	88
Nyabihu	76391	18485	57906	0.11	0.24	0.76	13	41	54
Ngororero	92623	4560	88063	0.14	0.05	0.95	3	65	68
Rusizi	104937	35056	69881	0.16	0.33	0.67	26	52	78
Nyamasheke	95229	7351	87878	0.14	0.08	0.92	5	63	68
Northern Province	506064	88394	417670	0.15	0.17	0.83	62	304	366
Rulindo	91909	9898	82011	0.18	0.11	0.89	7	58	65
Gakenke	93609	4009	89600	0.18	0.04	0.96	3	63	66
Musanze	119387	58426	60961	0.24	0.49	0.51	43	45	88
Burera	91786	9158	82628	0.18	0.10	0.90	7	59	66
Gicumbi	109373	6903	102470	0.22	0.06	0.94	5	76	81
Eastern Province	886132	186083	700049	0.27	0.21	0.79	138	520	658
Rwamagana	121051	41920	79131	0.14	0.35	0.65	32	60	92
Nyagatare	160435	40099	120336	0.18	0.25	0.75	30	88	118
Gatsibo	136208	14325	121883	0.15	0.11	0.89	11	88	99
Kayanza	114186	17233	96953	0.13	0.15	0.85	13	72	85
Kirehe	113886	7700	106186	0.13	0.07	0.93	6	80	86
Ngoma	102589	9196	93393	0.12	0.09	0.91	7	72	79
Bugesera	137777	55610	82167	0.15	0.40	0.60	40	59	99

Source: Fifth Rwanda Population and Housing Census, 2022 (NISR)

Annex C, Table 2. Sample distribution indicated by administrative sectors, cells and villages

Domain/District	Sector	Cell	Village	Sample
Nyarugenge	Kimisagara (Urban)	Kamuhoza	Isimbi	34
			Karwarugabo	34
	Kanyinya (Per-urban/rural)	Nyamweru	Bwimo	5
			Nyamweru	4

Gasabo	Kinyinya (Urban)	Kagugu	Kabuhunde I	75
			Kadobogo	80
	Rutunga (Per-urban/rural)	Kacyatwa	Kacyatwa	16
		Gasabo	Gasharu	16
Kicukiro	Nyarugunga (Urban)	Kamashashi	Kibaya	50
			Kabagendwa	51
	Gahanga (Rural)	Nunga	Mugendo	1
		Murinja	Mashyiga	0
Nyanza	Busasamana (Urban)	Kavumu	Akirabo	3
			Majyambere	4
	Busoro (Rural)	Gitovu	Kabeza	30
			Musumba	30
Gisagara	Save (Urban)	Rwanza	Cyezuburo	2
			Kivumu	0
	Nyanza (Rural)	Nyamugari	Akayange	35
			Rwamiko	36
Nyaruguru	Kibeho (Urban)	Kibeho	Agateko	2
			Sinayi	0
	Busanze (Rural)	Kirarangombe	Bukinanyana	24
			Kinyinya	30
Huye	Tumba (Urban)	Cyarwa	Agahora	7
			Agasharu	6
	Gishamvu (Rural)	Nyumba	Busoro	30
			Nyagatama	30
Nyamagabe	Gasaka (Urban)	Ngiryi	Karambi	3
		Nyamugari	Nyamugari	4
	Musange (Rural)	Nyagisozi	Dusenya	30
		Masangano	Nyakabuye	30
Ruhango	Ruhango (Urban)	Nyamagana	Butare I	3
			Gataka	4
	Bweramana (Rural)	Buhanda	Gakongoro	30
			Mpunu	30
Muhanga	Nyamabuye (Urban)	Gahogo	Ruvumera	10
			Kamugina	7
	Kabacuzi (Rural)	Ngoma	Gitwa	30
		Kavumu	Rukoma	26

Kamonyi	Runda (Urban)	Ruyenzi	Nyagacaca	10
			Rubumba	16
	Karama (Rural)	Nyamirembe	Gaji	30
			Nyakizu	28
Karongi	Bwishyura (Urban)	Gasura	Gisayo	3
			Ruganda	4
	Gashari (Rural)	Musasa	Kabasare	30
			Musasa	31
Rutsiro	Kivumu (Urban)	Bunyunju	Karungu	2
		Kabujenje	Kanyamatembe	2
	Boneza (Rural)	Bushaka	Gaseke	30
			Muramba	29
Rubavu	Rugerero (Urban)	Kabilizi	Ruhangiro	20
		Rugerero	Kabarora	29
	Busasamana (Rural)	Gasiza	Kinyababa	20
		Makoro	Karambi	19
Nyabihu	Mukamira (Urban)	Rurengeri	Kibugazi	7
		Jaba	Biriba	6
	Rambura (Rural)	Nyundo	Rwinkingi	20
		Birembo	Mariba	21
Ngororero	Ngororero (Urban)	Rususa	Kabagari	3
			Rususa	0
	Bwira (Rural)	Gashubi	Gasasa	30
			Rukeri	35
Rusizi	Gihundwe (Urban)	Burunga	Cyapa	10
			Gacamahembe	16
	Bugarama (Rural)	Ryankana	Gihigano	30
			Kagarama	22
Nyamasheke	Kagano (Urban)	Ninzi	Gasayo	3
			Murwa	2
	Kanjongo (Rural)	Kigoya	Kabaga	30
			Museke	33
Rulindo	Shyorongi (Urban)	Bugaragara	Gatwa	3
			Kigarama	4
	Base (Rural)	Cyohoha	Buramba	30
			Kabingo	28

Gakenke	Gakenke (Urban)	Rusagara	Kabaya	3
			Sitwe	0
	Busengo (Rural)	Birambo	Birambo	30
		Butereri	Buhuga	33
Musanze	Muhoza (Urban)	Cyabararika	Yorodani	20
		Ruhengeri	Burera	23
	Rwaza (Rural)	Nturo	Rubabi	25
		Musezero	Mutara	20
Burera	Butaro (Urban)	Rusumo	Budogoro	3
			Kanyesogo	4
	Bungwe (Rural)	Bungwe	Gakeri	30
			Rweru	29
Gicumbi	Byumba (Urban)	Gacuramb-wenge	Gasharu	3
			Rubyiniro	2
	Bukure (Rural)	Kivume	Karambo	30
			Ruyange	46
Rwamagana	Kigabiro (Urban)	Nyagasenyi	Rusave	16
		Cyanya	Kamata	16
	Munyaga	Zinga	Karambo	30
		Nkungu	Kabuye	30
Nyagatare	Rwimiyaga (Urban)	Rwimiyaga	Rebero	15
			Kizungu	15
	Karangazi (Rural)	Nyamirama	Nyamirama li	48
		Karama	Karama	40
Gatsibo	Kabarore (Urban)	Kabarore	Kabarore I	6
		Nyabikiri	Kabeza	5
	Rwimbogo (Rural)	Nyamatete	Kidugudu	40
			Kabeza	48
Kayonza	Mukarange (Urban)	Kayonza	Kayonza Centre	7
		Nyagatovu	Akanyinya	6
	Mwiri (Rural)	Nyamugari	Rwazana	40
			Gasarabwayi	32
Kirehe	Kiniga (Urban)	Ruhanga	Ku Murenge	3
			Nyakarambi li	3
	Gahara (Rural)	Butezi	Cyasusa li	40
			Kivogera	40

Ngoma	Kibungo (Urban)	Cyasemakamba	Amarembo	3
			Kiruhura	4
	Gashanda (Rural)	Cyerwa	Gako	40
			Ruyema I	32
Bugesera	Nyamata (Urban)	Kayumba	Gatare	20
			Rwanza	20
	Gashora (Rural)	Biryogo	Buhoro	30
		Kabuye	Kabuye	29

Annex D - Comparison of Overall Vulnerability, 2025 to 2029, Technical Note

COMPARISON OF THE VULNERABILITY 2018 and 2025

The results of vulnerability 2025 were compared to those of 2018 to check if the situation of vulnerability was improved, deteriorated or remained stable.⁵⁵

The first step was to verify if the data complies with the assumption of sphericity. As the test of Mauchly for sphericity was significant, Greenhouse-Geisser test (which is not significant) was considered.

