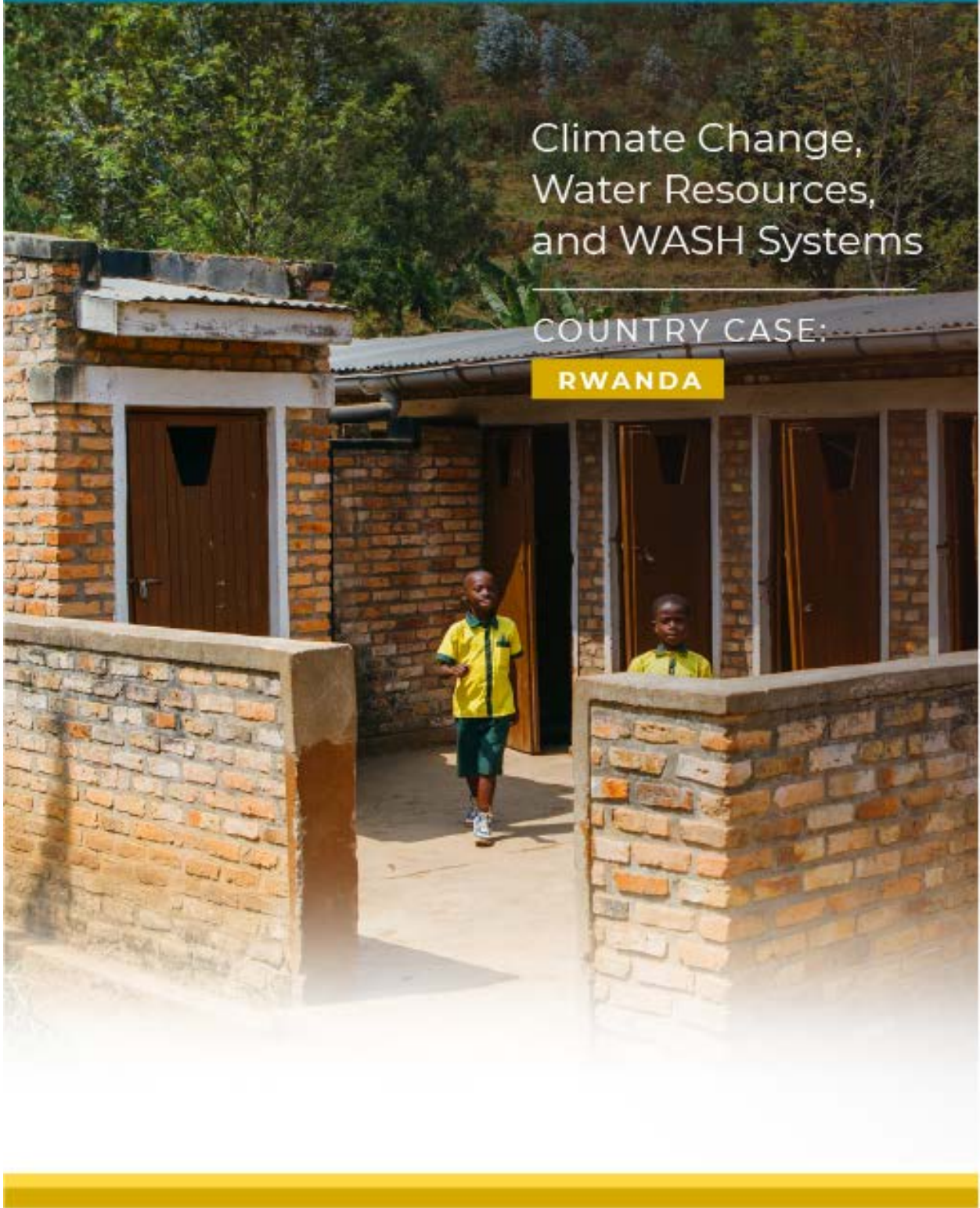


Climate Change, Water Resources, and WASH Systems

COUNTRY CASE:

