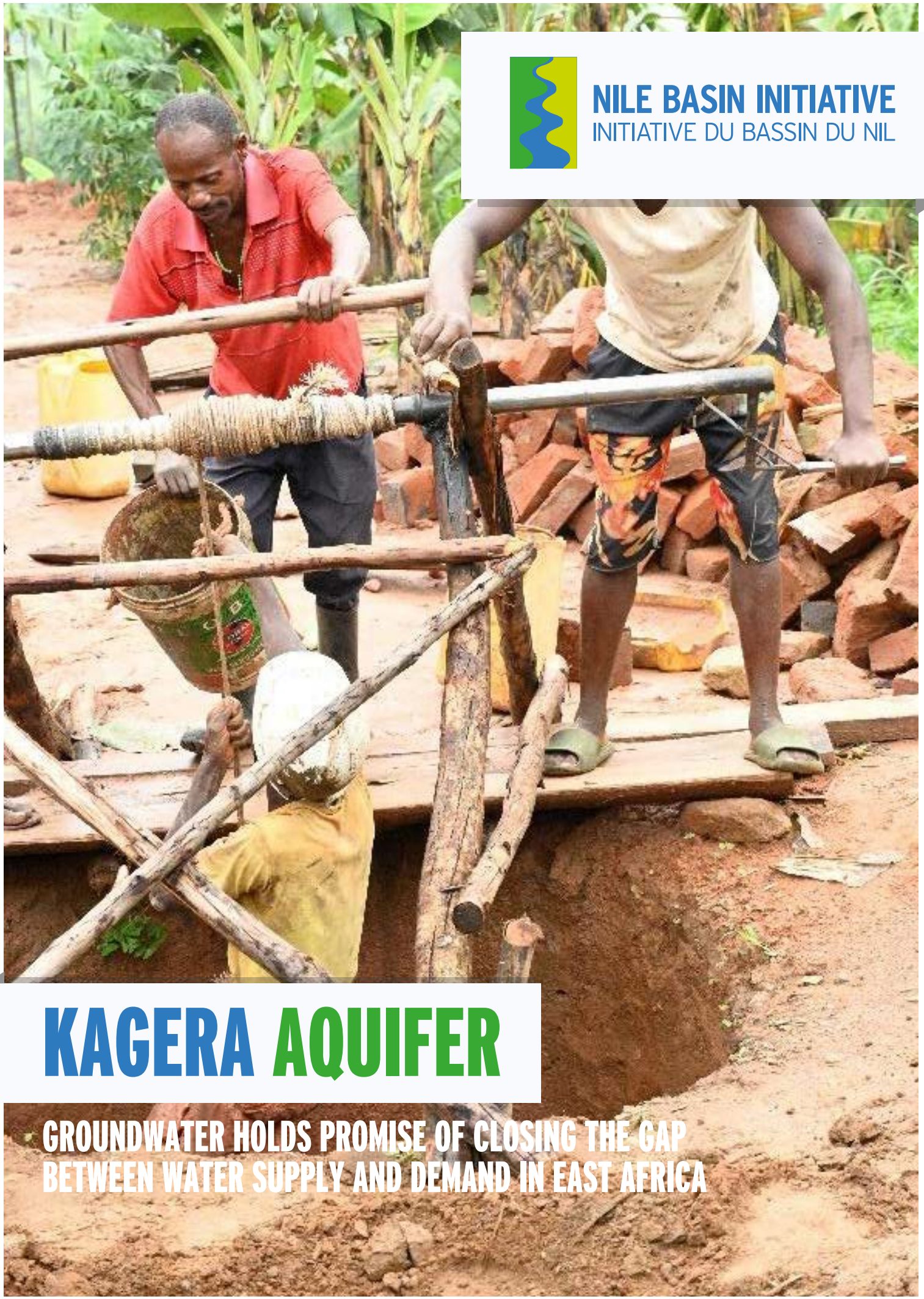


NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

KAGERA AQUIFER

GROUNDWATER HOLDS PROMISE OF CLOSING THE GAP BETWEEN WATER SUPPLY AND DEMAND IN EAST AFRICA

DISCLAIMER
The views expressed in this publication are not necessarily those of NBI's Member States, its development partners or contracted entities.

