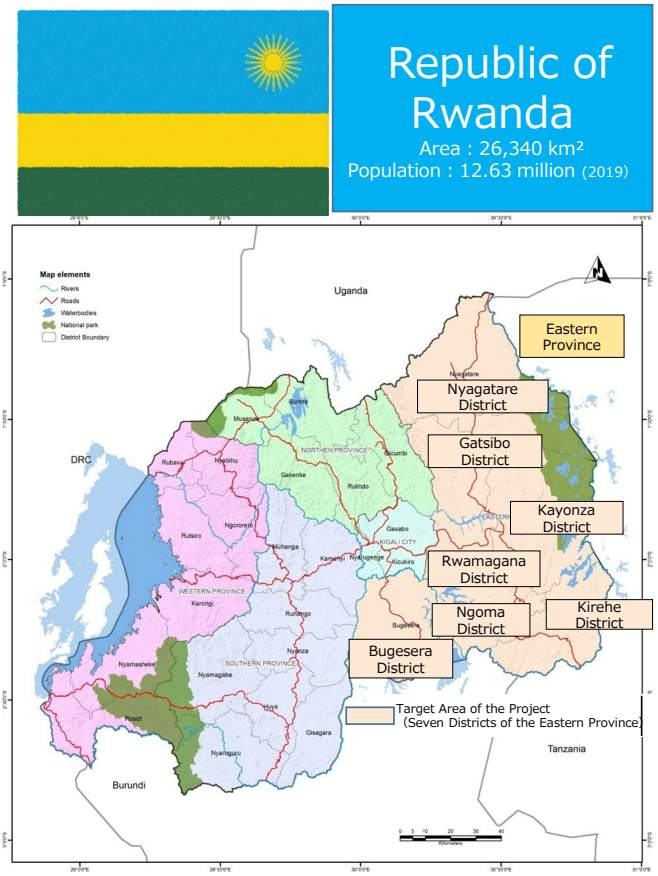
JICA Project Brief Note

# The Project for Rural Water Supply Services and Infrastructure Management Development in Rwanda

September, 2023
End of Phase 1 Activities




Project Target Area (Seven Districts in Eastern Province)

## 1. Background of the Project

### 1.1 Background of Project Implementation

The Government of Rwanda, based on its "National Strategy for Transformation (2017)", has set a goal of providing safe water to the entire population by 2024. However, just under 60% of rural water supply facilities are in operation; in rural areas, access to at least basic drinking water services is 60.0% (WHO/UNICEF, 2023). The low operation rate for water supply facilities is largely attributable to the weakness of operation and maintenance (O&M) systems. The technical capacity of many Water Service Providers (WSPs) is not sufficient and WSP budgets are not allocated with consideration for maintenance, resulting in many cases where pumps and other equipment remain unrepaired due to a lack of funds and technical expertise. Furthermore, under a decentralization policy, it was the responsibility of districts to provide support to WSPs. However, districts faced challenges due to insufficient technical and human resources, which hindered proper O&M. In response to these issues, the Government of Rwanda took steps in 2014 to strengthen support for WSPs by establishing the Department of Rural Water and Sanitation Services (RWSS) within the Water and Sanitation Corporation Ltd

(WASAC) to oversee rural water supply. While this move laid the foundation for improving O&M, the roles of WASAC RWSS, districts, and Private Operators (POs), which are the outsourced contractors for facility management, were not clearly defined, and the organizational structures within each entity were underdeveloped. Additionally, challenges persisted regarding technical capacity. In light of these issues, the Japan International Cooperation Agency (JICA) implemented the "Project for Strengthening Operation and Maintenance of Rural Water Supply Systems in Rwanda" (2015-2019) (hereinafter referred to as "RWASOM1") in four districts in Eastern Province. Through RWASOM1, national guidelines and manuals on the O&M systems of rural water facilities were developed. However, challenges remained in updating and utilizing these guidelines and manuals, as well as in areas such as the adoption of Geographic Information Systems (GIS) for facility maintenance plans and water quality management. In addition, RWASOM1 excluded spring water facilities, which constitute a critical water source, accounting for 44% of Rwanda's national water resources (NISR, 2018). Despite this, due to inadequate management, issues related to water quality pollution, such as the detection of coliform bacteria, have been observed. This has led to the proliferation of waterborne diseases and is considered a contributing factor to child malnutrition. Therefore, it has become imperative to further strengthen the planning and implementation capacity of rural water supply services, including the management of community water sources. This need has prompted the initiation of the "Project for Rural Water Supply Services and Infrastructure Management Development in Rwanda" (hereinafter referred to as the "Project").

## 1.2 Key Challenges in Rural Water Supply O&M

To understand the current situation and specific challenges in the O&M of rural water supply facilities in Rwanda, a baseline survey was conducted during Phase 1 (November 2021-September 2023) of the Project. This baseline survey aimed to identify the major challenges that the Project should address in subsequent phases.