RWANDA



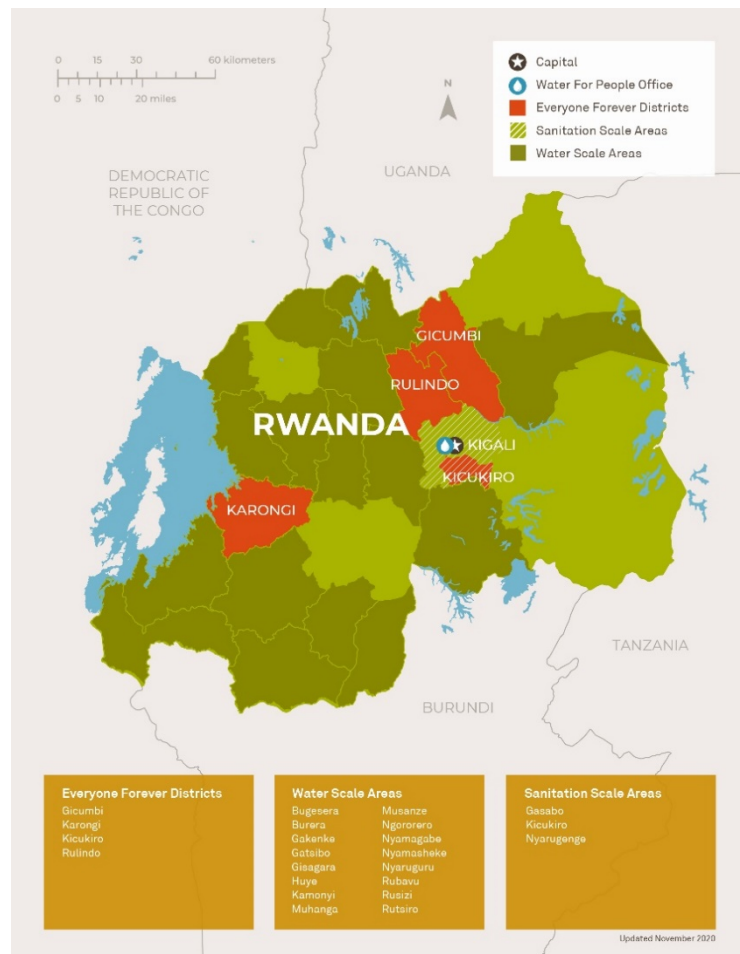
	Risk	Programming	Policy & Planning	
Polluted water	High	Focused	NAP	Yes
Too little water	Low	Related	National climate policies & plans	Comprehensive
Too much water	Medium	Focused	Extent WASH is included	Moderate

Climate trends and impacts on water resources

According to [Rwanda Climate Change Profile](#) elaborated in 2015, temperature predictions suggest that the country's temperature will increase another 1-2.5°C between 2000 and 2050, and 1-6°C by 2100. The increase is expected to be consistent across the country and across seasons. Average annual rainfall models predict a change between -100mm and +400mm for the period 2000-2050.¹ The Government of Rwanda perceives the country as water-rich and therefore does not prioritize climate change planning for water resources. However, when combined with rapid population growth, urbanization, environmental degradation, and pollution, climate change will raise new challenges. Increased attention to water resources management (WRM) and options for water storage, irrigation infrastructure, and water monitoring are needed to cope with future water demands in all regions of the country.

According to the [National Policy for Water Resources Management](#) and [Rwanda Water Resource Management Strategic Plan](#), population growth in Rwanda has increased pressure on land and forests for agriculture and settlements, resulting in land degradation, siltation of water bodies, and reduced water quality. Water in Rwanda is not only a strategic resource, but also a major source of natural and human-induced disasters.

Rwanda has become more susceptible to frequent and destructive water-related disasters such as landslides, floods, erratic rains, prolonged droughts, and strong winds and water currents that cause marine accidents and disease epidemics such as cholera. Water is also regarded as the main destroyer of infrastructure (roads, bridges, and water infrastructure) in Rwanda, with more than 40% of the sector budget



¹ Netherlands Commission for Environmental Assessment, Rwanda Climate Change Profile, 2015.

reportedly spent on repairing or rehabilitating water-destroyed infrastructures. These water-related disasters have significant impacts on the economy and livelihoods.^{2,3}