Trademark names and symbols are used in an editorial fashion and no intention of infringement on trade mark or copyright laws. While every care has been exercised in compiling and publishing the information and data contained in this document, the NBI regrets any errors or omissions that may have been unwittingly made in this publication.

The NBI is not an authority on International Administrative Boundaries. All country boundaries used in this publication are based on FAO Global Administrative Unit Layers (GAUL).

Launch date 22nd February 2025

Cover Photo: Byabasaija climbing down to the bottom of the well, to collect water

Photo by Emma Muchunguzi
Designed by Jonathan Kabugo

TABLE OF CONTENTS

Burundi DR Congo Egypt Ethiopia Kenya Rwanda South Sudan Sudan Tanzania Uganda

INTRODUCTION

The Nile Basin is characterised by strong spatial and temporal variability of water resources availability; river flow is highly seasonal and substantial parts of the Basin are water scarce. This, coupled with the rapidly growing water demand resulting from increasing population and economic growth in the Nile Basin countries, is increasing pressure on the already scarce Nile Basin water resources.

Given that the Nile is a shared river, the challenge remains how to ensure that Basin countries sustainably and optimally utilise the common Nile Basin water resources to meet the needs of all riparian States. Among other things, the Nile Basin Initiative (NBI) is facilitating Member States to cooperatively manage and develop their common Nile Basin water resources taking in to consideration the basin wide context, for win-win outcomes.

Goal 1 of NBI's (2017 - 2027) Strategy focuses on Water Security. Given that demand for water for various uses is rapidly growing and will outstrip the supply of conventional surface-based sources soon, enhancing conjunctive use of groundwater and surface water is one of the strategic directions under this goal.

NBI Member States recognise that the interaction betweengroundwater and surface water systems (rivers, wetlands, lakes) has not been adequately considered in the NileBasin.

Through its five-year (2020 - 2025) groundwater project, NBI is supporting Member States to monitor groundwater; improve the knowledge base and capacity as well as put in place cross-border mechanisms for joint management and sustainable utilisation of shared aquifers. This is in addition to addressing the water related Sustainable Development Goals.

The Project - 'Enhancing Conjunctive Management of Surface Water and Ground+ water Resources in Selected Transboundary Aquifers: Case Study for selected Shared Groundwater Bodies in the Nile Basin is implemented with financial support from the Global Environment Facility (GEF) through the United Nations Development Programme (UNDP).

Three aquifers were selected for the current intervention namely; Mt Elgon shared between Kenya and Uganda, Gedaref-Adigrat, shared between Ethiopia and The Sudan as well as Kagera shared among Burundi, Rwanda, Tanzania and Uganda.

This booklet features stories about ground water in the four countries that share the Kagera aquifer. The purpose is to raise awareness about the importance of groundwater and its potential to close the gap between water supply and water demand, as well as in buffering the effects of climate variability.

NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

InfoNile

WATER JOURNALISTS AFRICA

gef
GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

UNDP

MESSAGE FROM THE EXECUTIVE DIRECTOR

Dear reader,

In the Nile Basin, ensuring sustainable and equitable access to water is fundamental for socio-economic development, regional peace and stability. With increasing climate variability, population growth and competing demands for socio-economic uses, securing reliable water supplies to meet growing demand through conventional surface sources (rivers, streams, ponds and wetlands) will outstrip supply. The Nile Basin countries regard groundwater resource, which over 70% of the rural population depends on, as an insufficiently understood asset that has the potential to complement surface water and contribute to resilience. In addition, barriers such as gaps in governance mechanisms for shared aquifers and capacity exist.