### Challenge 1: Updating the O&M Framework for Rural Water Supply Facilities in Line with Actual Conditions

#### (1) Need for Improvement of WASAC, Districts (Facility Owners), and POs' O&M Capacity for Rural Water Supply Facilities

A framework for the O&M of rural water supply facilities was established in RWASOM1, clarifying procedures for water quality monitoring and the roles of various stakeholders. However, there remains a need for enhanced technical expertise and increased awareness of water quality management, particularly among districts that are facility owners and POs responsible for facility O&M. While progress has been made, there are deficiencies in data consistency within the monthly facility monitoring reports submitted by POs; in addition, feedback on these reports has not been effectively provided by districts. Furthermore, the cost of water quality testing and chlorination is not included in the O&M expenses covered by water fees, leading many facilities to neglect them.

#### (2) Lack of Technical Data (Operational, Maintenance, and Repair Records)

In rural water supply facilities, technical data, including operational, maintenance and repair records, are rarely recorded. This significant deficiency has resulted in severe issues related to facility aging, such as water leakage, damage and the increased risk of equipment failure due to inadequate maintenance and inspections. Even in water supply facilities that are equipped with flow meters and pressure gauges, data recording is frequently lacking. Consequently, the detection of issues like water leakages and equipment failure is delayed until they become critical, leading to increased repair costs and extended periods of water supply disruptions. While O&M manuals for preventive care of water supply facilities were developed in RWASOM1, regular diagnostic assessments of facility conditions are not being

conducted and preventive measures are not being implemented effectively.

**Challenge 2: Underutilization of Water Supply Facility Information (Inventory Data, Pipeline Maps) for Facility Upgrades, Rehabilitation, and Expansion**

(1) Necessity of Mapping Public Facilities (Schools, Health Centers, ECD Centers)

In many rural areas, public facilities such as schools, health centers, and Early Childhood Development (ECD) centers lack adequate access to water supply facilities (door-to-door connections). Consequently, the inability to access clean water contributes to issues like malnutrition and stunted growth in infants and young children. To address these challenges effectively, it is crucial to systematically develop water, sanitation, and hygiene (WASH) facilities. Specifically, when planning the expansion of water supply systems in public facilities, it is essential to have accurate information about the existing water supply facilities' locations, the status of connections, and the population supplied. However, currently this information is largely lacking.

(2) Underutilization of GIS Databases in Planning the Renewal, Rehabilitation, and Expansion of Water Supply Facilities

In RWASOM1, inventory data (facility specifications, equipment details, location data, etc.) and pipeline maps for facilities in all 27 districts were prepared. However, GIS maps and the database of water supply facilities have not been adequately utilized in the development of facility maintenance plans.

**Challenge 3: Lack of an Established Framework for O&M of Point Water Supply Facilities**

(1) Lack of Spring Water Source Protection and Safe Water Use

Springs are vital water sources in Rwanda, particularly in rural areas where the use of non-piped water supply facilities is as high as 64%, of which 53% is spring water (NISR 2017). However, springs are typically located in valley bottoms, posing a high risk of contamination due to sediment runoff during the rainy season, turbid water inflow, and animal waste. These issues raise concerns about their impact on public health. Therefore, strengthening water source protection activities and improving the hygiene awareness and behaviors of residents are crucial. However, baseline survey results showed that over half (63.4%) of households do not treat their water. It was also found that dissatisfaction with spring water quality were more related to physical factors such as "turbidity" and "taste/smell" than health-related issues, indicating an insufficient understanding of the relationship between water quality and health among communities.

(2) Lack of Framework for O&M of Handpump Borehole Facilities

According to the baseline survey, the operation rate of borehole facilities was below 50%, at 42.7% (346/811). For facilities not in operation, over half of the users (51.9%) had taken no action regarding repairs or maintenance requests, and once a facility breaks down, it remains abandoned for extended periods (over six months). The main reason behind this low operation rate is the absence of a national O&M framework, resulting in an inadequate O&M system. This has led to problems such as low organizational rates for Water Users Committees (WUCs), a shortage of hand pump repair technicians, and the absence of support systems and human resource development at the district level, which pose significant challenges for O&M management.

## 2. Approach to Addressing Issues

### 2.1 Project Implementation Approach

(1) Project Overview

The Project, which commenced in November 2021, is known as "RWASOM Phase 2, Amazi meza, ubuzima Bwiza (The Project for Rural Water Supply Services and Infrastructure Management Development in Rwanda)". It has gradually gained recognition among stakeholders, other aid organizations, beneficiaries, and the wider community. *Amazi meza, ubuzima Bwiza* is a slogan in

Kinyarwanda, symbolizing the Project's mission. It translates to "Clean Water, Healthy Life", signifying the aim of residents achieving healthy lives through access to clean water. The objective of the Project is to strengthen the capacity for planning and implementation capabilities for rural water supply services. To achieve this project goal, three key outputs have been outlined.