The vulnerability statistically and significantly deteriorated from 0,395 in 2018 to 0,524 in 2025 (Table 1).

Table 1: Overall vulnerability

Vulnerability	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
2018	0.395	.007	.380	.410
2025	0.524	.007	.511	.538

The Table 2 shows that it is in the Eastern Province, where the vulnerability deteriorated the most from 0,379 in 2018 to 0,541 in 2025, followed by Southern Province (from 0,377 to 0,529), City of Kigali (from 0,355 to 0,484), Western Province (from 416 in 2018 to 529 in 2025 and Northern Province (from 0,432 in 2018 to 0,514 in 2025).

Table 2: Comparison of 2018 and 2025 vulnerability

Province	District	Vulnerability 2018	Vulnerability 2025	Difference (2018 /2025)
CoK	Gasabo	0.390	0.486	0.096
	Kicukiro	0.352	0.488	0.136
	Nyarugenge	0.328	0.480	0.152
	Total	0.356	0.484	0.128

⁵⁵ Please note the national index for 2018 was revised during the 2025 CCVIA to make a computational correction.

Eastern	Bugesera	0.382	0.501	0.120
	Gatsibo	0.365	0.565	0.200
	Kayanza	0.394	0.541	0.148
	Kirehe	0.406	0.522	0.117
	Ngoma	0.391	0.555	0.164
	Nyagatare	0.361	0.589	0.228
	Rwamagana	0.357	0.514	0.157
	Total	0.379	0.541	0.162
Northern	Burera	0.426	0.516	0.089
	Gakenke	0.441	0.520	0.079
	Gicumbi	0.443	0.538	0.095
	Musanze	0.418	0.493	0.076
	Rulindo	0.431	0.503	0.072
	Total	0.432	0.514	0.082
Southern	Gisagara	0.394	0.525	0.131
	Huye	0.357	0.495	0.139
	Kamonyi	0.396	0.538	0.143
	Muhanga	0.406	0.514	0.108
	Nyamagabe	0.354	0.567	0.213
	Nyanza	0.390	0.531	0.141
	Nyaruguru	0.360	0.533	0.173
	Ruhango	0.364	0.527	0.163
	Total	0.377	0.529	0.151
Western	Karongi	0.416	0.550	0.134
	Ngororero	0.434	0.536	0.102
	Nyabihu	0.420	0.532	0.112
	Nyamasheke	0.433	0.528	0.095
	Rubavu	0.383	0.512	0.130
	Rusizi	0.415	0.507	0.092
	Rutsiro	0.412	0.537	0.125
	Total	0.416	0.529	0.113

The results of the table above are confirmed by the chart below showing the status of the vulnerability in 2018 and 2025 for different provinces and City of Kigali.

The blue line is the vulnerability in 2018, while the green line is the vulnerability in 2025.

The table 3 shows that the deterioration of the situation between provinces; it was the same between City of Kigali (CoK) and Eastern Province, between City of Kigali and Southern Province, while it is statistically significant ($p\text{-value} < 0.05$) between City of Kigali and Northern Province and between City of Kigali and Western Province. The deterioration of the situation is the same between other provinces.

Table 3: Pairwise comparison between provinces and City of Kigali

Province		p-value
CoK	Eastern	0.103
	Northern	0.044
	Southern	0.169
	Western	0.036
Eastern	CoK	0.103
	Northern	0.529
	Southern	0.694
	Western	0.507
Northern	CoK	0.044
	Eastern	0.529
	Southern	0.318
	Western	0.981
Southern	CoK	0.169
	Eastern	0.694
	Northern	0.318
	Western	0.284
Western	CoK	0.036
	Eastern	0.507
	Northern	0.981
	Southern	0.284

However, the table 4 indicates that when each district is compared to another, the evolution of the vulnerability was the same (p-value > 0.05); meaning that the situation of vulnerability evolved the same way between any pair of the districts. The value of the vulnerability may be different, but the way it evolved (the difference between the situation of 2018 and 2025) is quite similar.

Table 4: Pairwise comparison between districts

District		p-value
Bugesera	Burera	0.546
	Gakenke	0.423
	Gasabo	0.939
	Gatsibo	0.630
	Gicumbi	0.321
	Gisagara	0.716
	Huye	0.751
	Kamonyi	0.601
	Karongi	0.400
	Kayonza	0.594
	Kicukiro	0.656
	Kirehe	0.645
	Muhanga	0.704
	Musanze	0.774
	Ngoma	0.516
	Ngororero	0.375
	Nyabihu	0.477
	Nyagatare	0.493
	Nyamagabe	0.693
	Nyamasheke	0.429
	Nyanza	0.697
	Nyarugenge	0.447
	Nyaruguru	0.914
	Rubavu	0.902
	Ruhango	0.939
	Rulindo	0.598
	Rusizi	0.689
	Rutsiro	0.500
	Rwamagana	0.898

Burera	Bugesera	0.546
	Gakenke	0.841
	Gasabo	0.497
	Gatsibo	0.902
	Gicumbi	0.693
	Gisagara	0.809
	Huye	0.359
	Kamonyi	0.935
	Karongi	0.809
	Kayonza	0.943
	Kicukiro	0.297
	Kirehe	0.886
	Muhanga	0.821
	Musanze	0.751
	Ngoma	0.963
	Ngororero	0.774
	Nyabihu	0.914
	Nyagatare	0.935
	Nyamagabe	0.833
	Nyamasheke	0.849
	Nyanza	0.829
	Nyarugenge	0.177
	Nyaruguru	0.619
	Rubavu	0.630
	Ruhango	0.598
	Rulindo	0.939
	Rusizi	0.837
	Rutsiro	0.943
	Rwamagana	0.465

Gakenke	Bugesera	0.423
	Burera	0.841
	Gasabo	0.380
	Gatsibo	0.747
	Gicumbi	0.845
	Gisagara	0.659
	Huye	0.266
	Kamonyi	0.778
	Karongi	0.967
	Kayonza	0.786
	Kicukiro	0.216
	Kirehe	0.731
	Muhanga	0.671
	Musanze	0.605
	Ngoma	0.878
	Ngororero	0.930
	Nyabihu	0.926
	Nyagatare	0.906
	Nyamagabe	0.682
	Nyamasheke	0.992
	Nyanza	0.678
	Nyarugenge	0.124
	Nyaruguru	0.487
	Rubavu	0.497
	Ruhango	0.468
	Rulindo	0.782
	Rusizi	0.686
	Rutsiro	0.898
	Rwamagana	0.354

Gasabo	Bugesera	0.939
	Burera	0.497
	Gakenke	0.380
	Gatsibo	0.577
	Gicumbi	0.286
	Gisagara	0.659
	Huye	0.809
	Kamonyi	0.549
	Karongi	0.359
	Kayonza	0.543
	Kicukiro	0.712
	Kirehe	0.591
	Muhanga	0.648
	Musanze	0.716
	Ngoma	0.468
	Ngororero	0.336
	Nyabihu	0.432
	Nyagatare	0.447
	Nyamagabe	0.637
	Nyamasheke	0.386
	Nyanza	0.641
	Nyarugenge	0.493
	Nyaruguru	0.853
	Rubavu	0.841
	Ruhango	0.878
	Rulindo	0.546
	Rusizi	0.634
	Rutsiro	0.453
	Rwamagana	0.959

Gatsibo	Bugesera	0.630
	Burera	0.902
	Gakenke	0.747
	Gasabo	0.577
	Gicumbi	0.605
	Gisagara	0.906
	Huye	0.426
	Kamonyi	0.967
	Karongi	0.716
	Kayonza	0.959
	Kicukiro	0.356
	Kirehe	0.984
	Muhanga	0.918
	Musanze	0.845
	Ngoma	0.866
	Ngororero	0.682
	Nyabihu	0.817
	Nyagatare	0.837
	Nyamagabe	0.930
	Nyamasheke	0.754
	Nyanza	0.926
	Nyarugenge	0.218
	Nyaruguru	0.708
	Rubavu	0.720
	Ruhango	0.686
	Rulindo	0.963
	Rusizi	0.935
	Rutsiro	0.845
	Rwamagana	0.543