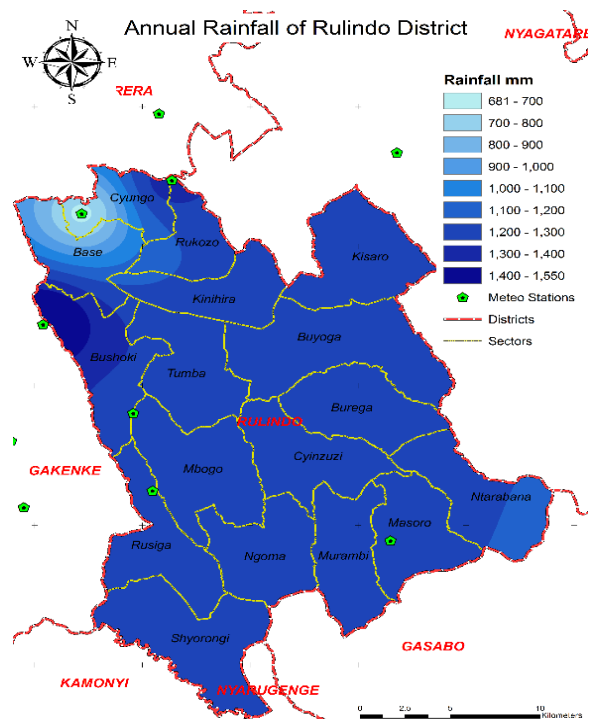
Impacts on WASH infrastructure and services

In the rural context, the main source of drinking water is groundwater, either natural springs in Northern and Western Provinces (where Water For People works) or wells in Southern and Eastern Provinces. Water is either fetched directly or piped to communities from springs and wells. As most Rwandan terrain is mountainous, and most people live on top of the mountains, water is pumped to the top of hills then distributed by gravity through distribution tanks.

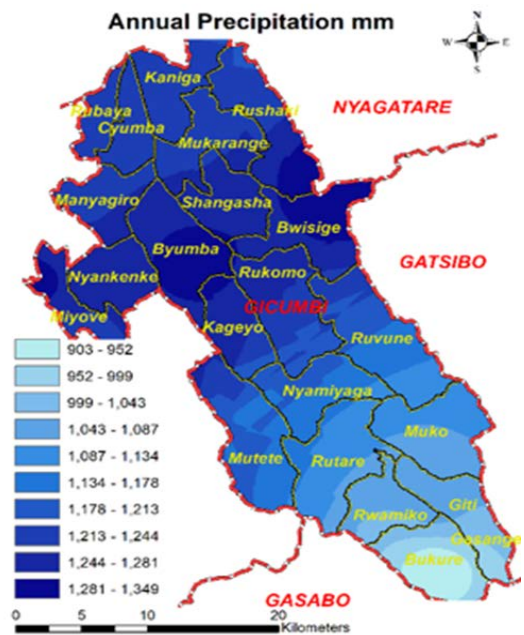
Onsite sanitation facilities are common in rural areas, and sanitation systems for urban areas are currently limited to small decentralized systems with few households connected. Major hotels, hospitals, and some industries have installed their own treatment systems as part of commercial and industrial environmental management requirements.

Most buildings in urban areas are not connected to decentralized wastewater treatment systems or facilities, with the exception of high standing residential areas. The remaining buildings have individual sewage treatment systems that allow for the percolation of treated effluent into the ground through leaching pits. This kind of localized handling of waste raises risk of groundwater contamination through malfunctioning or inefficient waste treatment systems.

Industries are a major contributor to water pollution mainly through the release of untreated effluent in streams, rivers, and marshlands. Rwanda is addressing this issue through the regulatory role of the Rwanda Environment Management Authority (REMA), continued development of industrial and wastewater standards by the Rwandan Bureau of Standards, and the recent establishment of land



Map 1: Annual Rainfall for Rulindo



Map 2: Annual Rainfall for Gicumbi

² Rwanda Ministry of Natural Resources, National Policy for Water Resources Management, 2011

³ Rwanda Ministry of Natural Resources, Water Resource Management Sub-Sector Strategic Plan, 2011

use and development laws and planning controls. The main challenges are increasing multiple water demands, declining water quantity and quality, and inadequate governance framework. In the future, Rwanda's main WRM challenge will be meeting the increasing water demand for internal use and transboundary needs, with limited capacity and in the face of declining water availability due to ecosystems degradation and pollution, which could increase with greater intensity and variability of rainfall events that are predicted with climate change.

Rwanda's water resources are severely polluted due to land degradation resulting in siltation of water bodies, pollution from agricultural chemicals of point and non-point water sources, inappropriate human settlements, and poor urban and industrial waste management. Because of increasing population pressure and declining water quality and quantity, access to clean water is a problem.

Specific impacts in Rulindo and Gicumbi Districts

According to an analysis of the WRM Plans for Rulindo and Gicumbi Districts, water sources in both districts are prone to contamination during rainy seasons. The number of fecal coliforms increases in rainy seasons and drops in dry seasons. The increased concentration of fecal coliforms during the rainy season is associated with groundwater contamination by pit latrines in the area and the runoff of water in water catchment areas that are not well protected.