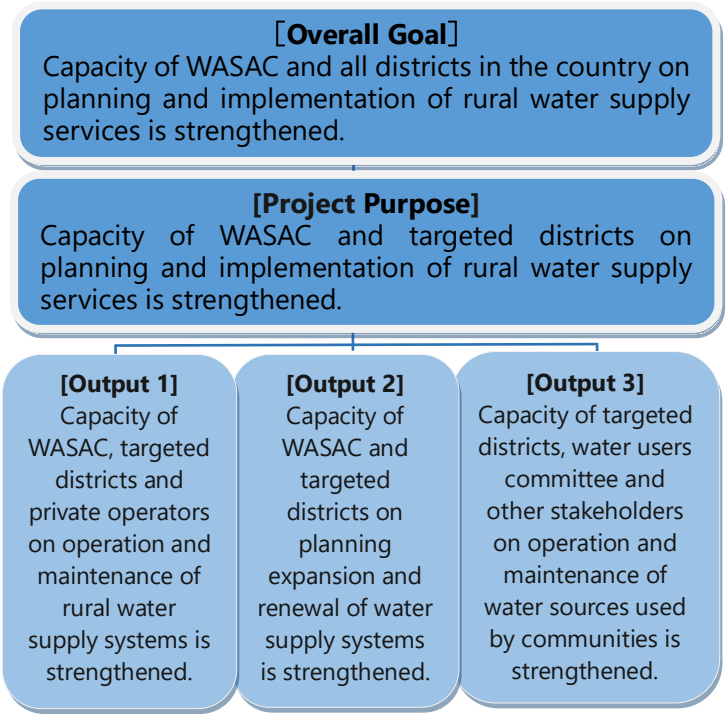



Figure 1: Framework of the Project

The Project's cooperation period is from November 2021 to October 2026 and is divided into three phases, each with the following durations:

Phase 1: November 2021 - September 2023

Phase 2: October 2023 - March 2025

Phase 3: April 2025 - October 2026

### (2) Project Implementation Structure

The Ministry of Infrastructure (hereinafter referred to as "MININFRA") is the lead agency for the Project, with WASAC RWSS as the implementing agency. RWSS, the Project's counterpart (C/P) agency, operates under the supervision of the RWSS Director. The structure of RWSS comprises three units, as illustrated in Figure 2.

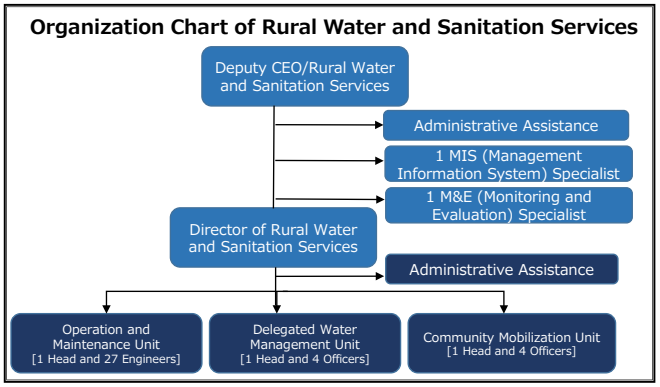



Figure 2: Organizational Chart of RWSS

The Project conducts quarterly Project Implementation Committee (PIC) meetings to address technical challenges that arise during implementation. These meetings involve discussions with districts, the C/P, and other concerned agencies, ensuring the smooth execution of the Project. Additionally, the Steering Committee (SC), which meets once or twice a year, is chaired by the CEO of WASAC and involves various government agencies and project-related organizations. The SC reviews the Project's progress, assesses the status of output achievement, and deliberates on significant challenges related to implementation.

## 2.2 Approach to Addressing Problems

The following approaches are being used to address the issues identified during the first phase of the Project.

**Approach 1: Update the O&M Framework for Rural Water Supply Facilities in Line with Actual Conditions**

### (1) Enhancing the Capacity of WASAC, Districts (Asset Owners), and POs in O&M of Rural Water Facilities

A capacity assessment of districts' water supply operations was conducted; based on the results, the improvement of water quality management capacity was selected as a major training focus. The training plan, developed through the results of the capacity assessment includes the following key topics.