Gicumbi	Bugesera	0.321
	Burera	0.693
	Gakenke	0.845
	Gasabo	0.286
	Gatsibo	0.605
	Gisagara	0.526
	Huye	0.193
	Kamonyi	0.634
	Karongi	0.878
	Kayonza	0.641
	Kicukiro	0.155
	Kirehe	0.591
	Muhanga	0.536
	Musanze	0.477
	Ngoma	0.727
	Ngororero	0.914
	Nyabihu	0.774
	Nyagatare	0.754
	Nyamagabe	0.546
	Nyamasheke	0.837
	Nyanza	0.543
	Nyarugenge	0.085
	Nyaruguru	0.375
	Rubavu	0.383
	Ruhango	0.359
	Rulindo	0.637
	Rusizi	0.549
	Rutsiro	0.747
	Rwamagana	0.264

Gisagara	Bugesera	0.716
	Burera	0.809
	Gakenke	0.659
	Gasabo	0.659
	Gatsibo	0.906
	Gicumbi	0.526
	Huye	0.497
	Kamonyi	0.874
	Karongi	0.630
	Kayonza	0.866
	Kicukiro	0.420
	Kirehe	0.922
	Muhanga	0.988
	Musanze	0.939
	Ngoma	0.774
	Ngororero	0.598
	Nyabihu	0.727
	Nyagatare	0.747
	Nyamagabe	0.975
	Nyamasheke	0.667
	Nyanza	0.980
	Nyarugenge	0.264
	Nyaruguru	0.798
	Rubavu	0.809
	Ruhango	0.774
	Rulindo	0.870
	Rusizi	0.971
	Rutsiro	0.754
	Rwamagana	0.623

Huye	Bugesera	0.751
	Burera	0.359
	Gakenke	0.266
	Gasabo	0.809
	Gatsibo	0.426
	Gicumbi	0.193
	Gisagara	0.497
	Kamonyi	0.403
	Karongi	0.249
	Kayonza	0.397
	Kicukiro	0.898
	Kirehe	0.438
	Muhanga	0.487
	Musanze	0.546
	Ngoma	0.336
	Ngororero	0.231
	Nyabihu	0.307
	Nyagatare	0.318
	Nyamagabe	0.477
	Nyamasheke	0.270
	Nyanza	0.481
	Nyarugenge	0.656
	Nyaruguru	0.671
	Rubavu	0.659
	Ruhango	0.693
	Rulindo	0.400
	Rusizi	0.474
	Rutsiro	0.323
	Rwamagana	0.849

Kamonyi	Bugesera	0.601
	Burera	0.935
	Gakenke	0.778
	Gasabo	0.549
	Gatsibo	0.967
	Gicumbi	0.634
	Gisagara	0.874
	Huye	0.403
	Karongi	0.747
	Kayonza	0.992
	Kicukiro	0.336
	Kirehe	0.951
	Muhanga	0.886
	Musanze	0.813
	Ngoma	0.898
	Ngororero	0.712
	Nyabihu	0.849
	Nyagatare	0.870
	Nyamagabe	0.898
	Nyamasheke	0.786
	Nyanza	0.894
	Nyarugenge	0.204
	Nyaruguru	0.678
	Rubavu	0.689
	Ruhango	0.656
	Rulindo	0.996
	Rusizi	0.902
	Rutsiro	0.878
	Rwamagana	0.516

Karongi	Bugesera	0.400
	Burera	0.809
	Gakenke	0.967
	Gasabo	0.359
	Gatsibo	0.716
	Gicumbi	0.878
	Gisagara	0.630
	Huye	0.249
	Kamonyi	0.747
	Kayonza	0.754
	Kicukiro	0.202
	Kirehe	0.701
	Muhanga	0.641
	Musanze	0.577
	Ngoma	0.845
	Ngororero	0.963
	Nyabihu	0.894
	Nyagatare	0.874
	Nyamagabe	0.652
	Nyamasheke	0.959
	Nyanza	0.648
	Nyarugenge	0.115
	Nyaruguru	0.462
	Rubavu	0.471
	Ruhango	0.444
	Rulindo	0.751
	Rusizi	0.656
	Rutsiro	0.866
	Rwamagana	0.333

Kayonza	Bugesera	0.594
	Burera	0.943
	Gakenke	0.786
	Gasabo	0.543
	Gatsibo	0.959
	Gicumbi	0.641
	Gisagara	0.866
	Huye	0.397
	Kamonyi	0.992
	Karongi	0.754
	Kicukiro	0.331
	Kirehe	0.943
	Muhanga	0.878
	Musanze	0.805
	Ngoma	0.906
	Ngororero	0.720
	Nyabihu	0.857
	Nyagatare	0.878
	Nyamagabe	0.890
	Nyamasheke	0.794
	Nyanza	0.886
	Nyarugenge	0.200
	Nyaruguru	0.671
	Rubavu	0.682
	Ruhango	0.648
	Rulindo	0.996
	Rusizi	0.894
	Rutsiro	0.886
	Rwamagana	0.509

Kicukiro	Bugesera	0.656
	Burera	0.297
	Gakenke	0.216
	Gasabo	0.712
	Gatsibo	0.356
	Gicumbi	0.155
	Gisagara	0.420
	Huye	0.898
	Kamonyi	0.336
	Karongi	0.202
	Kayonza	0.331
	Kirehe	0.367
	Muhanga	0.411
	Musanze	0.465
	Ngoma	0.277
	Ngororero	0.187
	Nyabihu	0.251
	Nyagatare	0.262
	Nyamagabe	0.403
	Nyamasheke	0.220
	Nyanza	0.406
	Nyarugenge	0.751
	Nyaruguru	0.580
	Rubavu	0.570
	Ruhango	0.601
	Rulindo	0.333
	Rusizi	0.400
	Rutsiro	0.266
	Rwamagana	0.751

Kirehe	Bugesera	0.645
	Burera	0.886
	Gakenke	0.731
	Gasabo	0.591
	Gatsibo	0.984
	Gicumbi	0.591
	Gisagara	0.922
	Huye	0.438
	Kamonyi	0.951
	Karongi	0.701
	Kayonza	0.943
	Kicukiro	0.367
	Muhanga	0.935
	Musanze	0.861
	Ngoma	0.849
	Ngororero	0.667
	Nyabihu	0.802
	Nyagatare	0.821
	Nyamagabe	0.947
	Nyamasheke	0.739
	Nyanza	0.943
	Nyarugenge	0.226
	Nyaruguru	0.724
	Rubavu	0.735
	Ruhango	0.701
	Rulindo	0.947
	Rusizi	0.951
	Rutsiro	0.829
	Rwamagana	0.556

Muhanga	Bugesera	0.704
	Burera	0.821
	Gakenke	0.671
	Gasabo	0.648
	Gatsibo	0.918
	Gicumbi	0.536
	Gisagara	0.988
	Huye	0.487
	Kamonyi	0.886
	Karongi	0.641
	Kayonza	0.878
	Kicukiro	0.411
	Kirehe	0.935
	Musanze	0.926
	Ngoma	0.786
	Ngororero	0.609
	Nyabihu	0.739
	Nyagatare	0.758
	Nyamagabe	0.988
	Nyamasheke	0.678
	Nyanza	0.992
	Nyarugenge	0.258
	Nyaruguru	0.786
	Rubavu	0.798
	Ruhango	0.762
	Rulindo	0.882
	Rusizi	0.984
	Rutsiro	0.766
	Rwamagana	0.612