Against this background, and with financial support from the Global Environment Facility (GEF) the Nile Basin Initiative (NBI) in partnership with the United Nations Development Programme (UNDP), is implementing a project that supports consolidated management of surface and groundwater in selected transboundary aquifers. The project entitled, 'Enhancing Conjunctive Management of Surface and Groundwater Resources in Selected Transboundary Aquifers: Case Study for Selected Shared Groundwater Bodies in the Nile Basin', is implemented on the Mt. Elgon aquifer, shared between Kenya and Uganda, Gedaref-Adigrat aquifer- shared between Ethiopia and Sudan, and the Kagera aquifer, shared among Burundi, Rwanda, Tanzania, and Uganda. The objective is to strengthen the knowledge base, capacity and cross-border institutional mechanisms for sustainable use and management of selected transboundary aquifers in the Nile Equatorial Lakes and Eastern Nile sub-basins. This project aims to attain more effective utilisation and protection of selected shared aquifers in the selected sub-basin in the Eastern Nile and the Nile Equatorial Lakes region through further improving the understanding of available groundwater resources and demonstrating 'conjunctive management' that optimizes the joint use of surface and groundwaters. The project lies at diverse geographical, geological and ecological systems within the Nile Basin. This will improve knowledge-base and understanding on groundwater resources availability in the Basin to facilitate informed decision and innovative interventions for sustainable management and development of the common water resources.

In line with the six strategic goals in the 10-year NBI Strategy (2017 – 2027), the conjunctive use of groundwater and surface water emerges as a transformative approach to good water resources management. By strategically integrating these resources, we can enhance water security, reduce vulnerability to droughts and floods, promote environmental protection and optimize water availability for agriculture, energy, domestic use, and industrial development. The outcomes of the project complement the Nile Basin Member States efforts in achieving sustainable development, including Sustainable Development Goal (SDG) 6: Clean Water and Sanitation, SDG 13 on Climate Action and Goal 17: Partnerships for the Goals.

Given the complexity of addressing transboundary water resources, the project focuses on furthering knowledge and understanding of ground water through studies, followed by governance, pilot schemes, capacity building and awareness creation. First and foremost, this project dealt with studies in the project areas for furthering knowledge and understanding about availability of groundwater resources in the selected aquifers underlying watersheds in the sub-basins of the Eastern Nile and the Nile Equatorial Lakes. From the very beginning, NBI project experts interacted and shared experiences with the communities within Mt. Elgon and Kagera aquifers. The impact of groundwater to the communities' daily lives, the landslides affected people, and indigenous practices for water conservation is documented, and the need for integrated water management for sustainable water supply is eminent. Information such as this provides a great opportunity to appreciate the importance of groundwater and get a closer look to know how groundwater is improving the lives of ordinary people in the Nile Basin in this era of climate change.

As we prepare to pilot innovative technologies on the conjunctive use of surface and ground water, I feel delighted to share with you the initial stories and invaluable insights of this unique project, drawing from the communities' engagements, studies undertaken, and lessons learned from ongoing initiatives. The stories touch on various social dimensions regarding the use of groundwater, including communal climate resilience efforts, the institutional, legal and policy frameworks around the use of freshwater, especially groundwater in rural communities, among landslides affected people, as well as the role of women and youth in water management at village level. The need for robust policies, institutional coordination, and investment in data-driven decision-making is underscored to ensure that groundwater and surface water resources are managed as a single interconnected system.

Dear reader, cooperative management and development of the common Nile water resources in a sustainable manner is more important than ever as Nile Basin grapples with reduced water availability, climate extremes, socio-economic pressures, and environmental decline. As we navigate the complexities of water governance in an era of climate change, let us commit to collaborative, socio-economic, science-based, and holistic approaches that will secure water resources for generations. NBI remains the only basin-wide and impartial platform for dialogue to jointly take care of and equitably utilize the common Nile Basin water resources for win-win benefits. NBI will continue to facilitate Member countries in evidence-based decisions and guided interventions informed by science, knowledge and understanding on transboundary water management. I wish to invite all the Nile Basin Member States, partners, water managers, private sector, academia, communities and all stakeholders to work together towards a resilient and water-secure Nile Basin.

Dr Florence Grace Adongo

HOW GROUNDWATER HAS CHANGED THE LIVES OF THE BATWA OF GIKA

By Eraste Manishaka – Burundi

About 125 kilometres northeast of Burundi's economic capital Bujumbura lies Ngozi province – home to thousands including the Batwa of Gika Community.

The Batwa is one of Africa's most marginalised communities and they are conservation refugees in many countries- including in Burundi, Rwanda and Uganda. For decades, the Batwa in Gika faced several challenges ranging – including lack of clean water.