Table 1: Training Topics on Improving Water Quality Management

| Training Topic | Targets |
|---|---|
| Technical support for chlorine injection management at chlorine disinfection facilities and measurement of free residual chlorine | WASAC, DWSSE |

| Training Topic | Targets |
|---|---|
| Raising awareness of the importance of water quality management in water supply systems and improving the supervisory capacity of POs for water quality management | District Officers |
| Improving the capacity for regular measurement of *Escherichia coli* (*E. coli*) in water supply systems | POs |
| Improving the capacity of chlorination management and regular measurement of residual chlorine in chlorine disinfection facilities | |

The National Child Development Agency (NCDA) is currently leading a two-year plan to reduce stunting rates in Rwanda. WASAC, as an implementing member of this plan, is in charge of the water quality assessment of water sources and supply, and of the implementation of hygiene education. Regular water quality monitoring at public facilities, including schools and health centers, is essential to achieving the plan's goals; thus, synergistic effects with training in this activity are expected. In addition, regarding operational challenges, including the PO's monthly monitoring reports, the Isoko y'Ubuzima Project (funded by USAID, 2021-2026) is currently developing a system to evaluate the performance of the client management and PO's commission management. Therefore, the Project plans to work together to ensure the adoption and effectiveness of the system by providing recommendations for its finalization and post-implementation monitoring.

### (2) Enhancing the Capacity for Recording and Storing Technical Data (Operation, Maintenance, and Repairs)

While an O&M manual for preventive maintenance of water supply facilities was prepared in RWASOM1, practical adaptations are needed for its on-site utilization. Therefore, the Project aims to improve POs' facility diagnostic capacity and data management capacity by developing practical periodic checklists for on-site use and conducting training on their utilization. In addition, the baseline survey revealed that only 60% (48 units) of the 80 solar-powered hand pump borehole facilities installed in the 7 districts of Eastern Province are operational. As the existing training module on pump management did not include content related to solar pumping systems, the module will be reviewed and appropriate training provided to enhance POs' capacity to operate and maintain solar pumping systems.

## Approach 2: Utilize GIS Databases for the Upgrade, Rehabilitation, and Expansion of Piped Water Supply Facilities

### (1) Conduct Mapping Surveys of Public Facilities (Schools, Health Centers and ECD Centers)

Capacity building training on GIS data collection and management has been provided to the C/P and District Water and Sanitation Support Engineers (DWSSEs) in Eastern Province to improve their capacity to update and manage the GIS database. Through the knowledge acquired in this training, DWSSEs will take the initiative to conduct mapping surveys of public facilities and develop water supply expansion plans for unserved water supply facilities based on the data collected. The mapping surveys will target key facilities such as schools, health centers and ECD centers, and the following data items will be collected.

Table 2: Data Collection Items for Mapping Surveys

| Data Collection Items | |
|---|---|
| General | Facility name, facility type, number of students, number of staff members, location information |
| Water Supply Status | State of water supply pipeline connections, state of water supply pipelines (malfunctioning/ operational, always/occasionally operational) |

### (2) Fully Utilize GIS Databases for Planning the Upgrade, Rehabilitation, and Expansion of Water Supply Facilities

A training program will be designed to develop the capacity to use GIS data to determine the locations of water sources, intake facilities, water transmission pipes, reservoirs, distribution pipes, and public taps of water supply facilities, and to facilitate their simplified design. Additionally, this training will utilize a manual developed within the scope of the Project for estimating the construction costs of water supply facilities, providing instruction on creating preliminary budgets using this same manual. Through this training, participants will enhance their ability to budget, execute, and manage upgrades, improvements, and expansions of water supply facilities.

### Approach 3: Establish a Framework for the O&M of Point Water Supply Facilities

#### (1) Protection of Spring Water Sources and Establishment of Safe Water Use

In each of the districts of Eastern Province, pilot sectors have been identified for the development of "Community Water Safety Plans". These plans will encompass activities such as protecting spring water sources, monitoring water quality, preserving the sanitation environment of water catchment areas, and promoting safe water usage. These activities will also include community awareness to be implemented by a multi-sectoral team consisting of Infrastructure, Health, Education, and Good Governance departments as well as a model construction for the protection of spring water sources. In the execution of each of these activities, the aforementioned baseline survey will assess the status of protected spring facilities, water quality, water usage patterns, and the sanitation environment in the vicinity of the springs. Furthermore, the degree of satisfaction with the protected springs, willingness for improvements, the current state of and awareness of WASH practices, and household economic conditions have been e examined. Based on these findings, the most suitable approaches for engaging with the communities will be determined.

#### (2) Establishment of the O&M Framework for Handpump Boreholes

Since there is no unified O&M framework for borehole facilities nationwide, each district has been adopting different approaches to establishing O&M systems. In consultation with each district, O&M systems, including water fees, repair systems, and spare part supply systems will be considered and tested on a district-by-district basis. In addition, due to the large number of solar-powered hand pump borehole facilities with low operational rates, a survey on actual condition will be conducted. Based on the results, O&M systems will be formulated and tested. On the other hand, regarding the maintenance of hand pump boreholes, Japan Overseas Cooperation Volunteers (JOCV) members have been actively involved for years in activities such as training WUC staff, improving fee collection methods, providing repair assistance, and systematizing monitoring and failure reporting. In conjunction with these efforts, the Project assists districts and communities in establishing O&M systems.