Musanze	Bugesera	0.774
	Burera	0.751
	Gakenke	0.605
	Gasabo	0.716
	Gatsibo	0.845
	Gicumbi	0.477
	Gisagara	0.939
	Huye	0.546
	Kamonyi	0.813
	Karongi	0.577
	Kayonza	0.805
	Kicukiro	0.465
	Kirehe	0.861
	Muhanga	0.926
	Ngoma	0.716
	Ngororero	0.546
	Nyabihu	0.671
	Nyagatare	0.689
	Nyamagabe	0.914
	Nyamasheke	0.612
	Nyanza	0.918
	Nyarugenge	0.297
	Nyaruguru	0.857
	Rubavu	0.870
	Ruhango	0.833
	Rulindo	0.809
	Rusizi	0.910
	Rutsiro	0.697
	Rwamagana	0.678

Ngoma	Bugesera	0.516
	Burera	0.963
	Gakenke	0.878
	Gasabo	0.468
	Gatsibo	0.866
	Gicumbi	0.727
	Gisagara	0.774
	Huye	0.336
	Kamonyi	0.898
	Karongi	0.845
	Kayonza	0.906
	Kicukiro	0.277
	Kirehe	0.849
	Muhanga	0.786
	Musanze	0.716
	Ngororero	0.809
	Nyabihu	0.951
	Nyagatare	0.971
	Nyamagabe	0.798
	Nyamasheke	0.886
	Nyanza	0.794
	Nyarugenge	0.163
	Nyaruguru	0.587
	Rubavu	0.598
	Ruhango	0.566
	Rulindo	0.902
	Rusizi	0.802
	Rutsiro	0.980
	Rwamagana	0.438

Ngororero	Bugesera	0.375
	Burera	0.774
	Gakenke	0.930
	Gasabo	0.336
	Gatsibo	0.682
	Gicumbi	0.914
	Gisagara	0.598
	Huye	0.231
	Kamonyi	0.712
	Karongi	0.963
	Kayonza	0.720
	Kicukiro	0.187
	Kirehe	0.667
	Muhanga	0.609
	Musanze	0.546
	Ngoma	0.809
	Nyabihu	0.857
	Nyagatare	0.837
	Nyamagabe	0.619
	Nyamasheke	0.922
	Nyanza	0.616
	Nyarugenge	0.105
	Nyaruguru	0.435
	Rubavu	0.444
	Ruhango	0.417
	Rulindo	0.716
	Rusizi	0.623
	Rutsiro	0.829
	Rwamagana	0.311

Nyabihu	Bugesera	0.477
	Burera	0.914
	Gakenke	0.926
	Gasabo	0.432
	Gatsibo	0.817
	Gicumbi	0.774
	Gisagara	0.727
	Huye	0.307
	Kamonyi	0.849
	Karongi	0.894
	Kayonza	0.857
	Kicukiro	0.251
	Kirehe	0.802
	Muhanga	0.739
	Musanze	0.671
	Ngoma	0.951
	Ngororero	0.857
	Nyagatare	0.980
	Nyamagabe	0.751
	Nyamasheke	0.935
	Nyanza	0.747
	Nyarugenge	0.147
	Nyaruguru	0.546
	Rubavu	0.556
	Ruhango	0.526
	Rulindo	0.853
	Rusizi	0.754
	Rutsiro	0.971
	Rwamagana	0.403

Nyagatare	Bugesera	0.493
	Burera	0.935
	Gakenke	0.906
	Gasabo	0.447
	Gatsibo	0.837
	Gicumbi	0.754
	Gisagara	0.747
	Huye	0.318
	Kamonyi	0.870
	Karongi	0.874
	Kayonza	0.878
	Kicukiro	0.262
	Kirehe	0.821
	Muhanga	0.758
	Musanze	0.689
	Ngoma	0.971
	Ngororero	0.837
	Nyabihu	0.980
	Nyamagabe	0.770
	Nyamasheke	0.914
	Nyanza	0.766
	Nyarugenge	0.153
	Nyaruguru	0.563
	Rubavu	0.573
	Ruhango	0.543
	Rulindo	0.874
	Rusizi	0.774
	Rutsiro	0.992
	Rwamagana	0.417

Nyamagabe	Bugesera	0.693
	Burera	0.833
	Gakenke	0.682
	Gasabo	0.637
	Gatsibo	0.930
	Gicumbi	0.546
	Gisagara	0.975
	Huye	0.477
	Kamonyi	0.898
	Karongi	0.652
	Kayonza	0.890
	Kicukiro	0.403
	Kirehe	0.947
	Muhanga	0.988
	Musanze	0.914
	Ngoma	0.798
	Ngororero	0.619
	Nyabihu	0.751
	Nyagatare	0.770
	Nyamasheke	0.689
	Nyanza	0.996
	Nyarugenge	0.251
	Nyaruguru	0.774
	Rubavu	0.786
	Ruhango	0.751
	Rulindo	0.894
	Rusizi	0.996
	Rutsiro	0.778
	Rwamagana	0.601

Nyamasheke	Bugesera	0.429
	Burera	0.849
	Gakenke	0.992
	Gasabo	0.386
	Gatsibo	0.754
	Gicumbi	0.837
	Gisagara	0.667
	Huye	0.270
	Kamonyi	0.786
	Karongi	0.959
	Kayonza	0.794
	Kicukiro	0.220
	Kirehe	0.739
	Muhanga	0.678
	Musanze	0.612
	Ngoma	0.886
	Ngororero	0.922
	Nyabihu	0.935
	Nyagatare	0.914
	Nyamagabe	0.689
	Nyanza	0.686
	Nyarugenge	0.126
	Nyaruguru	0.493
	Rubavu	0.503
	Ruhango	0.474
	Rulindo	0.790
	Rusizi	0.693
	Rutsiro	0.906
	Rwamagana	0.359

Nyanza	Bugesera	0.697
	Burera	0.829
	Gakenke	0.678
	Gasabo	0.641
	Gatsibo	0.926
	Gicumbi	0.543
	Gisagara	0.980
	Huye	0.481
	Kamonyi	0.894
	Karongi	0.648
	Kayonza	0.886
	Kicukiro	0.406
	Kirehe	0.943
	Muhanga	0.992
	Musanze	0.918
	Ngoma	0.794
	Ngororero	0.616
	Nyabihu	0.747
	Nyagatare	0.766
	Nyamagabe	0.996
	Nyamasheke	0.686
	Nyarugenge	0.253
	Nyaruguru	0.778
	Rubavu	0.790
	Ruhango	0.754
	Rulindo	0.890
	Rusizi	0.992
	Rutsiro	0.774
	Rwamagana	0.605

Nyarugenge	Bugesera	0.447
	Burera	0.177
	Gakenke	0.124
	Gasabo	0.493
	Gatsibo	0.218
	Gicumbi	0.085
	Gisagara	0.264
	Huye	0.656
	Kamonyi	0.204
	Karongi	0.115
	Kayonza	0.200
	Kicukiro	0.751
	Kirehe	0.226
	Muhanga	0.258
	Musanze	0.297
	Ngoma	0.163
	Ngororero	0.105
	Nyabihu	0.147
	Nyagatare	0.153
	Nyamagabe	0.251
	Nyamasheke	0.126
	Nyanza	0.253
	Nyaruguru	0.386
	Rubavu	0.378
	Ruhango	0.403
	Rulindo	0.202
	Rusizi	0.249
	Rutsiro	0.156
	Rwamagana	0.526

Nyaruguru	Bugesera	0.914
	Burera	0.619
	Gakenke	0.487
	Gasabo	0.853
	Gatsibo	0.708
	Gicumbi	0.375
	Gisagara	0.798
	Huye	0.671
	Kamonyi	0.678
	Karongi	0.462
	Kayonza	0.671
	Kicukiro	0.580
	Kirehe	0.724
	Muhanga	0.786
	Musanze	0.857
	Ngoma	0.587
	Ngororero	0.435
	Nyabihu	0.546
	Nyagatare	0.563
	Nyamagabe	0.774
	Nyamasheke	0.493
	Nyanza	0.778
	Nyarugenge	0.386
	Rubavu	0.988
	Ruhango	0.975
	Rulindo	0.674
	Rusizi	0.770
	Rutsiro	0.570
	Rwamagana	0.813