The analysis also revealed that water demand is higher than water production from sources, and water from sources is not enough to meet the demand over the 25-year horizon. If the district continues to rely on water from springs, water demand will not be met, and water service will not be sustainable.

Climate and WASH policy and initiatives

To ensure climate resilience, mitigation, and adaptation, Rwanda decided to establish a national fund through which international and domestic climate finance can be managed. This Fund for Environment and Climate Change (FONERWA) can finance different environment and climate change related projects in Rwanda, through four thematic windows:

1. Conservation and sustainable natural resource management.
2. Technology transfer and implementation.
3. Environment and climate change mainstreaming.
4. Environmental impact assessment monitoring and enforcement.

FONERWA ensures that the country is in a good position to coordinate, manage, and disburse climate finance, as well as receive funding from international climate funds. Rwanda is one of few African countries (along with Benin, Kenya, Morocco, Namibia, Senegal, and South Africa) with a National Implementing Entity (the Ministry of Environment) for the [UNFCCC Adaptation Fund](#). REMA also serves as the designated authority to receive funding from the Green Climate Fund. With the climate finance from international funds that has been approved for Rwanda, the following initiatives have been adopted:

Action 1: Establishment of National Integrated Water Resource Management (IWRM) framework: The national framework coordinated by the Integrated Water Resources Management Department is under the Water Resource Board and cascaded down to district and catchment levels.

Action 2: District and Community Based Catchment Management under National IWRM

Framework: As part of the National Land Use Planning and IWRM framework, Rwanda integrated management of water resources at the district and community levels, defined catchment-wide responsibilities, clustered catchment partner-districts according to sub-catchment regions, and improved understanding of water users within districts and catchments.

Action 3: Understanding the Water Balance: Monitoring, Modeling and Analysis, Information Management: To allow precise planning of water resources and improved allocation, Rwanda has a plan to develop water balances at district and catchment levels, supported by hydrological models and improved rainfall monitoring and water quality testing.

Action 4: Water Security through Efficiency and Conservation: Rwanda has a comprehensive National Water Security Plan to expand water storage and irrigation infrastructure, rainwater harvesting, water conservation, and water efficiency practices. The plan brings together the national policies and strategies for irrigation, water supply and sanitation, IWRM, and energy.

Country program activities: mitigation and adaptation

Water For People in Rwanda supports districts to design resilient water infrastructure in partnership with district governments and the Ministry of Infrastructure. In addition, Water For People supports the development of a WRM Plan to ensure sustainable water services. WRM Plans quantify the available water resources and demand and evaluate current and future effects of climate change on water resources and water infrastructure in general.

The WRM Plans developed in Rulindo and Gicumbi illustrate that water quality is critical during the rainy season and that chlorination is needed to ensure the quality of drinking water in both rainy and dry seasons. Another lesson was that agriculture affects water resources in terms of water quality. As soil in Rulindo and Gicumbi is acidic, the pH of water from springs is below 6.5, which is the minimum standard of the World Health Organization. To this end, Water For People supported the districts to overcome the challenge of water quality by installing chlorination units to ensure that water is treated and has residual chlorine and installing pH regulators to ensure that drinking water from springs is between 6.5 and 8.5 pH.

Some preventive measures were also recommended, including relocating households living in the catchment areas of water sources and ensuring that agriculture in catchment areas is controlled to avoid contamination of aquifers. In addition, terraces were recommended to avoid erosion that can cause landslides and wash away water infrastructure. Water For People also supported a study of different alternatives to increase water production in Rulindo to ensure that people will have sufficient water supply that meet demand in the next 25 years. All District WASH Investment Plans now have an option of water balance analysis and proposal of alternative solutions to ensure that the water supply solution proposed is sufficient for a period of 25 years.

Key challenges

Growing demand for water, managing the multiple interests in water resources, and coordinating sectoral activities has led to cases of conflicts in water use.

In addition to the growing population and high demand versus supply, main challenges include:

- Water pollution caused by heavy rains and erosion affecting water quality.
- Heavy rains damaging water infrastructure.
- Droughts in some parts of Rwanda affecting water availability.
- Household agriculture and sanitation in the catchment areas affecting water quality.
- Acidic soil affecting the pH of water from springs.