## 3. Results of the Approaches

### Result 1: Update the O&M Framework for Rural Water Supply Facilities in Line with Actual Conditions

#### (1) State of Chlorine Disinfection Equipment in Rural Water Supply Systems

A survey was conducted through DWSSEs to determine the state of chlorine disinfection equipment in five Eastern Province districts where a PO manages the water supply facilities. Of the 107 water supply systems (as of July 2023), the installation rate for chlorine disinfection equipment was 47% (50/107). Of these facilities, 84% (42/50) were operational, with the rate of implementation for chlorine disinfection at 76% (38/50).

#### (2) Water Quality Management Training for WASAC RWSS, POs and DWSSEs

Two training sessions on residual free chlorine management were conducted to enhance practical capacity for water quality management, with a total of 54 participants. Many participants already had a basic understanding of drinking water quality, water treatment, and the importance of chlorine disinfection. However, many were introduced for the first time to topics like chlorine solution concentration and the maintenance of chlorine disinfection facilities. In particularly, understanding aspects like concentration calculations appeared challenging.

Photo 1: Guidance on chlorine solution concentration adjustment

### (3) Water Quality Assessment of Public Taps at Schools in Kirehe District

As part of the two-year plan to reduce stunting rates led by the NCDA, water samples from public taps at 22 schools in Kirehe District were obtained and subjected to water quality assessments, including testing for *E. coli*, pH, turbidity, iron, manganese, and fluoride. Of the 22 samples, about 80% of those from public taps connected to water supply systems were found to have no detectable *E. coli*, indicating safe water. However, samples from public taps connected to rainwater tanks were evaluated as having a medium to high risk of *E. coli* contamination.

## Result 2: Utilizing GIS Databases for the Upgrade, Rehabilitation, and Expansion of Piped Water Supply Facilities

### (1) Mapping Major Public Facilities such as Schools, Health, and ECD Centers in the Project Area

In conducting facility mapping surveys, training sessions were held. The total number of participants was 11, including seven DWSSEs from each district, two members of the C/P (the Head of the O&M Unit and an MIS Specialist), and two members of the JOCV specializing in water and sanitation. In checking participants' knowledge of GIS and their level of understanding about the importance of data management, results showed the average score increased by 32.5 points (out of 100) before and after the training, indicating improved understandings among DWSSEs of GIS and data management through the training.

Following the training, mapping surveys of facilities commenced in each district. The table below summarizes the results of the mapping surveys. Note that ECD centers are categorized into three types: community-based, school-based, and home-based. Due to the large number of home-based ECD centers and frequent openings and closings, they were excluded from the survey.

Table 3: Number of Facilities Identified in Mapping Surveys

| District | Number of Facilities | Remarks |
|---|---|---|
| Bugesera | 551 | School: 175, ECD: 212, Health: 77, Local Government Office: 87 |
| Gatsibo | 541 | School: 170, ECD: 220, Health: 67, Local Government Office: 84 |
| Kayonza | 431 | School: 141, ECD: 164, Health: 63, Local Government Office: 63 |
| Kirehe | 405 | School: 123, ECD: 153, Health: 56, Local Government Office: 73 |
| Ngoma | 463 | School: 161, ECD: 18, Health: 41, Local Government Office: 79 |
| Nyagatare | 996 | School: 319, ECD: 414, Health: 115, Local Government Office: 118 |
| Rwamagana | 539 | School: 145, ECD: 239, Health: 58, Local Government Office: 97 |

Photo 2: Facility mapping survey

The results of the facility mapping surveys revealed the state of water supply pipeline connections at various facilities in the seven districts of Eastern Province, as shown in the tables below. Nyagatare District had the highest percentage of unconnected water supply pipelines for schools at 55%, followed by Bugesera District at 38%. For health centers, the percentage of unconnected water supply pipelines was highest in Gatsibo District at 55%, followed by Bugesera at 52%. For ECD centers, six districts had unconnected water supply pipeline rates exceeding 45%. Lastly, for local government office, all districts had unconnected water supply pipeline rates exceeding 65%.

Table 4: Water Supply Pipeline Connection Rates for Schools (Seven Districts of Eastern Province)

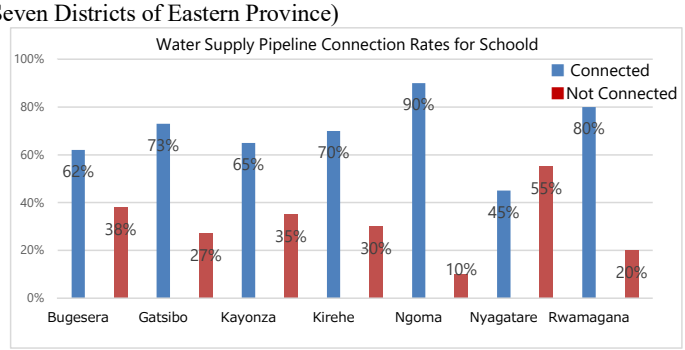


Table 5: Water Supply Pipeline Connection Rates for Health Centers (Seven Districts of Eastern Province)