During the rainy season, residents collected rainwater that was often stagnant and unsanitary while during the dry season they travelled several kilometres to draw water from the marshes. This situation not only affected the Batwa community of Gika, but the neighbouring villages of Mivo, Kinyana and Gatonde as well.

According to Sheikh Hussain Mohammed – one of the prominent leaders in the area, this situation not only caused water-borne diseases, but also plunged the communities into precarious living conditions.

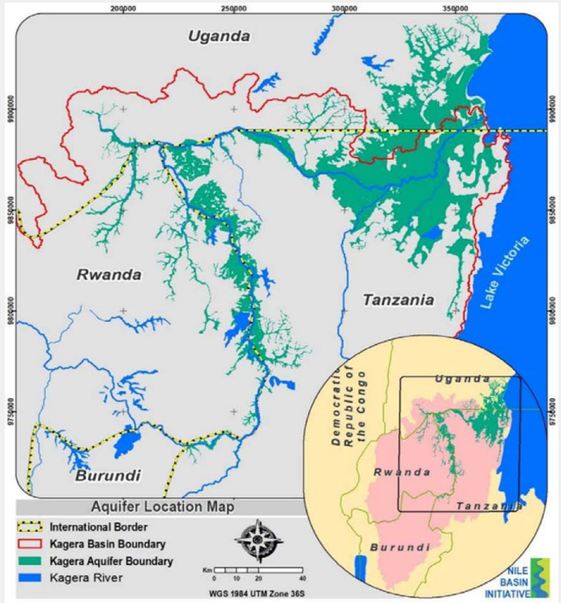
Ngozi province is located in the groundwater-rich Kagera basin. In this basin water collection is largely the responsibility of women and children.

AVERAGE TIME SPENT COLLECTING WATER 20-30 MINUTES

According to the Nile Basin Initiative (NBI) technical report, the average time spent collecting water varies between 20 and 30 minutes.

Community Centred Intervention
Groundwater in Ngozi province falls under the Kagera aquifer shared by Uganda, Tanzania, Rwanda, and Burundi. According to the Nile Basin Initiative water abstraction in this aquifer is estimated at 3.25 million m3/year.

With support from development partners, communities in Ngozi province villages – including the Batwa now have access to clean water which is being pumped from the ground. This project initiated by the Burundi Muslim community in Ngozi started in 2023.



A map by NBI, showing the extent of the Kagera aquifer

"We initiated the project to drill deep underground and install reservoirs and easily accessible distribution points after noticing that the Batwa community of Gika and the villages of Mivo, Kinyana and Gatonde were using unsafe water," explains Sheikh Mohammed.

Ground water projects are a game changer in countries with inadequate surface water sources.

Dr Abel Nsabimana, a hydrologist and lecturer at the University of Burundi says that Burundi has 5,000 sources of drinking water with a flow rate of more than two litres per second. "However, these sources of water are not sufficient to supply the population living in the towns and in the interior of the country, including schools. This is why it is so important to have recourse to groundwater drilling," he elaborates.

According to Seleus Ntunzwenimana, a manager at government's Water and Sanitation Department notes that groundwater is very important for supplying drinking water to schools and health centres where government's water agency - Régie de Production et de Distribution d'Eau et d'Electricité (REGIDESO) does not cover.

However, there are still low levels of underutilisation of ground water not only in Burundi – but across the entire Kagera aquifer area. According to NBI, Kagera aquifer has an estimated storage capacity of around 50 billion m3 but current groundwater abstraction for domestic water supply is estimated at 3.25 million m3/year.

LEFT Sheikh Hussain Mohammed

LEFT Refreshing moments at the borehole.

With groundwater irritation, Sinzumusi Rajab transforms his maize farming with easy irrigation.

Nile Basin Initiative (NBI) is a cooperative arrangement initiated and led by the Nile riparian countries to promote joint development, protection and management of the common Nile Basin water resources.

A Profound Tranformation

Groundwater today accounts for around 70 percent of the water supply in the Kagera basin, the NBI's technical report points out.

Groundwater projects like the one in Ngozi are playing a critical role in improving health and living conditions among people – including the Batwa.

Carine Migihsha, the head of the local health centre in Gika says that they used to see tens of patients every week suffering from diarrhoea or water-borne infections, but these cases have reduced.