Rubavu	Bugesera	0.902
	Burera	0.630
	Gakenke	0.497
	Gasabo	0.841
	Gatsibo	0.720
	Gicumbi	0.383
	Gisagara	0.809
	Huye	0.659
	Kamonyi	0.689
	Karongi	0.471
	Kayonza	0.682
	Kicukiro	0.570
	Kirehe	0.735
	Muhanga	0.798
	Musanze	0.870
	Ngoma	0.598
	Ngororero	0.444
	Nyabihu	0.556
	Nyagatare	0.573
	Nyamagabe	0.786
	Nyamasheke	0.503
	Nyanza	0.790
	Nyarugenge	0.378
	Nyaruguru	0.988
	Ruhango	0.963
	Rulindo	0.686
	Rusizi	0.782
	Rutsiro	0.580
	Rwamagana	0.802

Ruhango	Bugesera	0.939
	Burera	0.598
	Gakenke	0.468
	Gasabo	0.878
	Gatsibo	0.686
	Gicumbi	0.359
	Gisagara	0.774
	Huye	0.693
	Kamonyi	0.656
	Karongi	0.444
	Kayonza	0.648
	Kicukiro	0.601
	Kirehe	0.701
	Muhanga	0.762
	Musanze	0.833
	Ngoma	0.566
	Ngororero	0.417
	Nyabihu	0.526
	Nyagatare	0.543
	Nyamagabe	0.751
	Nyamasheke	0.474
	Nyanza	0.754
	Nyarugenge	0.403
	Nyaruguru	0.975
	Rubavu	0.963
	Rulindo	0.652
	Rusizi	0.747
	Rutsiro	0.549
	Rwamagana	0.837

Rulindo	Bugesera	0.598
	Burera	0.939
	Gakenke	0.782
	Gasabo	0.546
	Gatsibo	0.963
	Gicumbi	0.637
	Gisagara	0.870
	Huye	0.400
	Kamonyi	0.996
	Karongi	0.751
	Kayonza	0.996
	Kicukiro	0.333
	Kirehe	0.947
	Muhanga	0.882
	Musanze	0.809
	Ngoma	0.902
	Ngororero	0.716
	Nyabihu	0.853
	Nyagatare	0.874
	Nyamagabe	0.894
	Nyamasheke	0.790
	Nyanza	0.890
	Nyarugenge	0.202
	Nyaruguru	0.674
	Rubavu	0.686
	Ruhango	0.652
	Rusizi	0.898
	Rutsiro	0.882
	Rwamagana	0.513

Rusizi	Bugesera	0.689
	Burera	0.837
	Gakenke	0.686
	Gasabo	0.634
	Gatsibo	0.935
	Gicumbi	0.549
	Gisagara	0.971
	Huye	0.474
	Kamonyi	0.902
	Karongi	0.656
	Kayonza	0.894
	Kicukiro	0.400
	Kirehe	0.951
	Muhanga	0.984
	Musanze	0.910
	Ngoma	0.802
	Ngororero	0.623
	Nyabihu	0.754
	Nyagatare	0.774
	Nyamagabe	0.996
	Nyamasheke	0.693
	Nyanza	0.992
	Nyarugenge	0.249
	Nyaruguru	0.770
	Rubavu	0.782
	Ruhango	0.747
	Rulindo	0.898
	Rutsiro	0.782
	Rwamagana	0.598

Rutsiro	Bugesera	0.500
	Burera	0.943
	Gakenke	0.898
	Gasabo	0.453
	Gatsibo	0.845
	Gicumbi	0.747
	Gisagara	0.754
	Huye	0.323
	Kamonyi	0.878
	Karongi	0.866
	Kayonza	0.886
	Kicukiro	0.266
	Kirehe	0.829
	Muhanga	0.766
	Musanze	0.697
	Ngoma	0.980
	Ngororero	0.829
	Nyabihu	0.971
	Nyagatare	0.992
	Nyamagabe	0.778
	Nyamasheke	0.906
	Nyanza	0.774
	Nyarugenge	0.156
	Nyaruguru	0.570
	Rubavu	0.580
	Ruhango	0.549
	Rulindo	0.882
	Rusizi	0.782
	Rwamagana	0.423

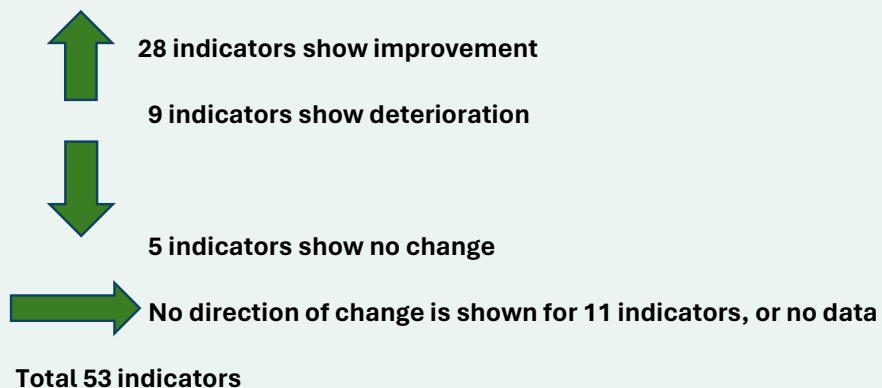
Rwamagana	Bugesera	0.898
	Burera	0.465
	Gakenke	0.354
	Gasabo	0.959
	Gatsibo	0.543
	Gicumbi	0.264
	Gisagara	0.623
	Huye	0.849
	Kamonyi	0.516
	Karongi	0.333
	Kayonza	0.509
	Kicukiro	0.751
	Kirehe	0.556
	Muhanga	0.612
	Musanze	0.678
	Ngoma	0.438
	Ngororero	0.311
	Nyabihu	0.403
	Nyagatare	0.417
	Nyamagabe	0.601
	Nyamasheke	0.359
	Nyanza	0.605
	Nyarugenge	0.526
	Nyaruguru	0.813
	Rubavu	0.802
	Ruhango	0.837
	Rulindo	0.513
	Rusizi	0.598
	Rutsiro	0.423

Annex E – 2025 National CC Vulnerability Indicator Data Analysis

KEY

Acronym	Meaning	Context Example
O	Original	Indicator from 2018, e.g., "1.2 Age-Dependency Ratio (O, S)".
N	New	New indicator for 2024-25, e.g., "N14 Wetland Restoration (N, AC)".
E	Exposure	Measures climate risks e.g., "2.2 Annual Change in Temperature (O, E)".
S	Sensitivity	Measures degree of vulnerability e.g., "2.3 Annual Loss Due to Multi-Hazards (O, S)".
AC	Adaptive Capacity	Measures resilience e.g., "7.5 Access to Electricity for Lighting (O, AC)".