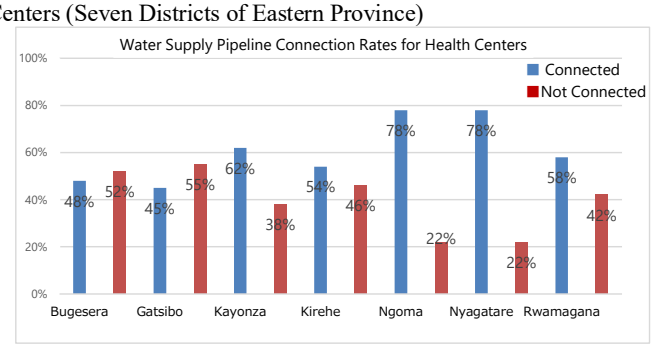



Table 6: Water Supply Pipeline Connection Rates for ECD Center (Seven Districts of Eastern Province)

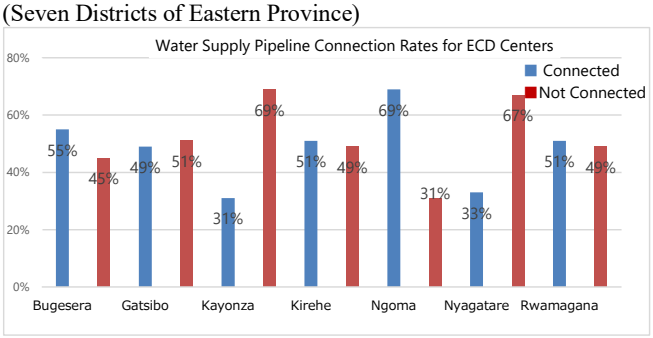
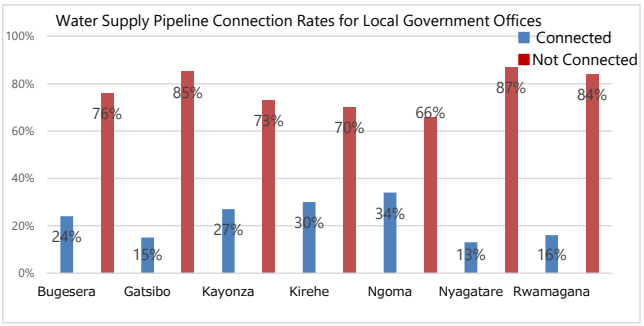



Table 7: Water Supply Pipeline Connection Rates for Local Offices (Seven Districts of Eastern Province)




### (2) Implementation of Training for Water Supply Planning

Training was conducted to develop capacity for the planning of water supply facility expansion. While the focus was on developing the critical skill of hydraulic calculations for expansion planning, requests were made for enhanced content related to general water facility design. This additional training content encompassed the design concepts and implementation capacity of various facilities from upstream to downstream, including water sources, water transmission pipes, reservoirs, distribution pipes, and public taps. Initially, training was conducted to prepare the C/P (MIS Specialist) to serve as a trainer for water supply facility expansion planning and hydraulic calculations. Subsequently, training was provided to DWSSEs in 27 districts nationwide. This training focuses on water supply planning and facility design and makes use of the GIS data of the existing water supply system updated within the scope of the Project, facility data obtained through mapping surveys, and Digital Elevation Model (DEM) data. Additionally, the training integrates GIS open-source software like QGIS and hydraulic calculation open-source software such as EPANET, allowing for preliminary design work to be conducted remotely, without the need for on-site surveys.

Photo 3: Facility planning training for 27 DWSSEs

## Result 3: Establishment of an O&M Framework for Point Water Supply Facilities

### (1) Conducting the O&M and Status Survey of Point Water Supply Facilities

As part of the baseline survey, investigations were carried out concerning the O&M status of handpump-equipped borehole facilities and protected springs, and the utilization of protected springs by water users. The major findings are outlined below.

#### 1) O&M Survey on Borehole Facilities and Protected Springs

A survey was conducted on the O&M status of handpump-equipped borehole facilities and protected springs. This included the number of facilities, their operational status, the organization rate for WUCs, and the status of water fee collection.

**[Survey Quantity]**

A survey was conducted for all borehole facilities in the seven districts of Eastern Province, confirming 811

borehole facilities. In contrast, with regard to protected springs, three pilot sectors were selected in each district, resulting in surveys conducted in a total of 21 pilot sectors. This revealed a total of 278 springs (including some that were not protected). The number of facilities in each district is shown below.