He notes that hygiene practices have also improved significantly, with residents now washing their clothes and cleaning utensils with clean water adding that the construction of toilets has become widespread, reducing the risk of water contamination.

In addition to health outcomes improvement, access to groundwater has created economic opportunities for the community.

Sinzumusi Rajab, a farmer in the Mubuga area now irrigates his maize gardens with ease. "Before, I used to walk miles to fetch water from Nkaka. Now water is close to my fields, making irrigation easier and increasing my production," he elaborates.

Another farmer, Simon Bukuru took advantage of the available water and bought an irrigation pump. Before, he used to spend 200,000 Burundian Francs (FBU) on buying water.

Kadandaza Nduwimana, a pig farmer and Batwa hill leader used to pay 20,000 FBU a day to buy and carry water for his animals, but now he saves this money for other purposes.

Community Interventions Sustainability

Sheikh Hussain Mohammed observes that development partners have helped to finance the groundwater projects and all that is expected of the community is responsible management to ensure that these infrastructures serve for generations.

As a sustainability intervention, area leaders have set up local committees to oversee the maintenance of the facilities and to raise awareness among residents of the need to use the established water sources responsibly.

Is Ground Water Key to Climate Change Resilience?

In Burundi, access to drinking water during the dry season is difficult. Taps often run dry in both urban and rural areas, and the situation normalises again during the rainy season. However, as Dr. Nsabimana observes that over the past years, the dry seasons are becoming longer.

He observes that the development of underground water supplies provides continuous access to drinking water, and helps people forget about water stress associated with the current unprecedented climate change in Burundi.

On his part, Sheikh Mohammed observes that "Solar-powered submersible pumps, with reservoirs and taps connected wherever possible, offer much better yields, supply two or three times as many people, and are easier to maintain."

The project to provide access to drinking water in the village of Gika shows that water can transform a community. By improving public health, easing economic burdens and offering new opportunities, this project has become a pillar of progress for the Batwa of Gika.

This initiative underlines the importance of sustainable management of natural resources and demonstrates that simple solutions can have a profound impact. Through this example, Gika is becoming an inspiring model for other regions facing similar challenges, and a reminder that access to drinking water is a fundamental right and a condition for an equitable future.

Using groundwater in everyday life: a woman Batwa community of Gika washes clothes while a man collects water from a borehole

GROUNDWATER IMPROVES ACCESS TO DRINKING WATER IN SCHOOLS IN BURUNDI

By Ezéchiel Nibaruta – Burundi

The A borehole at Bwiza-Bweranka Basic School in Ngozi province

Success at school largely depends on the environment. At Bwiza-Bweranka Basic School in Ngozi province- northeastern Burundi, the school environment was characterised by lack of water – with learners trekking long distances to access water for school use.

"This was catastrophic," says Apollinaire Ndikumana – the school Head Teacher.

> With no clean drinking water, no water to clean school classrooms and toilets, learners spending much time fetching water, it is not surprising that the success rate was gradually declining at this school.

Rafiki Niyonkuru, one of the pupils at this school says the conditions were poor to support success in class.

"Pupils were thirsty, wearing dirty uniforms that smelt of sweat. The classrooms were full of dust. As for the latrines, they were unsuitable and gave off a nauseating odour," he explains, adding that it was difficult to succeed under these conditions, but it was understandable.

"We studied after traveling long distances to bring water for drinking and cleaning – lest we studied in a dirty classroom."

Today, this situation is a story of the past – thanks to the groundwater project, established in 2022. This project has established a water tap that supplies the school and communities.

With pumped groundwater now flowing and accessible, Ndikumana observes that this saves time – with learners spending more time in class and the success rate has improved.

The transformation story of Bwiza-Bweranka Basic School underscores the importance of groundwater in solving water challenges faced by the population. This school of thought is shared by different scientists and institutions like the Nile Basin Initiative (NBI).

Dr. Abel Nsabimana, a hydrology expert who lectures at the University of Burundi, points out that Burundi has 5,000 sources of drinking water with a flow rate of more than two litres per second.

He however adds that these sources are not enough to supply all the population- hence the necessity to turn to groundwater drilling.
The groundwater in Ngozi province falls under the Kagera aquifer. This is shared by Uganda, Tanzania, Rwanda, and Burundi. According to the Nile Basin Initiative (NBI), Kagera aquifer covers an area of about 6,300 Km2.