Summary of Change in National Vulnerability Indicators 2018-2025



Sectors	Number of Indicators
Energy	4
Transportation Infrastructure	6
Human Settlements	6
Forest	5
Agriculture and Livestock	4
Water	7
Health	8
Socio-Economic and Livelihoods	5
Meteorological and Disaster Management	8
Total	53

New #	Code	Old #	Indicator	2018 – Indicator data – CCVIA Report	2025 – Indicator data – CCVIA Report	CHANGE	Source // Notes on 2025 data
1. Energy Sector							
1.1	O, E	7.1	Change of Hydropower Generation Capacity	At the end of 2017, Rwanda had 94.78 MW of installed capacity for hydroelectricity production with 47.5 MW capacity available, representing 45.1% of all electricity generation capacity.	49.44% of electricity from renewable sources, predominantly hydropower		Rwanda Utilities Regulatory Authority, Electricity Statistics Report as of the Second Quarter 2024
1.2	O, S	7.2	Level of Dependency on Imported Fuel	The current national energy balance statistics show that biomass (mostly wood fuel) accounts for about 83% of the total energy consumption, followed by petroleum at 9.7% (including petroleum products used to generate electricity), electricity at 1.3% and others at about less than 0,5%.	Approximately 10.15% of electricity generation from thermal sources (heavy fuel oil and diesel), all reliant on imported fuel.		Rwanda Utilities Regulatory Authority, Electricity Statistics Report as of the Second Quarter 2024
1.3	O, AC	7.5	Proportion of Population with Access to Electricity for Lighting	As of 2016/17, the EICV5 report indicated that the use of electricity as the energy source for lighting in the home has risen to 27.1%, nationally. In the earlier EICV4 period, 19.8% of households in Rwanda used electricity as their primary source of lighting. In EICV5, for urban areas, 75.6% of households use electricity for lighting (up from 71.8% in EICV4), and in the rural areas, 15.5% of household use electricity for	72.14% of households using electricity as the main source of lighting (urban: 88.12%, rural: 64.75%)		NISR EICV7 Main Indicators Report, 2024, Table A5.14

				lighting in EICV5 (up from 9.1 in EICV4).			
1.4	N, AC	N1	Proportion of National Energy Mix from Renewable Sources	Approximately 50–54%	50.70% of produced electricity came from renewable sources while 42.17% came from non-renewable sources		Rwanda Utilities Regulatory Authority (RURA) Electricity Statistics Report as of the Second Quarter 2024. Pg 2
2. Transport Infrastructure Sector							
2.1	O, AC	7.3	Quality of Trade and Transportation Infrastructure	2.622 in 2016, (World Bank LPI) No equivalent data in REMA's 2018 report	Logistics Performance Index (LPI): Quality of trade and transport-related infrastructure in Rwanda was reported at 2.9 in 2022 (scale: 1=low to 5=high)		World Bank, Logistics Performance Index (LPI) 2023, Connecting to Compete: Trade Logistics in the Global Economy
2.2	O, AC	7.4	Length of Paved National Roads	2018 data indicated there were 1385 km of national paved roads Approximately 50.9% of National Roads	1,704 kilometers of national roads are paved. (62% of 2,749 km of NR) During NST-1, 424 km of national roads were upgraded to paved roads, 303 km of national paved roads were rehabilitated and 237.46 km of urban roads upgraded in Kigali and other cities.		MINECOFIN SUMMARISED transport Sector STRATEGIC PLAN 2024/25-2028/29
Note: Rwanda has a road network with a total of 44,671 km of roads. At the end of NST-1, Rwanda's had a well-developed network of ~ 6,655 km of roads, consisting of 2,749 km of 2.3 National Roads (NR), and 3,906 km of District and City of Kigali roads (DR1 and DR-2), with 62% of the National Roads paved. (Official Gazette no. 10 of 09/03/2015) During NST-1, the cumulative length (km) of unpaved national roads that were upgraded to Paved National Roads grew from 1,305 Km to 1,729 km while 357 km of Paved National Roads were rehabilitated. A further 1,349 Km of roads were maintained, with 97% of the Paved National Roads maintained in good condition. At the end of 2023/2024 FY, a total of 4,137km of feeder roads were constructed and rehabilitated, including District and City of Kigali Road of Class 1 (DR1) and Class 2 (DR2), as well as specific roads and local roads.							

2.3	O/N , S	N2	Condition and Maintenance Status of Critical Infrastructure	Approximately 86% of paved roads were in good condition	By the end of the NST-1 period, National Roads: 97% maintained in good condition. Urban Roads: 237.46 km upgraded. Feeder Roads: 4,137 km constructed/rehabilitated		SUMMARISED transport Sector STRATEGIC PLAN 2024/25-2028/29
2.4	N, E	N3	Frequency and Duration of Infrastructure Disruptions	69 road- disruptions Bridges- 12 disruptions	Roads: 69 disruptions, with the highest in April (25) and May (19). Bridges: 12 disruptions, notably in March (3) and September (4).		MINEMA DISASTER EFFECTS SITUATION 2024 Report 2024
2.5	N, AC	N4	Proportion of Infrastructure Equipped with Flood and 2.6Erosion Control Systems	SWMF/Water Harvesting: <10,000 ha (<1% of 1,080,168 ha), Contour Bank Terraces: ~10,000–20,000 ha (~1–2%), Bench Terraces with Grassed Waterways: ~2,000–5,000 ha (<0.5%),	Storm Water Management Facilities (SWMF) / Water Harvesting Infrastructure: Total area equipped: 89,679 hectares, represents 8.3% of the total erosion risk area (1,080,168 ha) Contour Bank Terraces: 510,096 ha (47.2%) Bench Terraces with Grassed Waterways: 29,952 ha (2.8%)		The State of Soil Erosion Control in Rwanda (May 2022)
2.6	(N, AC)	N5	Availability of Public Transportation in Climate-Vulnerable Areas	New indicator No data was available now on this indicator Data provided below may not be useful. 34%paved, 1,391 km national roads)	The maintenance of 1,356.1 km of national roads (e.g., 157 km Kigali-Muhanga-Huye-Akanyaru at 85% riding quality) and upgrading of 215.95 km of feeder roads (e.g., 41 km in Rutsiro at 15%completion) supports public transport reliability.		MININFRA IMIHIGO framework
3. Human Settlements Sector							
3.1	(O, S)	3.2	Rural Population as	Approximately 83.3%	72%of the total population		EICV7 - Main Indicators Report 2023/2024

			%of Total Population				
3.2	(O, S)	5.4	Proportion of Urban Population Living in Slum Areas	Approximately 42.1%	22.4%live in spontaneous/informal/unplanned housing.		EICV7 - Poverty Profile Report 2023/24 National Institute of Statistics Rwanda
3.3	(N, AC)	N6	Proportion of Population Living in IDP Model Villages in Rural Areas ((Integrated Development Program)	New Nationally- Approximately 0.14% Rural Areas- Approximately 0.15-0.17%	Nationally, only 0.8%of private households live in Integrated Development Program (IDP) Model Villages. In rural areas specifically, the proportion is 0.7% This equates to approximately 16,575 households in rural areas and 27,105 households nationwide residing in IDP Model Villages.		5th Rwanda Population and Housing Census (RPHC5, 2022)
3.4	(N, A)	N7	Upgraded Human Settlement Sites in Urban Areas	NEW - data not from 20219 report Approximately 10 upgraded	6 informal settlements in Kigali are targeted for upgrading, focusing on infrastructure improvements and flood risk management.		Ministry of Infrastructure, Forward Looking Joint Sector Review Report, FY 2022/2023
3.5	(N, AC)	N8	Restored Landscapes Sites from Degraded Human Settlement Zones	NEW - data not from 20219 report 603 hectares of forest, improved 900 hectares of woodlots, and implemented Silvo pastoralism on 446 hectares of farmland.	Rwanda subsequently reported 597,718 hectares under restoration in 2022. Projects focus on farmlands, forests, and wetlands, supported by the ROAM assessment.		FULLY DEVELOPED PROPOSAL FOR SINGLE COUNTRY - Adaptation Fund, 2024 Global-restoration-database Source: IUCN's Global Restoration Commitments and Pledges: Background Note: Using IUCN's Restoration Opportunities Assessment Methodology (ROAM) Rwanda identified 2.25 million hectares

							of deforested and degraded land that could directly benefit from forest landscape restoration (2015).
3.6	(N, E)	N9	Proportion of Green Spaces and Vegetation Coverage in Urban Areas	NEW n/a			2024 Information on action being taken includes this: Green Climate Fund Approves \$28 Million Grant for Green City Kigali Project, Ministry of Environment, October, 2024 Media reports suggest a decline in green space and vegetation cover in Kigali - see: Population Pressure Blamed in Decline of Kigali's Urban Forests Pulitzer Center Academic information confirms this, see: Spatial Assessment of Urban Growth on Green Spaces in Rwanda: An insight from Rebero Mountain Landscape in Kicukiro District, City of Kigali Rwanda Journal of Engineering, Science, Technology and Environment
4. Forest Sector							
4.1	(O, S)	6.1	Change in %of National Forest Cover	Increased to 18%forest cover recorded in 2010	Forest cover at 30.4%(724,000 ha), up 1%from 2020		Rwanda Forestry Authority, 2024 Report, NISR 2024