Table 8: Number of Borehole Facilities in Seven Districts of Eastern Province and Protected Springs in Pilot Sectors

| District | Number of Borehole Facilities in Seven Districts | Number of Protected Springs in Pilot Sectors |
|---|---|---|
| Bugesera | 127 | 16 |
| Gatsibo | 130 | 47 |
| Kayonza | 147 | 64 |
| Kirehe | 49 | 38 |
| Ngoma | 70 | 56 |
| Nyagatare | 247 | 10 |
| Rwamagana | 41 | 47 |
| Total | 811 | 278 |

The following describes the status of operation for each facility and baseline survey analysis results.

### a) Borehole Facilities with Handpumps

**[Operational Status]**

Out of the total of 811 borehole facilities, only 346 (42.7%) were operational, indicating that more than half of the boreholes were not operational.

Table 9: Operation Rates of Borehole Facilities (Seven Districts of Eastern Province)

| District | Operation Rate of Borehole Facility |
|---|---|
| Bugesera | 24.4% (31/127) |
| Gatsibo | 31.5% (41/130) |
| Kayonza | 42.2% (62/147) |
| Kirehe | 71.4% (35/49) |
| Ngoma | 32.9% (23/70) |
| Nyagatare | 57.5% (142/247) |
| Rwamagana | 29.3% (12/41) |
| Total | 42.7% (346/811) |

**[Key Analysis Results]**

- The majority (84.2%) of non-operational borehole facilities had been out of service for more than six months, indicating that once a borehole breaks down, it is often abandoned for extended periods.
- Regarding non-operational borehole facilities, over half of the user communities (51.9%) responded that they had "not taken any action". The main reason reported by nearly half (47.0%) was, "We don't know procedures when there is a breakdown". This underscores the importance for local governments to develop support systems and make these systems known to the public.
- WUCs had been formed at approximately 40.8% of borehole facilities. In particular, the districts of Nyagatare and Kayonza had high rates of organization, reaching 61.1% and 52.4%, respectively. In contrast, other districts had organization rates of approximately 20% - 26%.
- An analysis of the correlation between WUC formation and facility operation rates shows that facilities at which WUCs had been formed had an operation rate of 63.2%, significantly surpassing the operation rate of facilities without WUCs formed (28.6%). The formation of WUCs is considered a significant contributor to the sustainability of facilities.
- About a quarter (26.0%) of communities reported having local artisans capable of repairing borehole facility equipment in the surrounding area. In particular, communities in the districts of Nyagatare and Kayonza reported a high percentage of such local human resources, with 36.8% and 38.1%, respectively.
- Examining the correlation between the presence of local artisans and facility operation rates, facilities with available local artisans had an operation rate of about 60% (57.3%), which was significantly higher than the operation rate of facilities that reported not having such human resources (37.3%). The development and improvement of the capacity of local artisans are also considered to be factors contributing to facility sustainability.
- About 26.4% reported collecting water usage fees

(O&M costs). The districts of Nyagatare and Kayonza, where WUC's organizational rate is high, have the highest water usage fee collection rates, standing at 48.2% and 27.2%, respectively (The collection rates in the other five districts are below 20.0%).

- The correlation between fee collection and facility operation rates shows that facilities in communities where fees were collected had an operation rate of about 70% (68.7%), surpassing the operation rate of communities where fees were not collected (33.3%).

### b) Protected Springs

**[Operational Status]**

Out of the 278 springs identified during the baseline survey, 13 locations (5%) were found to have partially damaged facilities or to be unusable due to issues related to the water source and surrounding environment.

**[Key Analysis Results (Water Quality)]**

- Results from simplified water quality tests (pack tests) indicated that manganese ion concentrations exceeded Rwanda's water quality standards (0.1 mg/L) in 5% (14 samples) of the spring facilities, and fluoride ion concentrations exceeded Rwanda's water quality standards (1.5 mg/L) in 3% (nine samples) of the facilities. Raw water with fluoride and manganese ions exceeding water quality standards is not suitable for drinking water and/or domestic use; thus, it is necessary to consider appropriate water treatment methods or alternative water sources.
- Total coliforms were detected in 70% of all facilities surveyed. Low contamination levels (one to ten colonies) were detected in 47% (127 samples), medium to high contamination levels (11-99 colonies) in 19% (51 samples), and very high contamination levels (≥100 colonies) in 4% (11 samples). While it cannot be determined if these water sources are contaminated with fecal coliform bacteria, the possibility of contamination cannot be ruled out.
- Spring water sources with samples of water with turbidity exceeding five Nephelometric Turbidity Units (NTU) were found to have damaged piping from the spring outlet to the protective structure, potentially allowing sewage to enter the water source. Structural assessments of deterioration should be conducted and necessary repairs or improvements should be implemented.

### 2) Household Socio-Economic Survey for Spring Facility Users

A household survey was conducted targeting residents using protected springs to assess the current usage of existing facilities, awareness and behaviors related to O&M, and awareness of WASH.

**[Survey Quantity]**

A total of 4,400 households (20 households x 220 sites) were surveyed across the 21 pilot sectors.