The water abstraction in this aquifer is estimated at 3.25 million m3/year, and groundwater is used primarily for water supply of rural communities.

Nile Basin Initiative (NBI) is a cooperative arrangement initiated and led by the Nile riparian countries to promote joint development, protection and management of the common Nile Basin water resources.

Seleus Ntunzwenimana, a manager in the Directorate General of Water and Sanitation, believes that groundwater is very important for the supply of drinking water in schools and health centres where Burundi's Régie de Production et de Distribution d'Eau et d'Electricité (REGIDESO) is unable to reach.

Today, learners at At Bwiza-Bweranka Basic School attest to the new state of the school environment. "none of my classmates suffer from hygiene-related diseases anymore. The teachers have taught us to wash our hands often, clean the classrooms and latrines daily to avoid hygiene-related illnesses," says one of the learners Aicha Mugishawimana.

The transformative impact of groundwater use is now felt beyond the school. Emile Ndikumana, the head of Bwiza-Bweranka Hill notes that the exploitation of groundwater is a step forward for the area.

"Previously, it was a hill without drinking water," Ndikumana elaborates – referring to his area. "The population fetched water from far and it was a burden. Now, with this tap, the population fetches clean drinking water and for other purposes from nearby," he adds. According to the NBI technical report, groundwater helps reduce the risk of waterborne diseases, as it is generally of better quality than surface water sources.

LEFT:
The ground water at Bwiza–Bweranka Basic School benefits the neighbouring community members as wel

BURUNDI: HOW GROUNDWATER IS REVOLUTIONIZING MARKET GARDENING

By Ferdinand Mbonihankuye – Burundi

Game changer: The community groundwater project that is transforming lives

"A can farm year-round, not only in marshlands but also on hillsides during the dry season, thanks to groundwater irrigation," says Audace Ngendakumana, a farmer from Mukoro Hill in Burundi's Bugendana Commune.

Local vegetable farmers like Ngendakumana now get water for irrigation from a borehole established in their community to improve living standards.

In Bugendana, the benefits of groundwater irrigation extend far beyond small home gardens. Once limited to small-scale vegetable farming during the dry season, agricultural ventures are now evolving into commercial large-scale farming operations. "We grow tomatoes, carrots, potatoes, and squash during the dry season and sell them. Vegetables are highly profitable, especially in the dry season, boosting our income," explains Elysé Ndereyimana, a farmer from Kamonyi Hill in the Kiriba zone, Giheta Commune.

In Mukoro farmers now grow sweet potatoes between June and September or maize during the dry season, a feat previously unimaginable. "It's no longer just a farm; it's a genuine source of prosperity," testifies Ngendakumana, as he inspects his maturing tomato garden.

Irrigation not only helps farmers diversify crops but also ensures continuous availability of jobs throughout the year. "There's no shortage of work, even in the dry season. Young people no longer need to leave in search of jobs elsewhere. We farm year-round, which brings stability," asserts Berchmans Hakizimana, a local official.

According to Hakizimana, irrigation is proving to be a crucial driver of resilience and social inclusion. "It reduces dependence on rainfall, stabilizes agricultural yields, and improves food security, even during the dry season. It also fosters the inclusion of vulnerable groups, such as women and youth, while strengthening community solidarity and reducing inequalities in access to agricultural resources," he explains.

A Thriving, Prosperous Community

In Mungwa, for instance, a system supplies water to 1,347 households, a school, and a church, reducing distances of up to five kilometers to access water. "These infrastructures, integrated into a beautiful landscape, not only provide easier water access but also reduce the exorbitant costs previously spent on water transported from other localities," elaborates Aristide Nzogirukwayo, Head of the Gitega City Sector.

Audace Ngendakumana is proud of the profits from his farm. He says that the profit from his vegetable garden in the four dry season months of this year was 300,000 BIF (about 103.12 USD).

The benefits extend beyond the fields. Goreth Hakizimana, a farmer from Kamonyi Hill, recounts, "With groundwater, I save 15,000 BIF (5.15 USD) a day that I used to spend on watering my crops."