							Statistical Yearbook
4.2	(O, S)	6.2	Change in Size (ha or km ²) of Natural Habitat or Critical Ecosystems		No recent data found		
4.3	((O, AC)	6.3	Proportion (%) & Extent (ha) of Land Area Protected to Maintain Biodiversity & Natural Ecosystem	approximately 232,000 hectares of land– equating to 9.11%	Approximately 20%of the total land area has been designated for environmental protection. About 673,000 hectares is set aside for conservation purposes.		Rwanda Wetlands Governance and Management Profile, September 2022.
4.4	(N, S)	N10	Number of Forest-Dependent Communities	NEW n/a	No data found		
4.5	(N, S)	N11	Extent of Habitat Fragmentation vs Connectivity	NEW Approximately 7,617 hectares, equating to a 64.22% reduction in forest cover	Level of fragmentation of forest plantations - Out of 387,425 hectares of forest plantations, about 278,656 hectares (72%) are made of large blocks of greater than 2 hectares, only 11,798 hectares (4%) are small woodlots of less than 0.25 hectares.” Plots between 1 ha and 2 ha account for 39,352 ha or 10%of forest plantations. Plots between 0.5 ha and 1 ha account for 31,207 ha or 8%of forest plantations.		Rwanda Forest Cover Mapping
5. Agricultural and Livestock Sector							

5.1	(O, AC)	3.1	Change in Agricultural Production	Approximately 1.38 million hectares, representing 60% of Rwanda's total land	3.1% growth in overall production.		MINAGRI Annual Report for 2023-24_FY__FINAL
5.2	(O, AC)	3.3	Extent of Fertilizer Use in Agricultural Production	Inorganic Fertilizer Application: Approximately 24.6% of farmers used Organic Fertilizer Application: 55.7% of farmers incorporating them	Organic: Season A: 89.1% of farmers used, Season B: 80.1%, Season C: 78.8% of farmers Inorganic: Season A: 64.5% of farmers, Season B: 52.0% of farmers, Season C: 60.4% of farmers		Seasonal Agricultural Survey - 2024 Annual Report
5.3	O/N, AC	N1 2	Number of Hectares of Irrigated Land	Around 63,742 hectares (based on the 10% of irrigable land being irrigated)	72,913 hectares of land under irrigation		MINAGRI Annual Report for the 2023/24 fiscal year RWANDA IRRIGATION MASTER PLAN (March 2020)
5.4	(N, AC)	N1 3	Extent of Severe Slopes Terraced (ha)	NEW Radical Terraces- 40% Progressive Terraces- 16%	In the 2023/24 fiscal year, the government developed 3,739.7 (2.6%) ha of radical terraces and 22,427.8 (2.3) ha of progressive terraces. In relation to the NST1 and PSTA4 targets, 142,318.7 ha of radical terraces have been constructed against a target of 142,500 ha, while 1,031,282.8 ha of progressive terraces were developed against a target of 1,007,624 ha		MINAGRI Annual Report for the 2023/24 fiscal year https://nilebasin.org/sites/default/files/2023-09/mp_rw.pdf
6. Water Sector							
6.1	O, E	4.1	Annual Precipitation Run-off Rate	Approximately 43.4%	about 41.3% of the precipitation that falls in Rwanda contributes directly to the surface water runoff. The recharge percentage attributed varied between 5 and 15% in Eastern province.		Rwanda National Water Resources Master Plan

6.2	(O, E)	4.2	Annual Groundwater Recharge Rate		No new data		Rwanda IWRM Programme: Ground Water Recharge and Storage Enhancement in Eastern Province https://waterportal.rwb.rw/sites/default/files/2019-07/Groundwater%20recharge%20and%20storage%20enhancement%20in%20eastern%20province%20of%20Rwanda1.pdf
6.3	(O, S)	4.3	Fresh Water Withdrawal Rate	Approximately 6.4%	Between 2015 and 2021, Rwanda's annual freshwater withdrawals increased by approximately 0.21 billion cubic meters, rising from 0.61 billion m ³ in 2015 to 0.82 billion m ³ in 2021. This represents a 34.4% increase over the six-year period		World Bank's World Development Indicators
6.4	(O, AC)	4.4	Change in Future Water Demand	About 608 million cubic meters The projected (2040) demand appears to remain at 3.356 BCM*/annum. No change in total projected renewable water resources is available - and remains at 6.826 BCM*/annum.	As of 2024, Rwanda's daily water production capacity stands at 368,736 m ³ . Projections to meet growing demand and support sustainable development include reaching 472,036 m ³ by 2025, 508,036 m ³ by 2026, and 544,036 m ³ by 2027, with a strategic goal to increase daily water production capacity to 688,686 m ³ by the end of 2029.		WATER AND SANITATION SECTOR STRATEGIC PLAN 2024-2029
6.5	(O, AC)	4.5	Capacity of Dams and Lakes to Store Water	Baseline water storage: - Inland natural lakes capacity: 253,616,771,908 m ³ (253.6 BCM) (2015);	225.165 billion cubic meters		The Water Storage Status Report 2022-2023, Rwanda Water Board

				- Dams reservoir capacity: 68,885,300 m³ (48 structures) (2018); - Water storage per capita (artificial dams, ponds): 6.89 m³ (target is 30 m³).			
6.6	(O, AC)	4.6	Access to Reliable Drinking Water	Estimated that 65%	90% of households received safe drinking water, compared to 87% in EICV5		Seventh Integrated Household Living Conditions Survey (EICV7) Report, NISR 2025, based on data collected in 2023-2024
6.7	(N, AC)	N1 4	Land Recognized as Natural Water Retention Areas (Wetlands)	New Approx. 10.6 percent	wetlands cover approximately 10.6% of Rwanda's total surface area, equivalent to 277,993 hectares (2,779.93 km ²)		Rwanda Wetlands Governance and Management Profile, September 2022.
7. Health Sector							
7.1	(O, AC)	3.4	Level of Severe Child Malnutrition	1%	0.4%		NISR Statistical Yearbook 2024.pdf
7.2	(O, E)	5.1	Change in Number of Deaths from Diarrhea Diseases and Malnutrition	Malnutrition Deaths in hospitals and outpatient centres: increased from 278 deaths in 2019 to 343 deaths in 2023 (including children under 5 years and over 5 years.) Table 3.6.2:	Cases of Diarrhea as a cause of morbidity in health centres were 194,904 visits in 2023. (In the past 5 years, the number of visits was lowest in 2020 at 133,784, and highest in 2022 at 395,176.) Table 3.9.3: Top causes of		NISR Statistical Yearbook 2024.pdfv

					morbidity in health centers, 2023 (All Age groups)		
7.3	(O, E)	5.2	Change of Malaria Hazard	Malaria as one of the top ten causes of death in health centres, District/Provincial and Referral Hospitals was 0% in 2023, with 47 cases (deaths), down from 2% of the top ten causes of death in 2020 with 145 cases (deaths)	Malaria as a proportion of morbidity for under 5 was 0.2% in 2023 (down from 1.8% in 2018) and for above 5 deaths to Malaria it was 0.4% in 2023 (down from 4.5% in 2018).		Rwanda Biomedical Centre (RBC) HMIS 2024, NISR 2024 Statistical Yearbook, Table 6.1
7.4	(O, S)	5.3	Rwanda's Dependency on External Resource for Health Services		No new data available		
7.5	(O, AC)	5.5	Change in Access to Health Care Facilities	76.8% of women reported that distance to a health facility	Reduction in sectors without health centres (from 17 to 0 by 2023/24). Increase in health posts (from 473 to 623 by 2023/24).		Fourth Health Sector Strategic Plan (2018-2024)
7.6	(O, AC)	5.6	Access to Improved Hygiene Sanitation Facilities	Urban areas: 88% of households had access to improved sanitation. Rural areas: 69% of households had access to improved sanitation.	Urban areas: Improved facilities: 88.6% (e.g., 12.8% flush/pour-flush, 72.5% pit latrine with slab, 2.8% VIP latrine, 0.5% composting toilet). Unimproved facilities: 11.4% (e.g., 8.5% pit latrine without slab, 0.9% no facility). Rural areas: Improved facilities: 67.6% (e.g., 1.7% flush/pour-flush, 64.7% pit latrine with slab, 0.9% VIP latrine, 0.2% composting toilet). Unimproved facilities: 32.4% (e.g., 28.6% pit latrine without slab, 2.9% no facility).		Fifth Rwanda Population and Housing Census (RPHC5) 2022 Main Indicators Report