**[Key Analysis Results]**

- 78.2% of households using protected springs were dissatisfied with the current state of water supply provided by the spring facilities. The most common reason given was “distance to the water source” (63.6%), followed by “waiting time” to fetch water (45.6%). On the other hand, relatively few households responded “water quality”, at only about 40% (40.2%).
- Among households dissatisfied with water quality, the majority responded “turbidity” as the reason (62.5%), followed by “taste/smell” (31.1%). About 30% of households reported that the water quality of the spring they used affected their health, while 70% of households showed a limited awareness of the relationship between water quality and health impacts.
- Most households using springs did not have any practice of paying for water use, nor did they have awareness of such a practice. The majority of households (96%) did not pay any fees for water use or access.
- Regarding the practice of cleaning jerrycan

containers before fetching water, about half of the households reported frequent cleaning. The correlation between the habit of cleaning containers and the incidence of diarrhea in the prior three months shows that households that reported washing containers "when necessary" (51.1%) had a relatively higher incidence of diarrhea in the prior three months than households that reported doing so "always and often" (31.4%).

- Many households recognized and practiced handwashing before and after using the toilet and after outdoor work or farming. However, the practice of handwashing "before cooking" (40.3%) was less recognized and practiced. Additionally, the rates for handwashing "after disposing of children's excrement" and "before feeding children" were low, at 7.1% and 9.4%, respectively.
- Examining the correlation between the source of water used for domestic purposes and the incidence of diarrheal diseases, households using unprotected springs had a higher incidence rate of 25.0%, compared to 18.5% for households using protected springs.

### (2) Workshops for Developing Water Safety Plans and O&M Models for Borehole Facilities

Workshops for district-level planning were held in each district to support the development of Community Water Safety Plans and the establishment of O&M models for handpump-equipped borehole facilities. District Planning Working Groups, selected from multi-sectoral department of local government, identified contamination pathways in the surrounding environment of water supply facilities that use springs as water sources, from water transportation, and household storage, to use for drinking, cooking, hand washing and dishwashing and to discuss the associated health risks. Based on this activity, the framework for the Community Water Safety Plan was formulated. The Community Awareness Teams, made up of multi-sectoral members, will use this framework to develop and implement water safety plans in target communities.

On the other hand, the O&M model for handpump borehole facilities in each district has been developed by analyzing the current O&M model, considering the O&M model to be introduced in each district, identifying issues related to the introduction of the model, and formulating an action plan. These O&M models and action plans were developed through examination of the district administrative services and policies, and financial and human resources, aiming to leverage the characteristics of each district and encourage district-level ownership in the planning process.

## 4. Lessons Learned in the Project

### (1) Fostering C/P Ownership

To foster a sense of ownership within the C/P in the Project, a measure was implemented whereby the C/P takes a leading role in meetings and workshops, acting as facilitators and presenters. Throughout the Project, workshops, seminars, PIC meetings, and SC meetings have been conducted, with the C/P leading the meetings. This approach has increased the C/P's understanding of the Project's content. This initiative will continue to enhance C/P ownership and contribute to the development of foundational skills for organizational self-sustainability.

### (2) Utilization of Mailing Lists

C/P members are busy with daily work and often find it challenging to attend regular meetings with Project experts due to various operational tasks and orders from MININFRA. Thus, the Project has adopted a style that allows C/P members to utilize available time for information sharing, discussions, and decision-making. Additionally, the Project sends out weekly emails containing activity schedules and progress updates, ensuring that stakeholders are always informed about the Project's activities. The mailing list includes WATSAN (Water and Sanitation) Officers, DWSSEs in the seven districts of Eastern Province, JOCV members specializing in water and sanitation, and other concerned individuals, fostering good cooperative relationships.

### (3) Collaboration with JOCV on Water and Sanitation

JOCV members specializing in water and sanitation are stationed in four target districts of the Project. They are actively involved in grassroots-level activities, including the repair of hand pump boreholes and hygiene promotion. They have an in-depth understanding of the latest conditions on the ground and at the water supply facilities in the districts and communities, and have been involved in activities related to O&M systems of hand pump borehole facilities since the RWASOM1. The Project is maintaining this cooperative relationship and further strengthening collaboration with JOCV members by involving them in district level meetings, technical trainings, engaging in discussions on on-site challenges. Their role as valuable advisors at the grassroots-level will be further strengthened.

Photo 4: Meeting between JOCV members and Japanese experts

[Project Implementation Period : September 28, 2021 – November 30, 2026]

References:

1. World Health Organization (WHO) and United Nations International Children’s Emergency Fund (UNICEF). 2023. “The WHO/UNICEF Joint Monitoring Programme (JMP) report – Progress on household drinking water, sanitation and hygiene 2000-2022: Special focus on gender”

2. National Institute of Statistics Rwanda (NISR). 2017. “Rwanda Integrated Household Living Conditions Survey 5 (EICV5 2016/2017)”