By reducing the distance to irrigation water—from three kilometres to 50 meters, Goreth says that they now save time, energy, and money, and this allows people to focus more on farming- leading to increased productivity and income.

LEFT: Vegetable gardens like this are possible because of irrigation by groundwater

A farmer inspecting her garden. With improved access to water, women who used to spend much time to fetch water are now more engaged in agriculture.

Beyond productivity, families also benefit. "I can buy clothes for my children and provide them with a balanced diet," Goreth highlights.

Establishing a life-changing projects is not an end. Many projects struggle to live beyond the early short term years.

To ensure sustainability, Amazi Water- the organization behind the establishment of the borehole has established water point management committees and offered training in basic maintenance and hygiene practices, says Clovis Nkunzimana, Regional Manager for Central-East Amazi Water.

Groundwater at the Heart of Community Climate Resilience

According to Burundi's Third National Communication on Climate Change, agricultural production has declined over the past decade due to the complete or partial destruction of fields. Prolonged drought primarily affects provinces like Kirundo, while excessive rainfall leads to massive crop destruction in the Imbo plains or lowlands of the central plateaus.

These climatic events not only devastate fields but also exacerbate soil degradation, threatening the land's regenerative capacity. Consequently, food insecurity intensifies, affecting an increasing number of households, the report states.

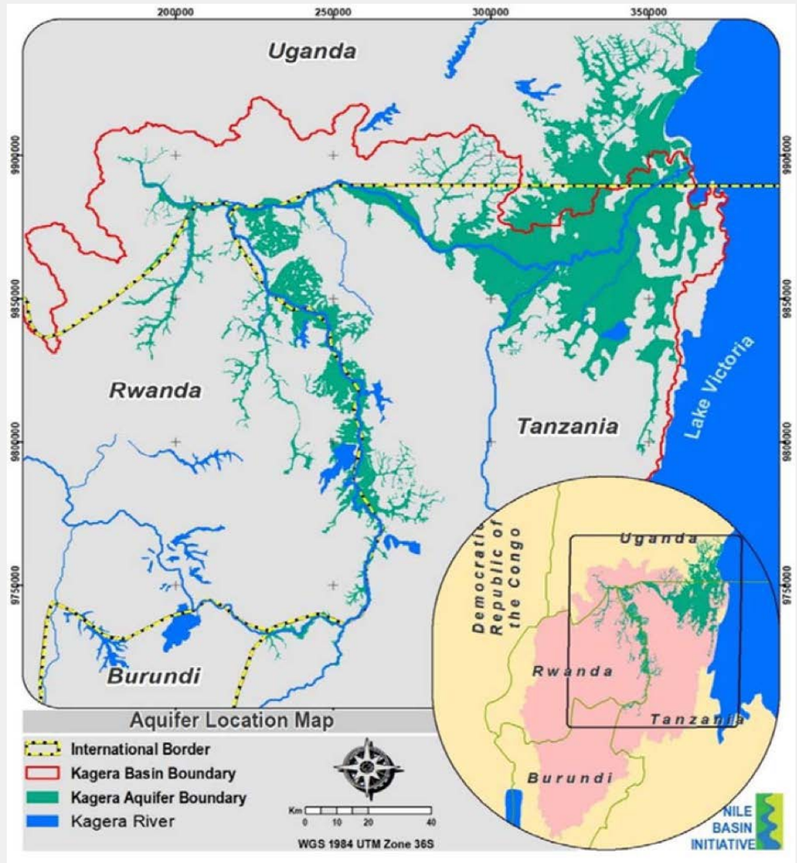
However, the technical report of the Nile Basin Initiative shows that the unconfined aquifer in the Kagera Basin that spans approximately 6,300 km⁺ remains underutilized.
This aquifer covers parts of Burundi, Rwanda, Tanzania and Uganda.

It has an estimated storage capacity of about 50 billion m⁺, while the current groundwater withdrawal for domestic water supply is estimated at 3.25 million m⁺/year.

Dr. Abel Nsabimana, a geographer specializing in hydrology and groundwater quality opines that the abundant groundwater in the Kagera Basin could be harnessed not only for drinking water supply but also for agriculture.