7.7	(N, S)	N1 5	Prevalence of Injury or Death Related to Disasters Linked to Climate Change	The death toll reached 134, with 271 people injured Floods- 16 deaths and 33 injuries	Total Fatalities: At least 211 people lost their lives due to climate-induced disasters. Over 150 individuals sustained injuries throughout the year NISR provides different data for 2023, indicating there were 339 deaths due to landslides, flooding, lightning, and rainstorms.		MINEMA 2024 Disaster Reports Statistical Yearbook 2024
7.8	(N, AC)	N1 6	Health Insurance Coverage by HH	Approximately 83%	Mutuelle de Santé (Community-Based Health Insurance): 93.1% RSSB (Rwanda Social Security Board - former RAMA): 4.1% Private insurance: 0.7% School-based insurance: 0.1% NGO-supported insurance: 0.8% Employer-provided insurance: 1.3% Total Percentage of individuals with health insurance is 97.3% based on 2022 RPHC.		RPHC 5 main Indicators Report Statistical Yearbook 2024 Table 1.1 Household indicators, line 28
8. Socio-Economic/ Livelihoods Sector							
8.1	(O, E)	1.1	Projected Growth in Population to 2030 and 2035	Approximately 15.71 million by 2030	By 2030 15.7 million (high, medium and low scenarios) By 2050 23.2 million (high scenario), 22.9 million (medium scenario), and 22.5 million (low scenario)		MAIN INDICATORS: 5th Rwanda Population and Housing Census (PHC)
8.2	(O, S)	1.2	Age-Dependency Ratio	Child Dependency Ratio- approximately 64.6%	78.4% Children (0-15 years): 5,270,262 (39.8% of the total population). Economically active Youth and Adults (16-65 years): 7,424,204 (56% of the total population).		5th Rwanda Population and Housing Census (PHC)

					Elderly (65+ years): 551,928 (4.2% of the total population). ADR: 5,270,262 plus 551,928 = 5,822,190 / 7,424,204 = 78.4% NISR defines ADR as the proportion (%) of people in Rwanda under 16 and over 64 years (dependent, not of working age), to those 16-64 years (economically productive ages)		
8.3	(O, S)	1.3	Total Urbanized Population	approximately 2,222,128 people	Approximately 3,701,245 people (27.9%)		5th Rwanda Population and Housing Census (PHC)
8.4	(O, S)	1.4	Effectiveness of Rwanda's Social Safety-Net/Social Protection System	78.4%	Proportion of the population with medical insurance coverage is 97.4% Almost all persons with medical insurance use the "Mutuelle de sante" insurance (93%). The second most popular type of insurance is RSSB (former RAMA) with 4%. The coverage for mutuelle de sante does not vary significantly across provinces, however Kicukiro district has the lowest with 80%		5th Rwanda Population and Housing Census (PHC)
8.5	(O, AC)	1.5	Level of Education Attained by Women	Primary Education - 56.9% Total Secondary - 10.36% Tertiary Education - 3%	Primary Education: 3,596,437 or 56.9% of population of 12,245,590 Total Secondary: 17% of women (1,075,655) Lower Secondary Education: 634,075 or 10% of women Upper Secondary Education: 441,580 or 7% of women Tertiary Education: 3% of women (189,092)		Note: 17.8% of women have never attended school 5th Rwanda Population and Housing Census (RPHC5), Table 10

9. Meteorological / Disaster Management							
9.1	(O, AC)	1.6	Strength of Government Capacity and Coordination to Mainstream Climate Change		Rwanda Governance Board - RGB - 11th Edition Scorecard New Assessment: Environment and Climate Change Resilience - 72% score - based on a comprehensive assessment of 27 indicators,		Rwanda Governance Score board (Dec. 2024)
9.2	(O, E)	2.1	Annual Frequency of Continuous Warm Days Above 30°C	Averages ranging from 18.5°C to 19.5°	November 2024 had warmer-than-average temperatures across most of Rwanda, with maximum temperatures ranging from 24°C to 30°C in most areas, and some eastern and southern regions (e.g., Kigali City, Ngoma, Kayonza) experiencing maximum temperatures between 30°C and 33°C.		Meteo Rwanda 2024
9.3	(O, E)	2.2	Current Annual Mean Temperature and Annual Change in Temperature		The avg. mean temperature increased by approximately 1-2°C over the past 50-60 years (1961-2021), translating to an average annual change of ~0.02-0.04°C/year		Meteo Rwanda Map Room
9.4	(O, S)	2.3	Annual Loss Due to Damage Caused by Multi-Hazards		Estimates ranging from \$200 million to \$300 million (approximately RWF 240-360 billion) each year		Media sources
9.5	(O, AC)	2.4	Number of People with Access to Improved Climate-	Approximately 4-6.6 million people (30-50% of Rwanda's 13.2 million population) have access to improved climate-related early	In 10 targeted districts, 1.5-3 million people benefit, particularly subsistence farmers.		MINEMA's 2024 report

			Related Early Warning Information	warning information, driven by CREWS, EW4All, and LDCF projects, with a focus on flood- and drought-prone districts.									
9.6	(0, AC)	2.5	Percentage of the Area of Rwanda Covered by the Meteo Rwanda		44 weather stations covering all provinces		November_2024_Monthly_climatology_and_rainfall_forecast						
9.7	(0, AC)	2.6	Extent of Use of Climate Information Products & Services in Decision-Making		No new data acquired								
9.8	(N, AC)	N17	Amount of Climate Finance Mobilized Annually from All Sources	New	<table><tr><th>Source</th><th>Commitment Currency</th><th>Amount Co</th></tr><tr><td>GIZ (Sustainable Waste and Circular Economy under Ireme Invest)</td><td>EUR</td><td>450,005</td></tr></table>	Source	Commitment Currency	Amount Co	GIZ (Sustainable Waste and Circular Economy under Ireme Invest)	EUR	450,005		Rwanda Green Fund FY 23-24 Activity Report.pdf Total for FY 2023-2024: Total Amount Mobilized in USD 37,190,232 Total Amount in RWF: 47,262,967,155 Also: Rwanda gained access to approx. USD \$319 million under the IMF’s Resilience and Sustainability Program, the first such arrangement in Africa. The
Source	Commitment Currency	Amount Co											
GIZ (Sustainable Waste and Circular Economy under Ireme Invest)	EUR	450,005											

					GIZ (Capacity Development for NDCs)	EUR	123,438		intention is to integrate climate related considerations into Rwanda's macro-economic policies and frameworks. May 2023
					DANIDA (Support for Rwanda Green Investment Facility - Ireme Invest)	DKK	37,000,000		
					Bill & Melinda Gates Foundation (Strengthening Agri SMEs for Climate-Resilient SSPs)	USD	2,000,000		
					UNDP (Support for 10-Year Impact Evaluation and 2024-2030 Strategic Plan)	USD	525,926		
					FCD0 (Transforming Access to Climate	GBP	7,000,000		

					Finance Programme)				
					Mitigation Action Facility (Accelerating Deployment of E-Motos in Rwanda)	EUR	16,799,995		
					Fines, Fees, and Penalties (Domestic revenues)	RWF	301,860,822		
					Counterpart Funding (Domestic revenues)	RWF	1,548,728,27		