"Farmers can utilize groundwater without fear of depletion to irrigate crops during the dry season and droughts, increasing agricultural production and mitigating food insecurity," Nsabimana explains.

He however emphasizes that groundwater exploitation requires significant investments, such as deep drilling reaching several hundred meters.



The extent of the Kagera Aquifer

BURUNDI: HARNESSING GEOTHERMAL SPRINGS FOR SUSTAINABLE DEVELOPMENT

By Arthur Bizimana – Burundi

The source of the thermal waters of Mugara

At the foot of the Mugara hill, in the commune and province of Rumonge, in Burundi's south-west, two fractured stones spew hot water that gives off steam. Surrounded by a giant tree known as 'Umuhona', the thermal waters of Mugara are channelled into the pool. However, the further down they go, the more the steam dissipates. Despite being hot, locals and tourists love the thermal waters of Mugara for their therapeutic and relaxing properties.

Nyandwi Chantal, manager of the Mugara tourist site, says that the number of tourists increases at weekends (Saturdays and Sundays) and decreases on working days. "On weekends, the site hosts more than 100 local and international tourists, while on working days it welcomes around 50 tourists."

The Legend

Although the thermal waters of Mugara are currently attracting many tourists, this was not always been the case. "Before the arrival of the Swedish missionaries in 1933, the local population was afraid of the Mugara marshes, which were home to the thermal waters," explains Ndayisaba Alexis, aka Bonne Idée, a resident of Mugara hill and massage service provider at the Mugara tourist site.

Asked by Swedish missionaries when they settled in Mugara in 1933 about the origin of the steam rising into the sky, the local people replied that: "The swamp is home to water spirits and large wild animals like the lion. They light the fire and cook, which is the origin of the steam," narrates Ndayisaba.

According to anthropologist Dr. Jean Bosco Manirambona, a research lecturer at the University of Burundi, any phenomenon that Burundians in the past could not understand fell within the realm of ibisigo (water spirits). That's why they used to say that the swamp was home to water spirits.

Accompanied by local people and Congolese interpreters, the Swedish missionaries went to investigate this phenomenon. They discovered that it was thermal water.

> This happens when "rainwater infiltrates the fractured rocks until it reaches a level close to the earth's crust, but is forced back to the surface because of the enormous heat of the magma," explains Dr Pascal Nkurunziza, hydrogeologist and lecturer at the University of Burundi.

The thermal waters of Mugara lie within the Kagera Basin. In this basin, the total surface area of the aquifer is estimated at 6,300 square kilometres, of which 1% is in Burundi, 13% in Rwanda, 22% in Uganda and 64% in Tanzania.

According to the Nile Basin Initiative's technical report, fractured consolidated rock is one of the areas with the greatest potential for groundwater. Dr Pascal Nkurunziza lists 27 thermal springs in Burundi.

Mugara Thermal Waters Today

Since realising that it is not the water spirits that haunt the marsh, local communities have used the thermal waters for other activities, and even for prayers. Nkurunziza for example notes that the tree known as "Umuhona", which stands at the source of the thermal waters, marks the indelible traces of the Ukubandwa – a traditional cult led by the main priest called Kiranga – who is believed to be the intermediary between men and God in Burundi.

According to traditional beliefs, the thermal waters cure sterility, stimulate and increase libido, are energising and increase the chance of finding a spouse for those who are struggling to find one, says Ndayisaba Alexis Bonne Idée. "We have seen Tanzanians and Congolese testify that they found what they wanted after taking a bath in the thermal waters of Mugara," he adds.

According to Dr. Nkurunziza, thermal waters contain high concentrations of mineral elements and even trace elements that the body needs and which, by osmosis, can penetrate the human body. So; "if we have deficiencies, we can get them from these thermal waters."

LEFT:
People from different areas frequent Mugara to bath in the thermal waters

Though the commune has developed the Mugara tourist site, Kazuguru Gabriel, a resident of Mugara hill, complains that the swimming pool is not big enough for the growing number of tourists. "Sometimes the tourists wait at the gate for the others to come out. If the high dignitaries come to bathe, we are denied access on the grounds that we can't bathe with them," he narrates.

This popular tourist destination, trade in different items including edibles is booming much to the benefit of local business communities.

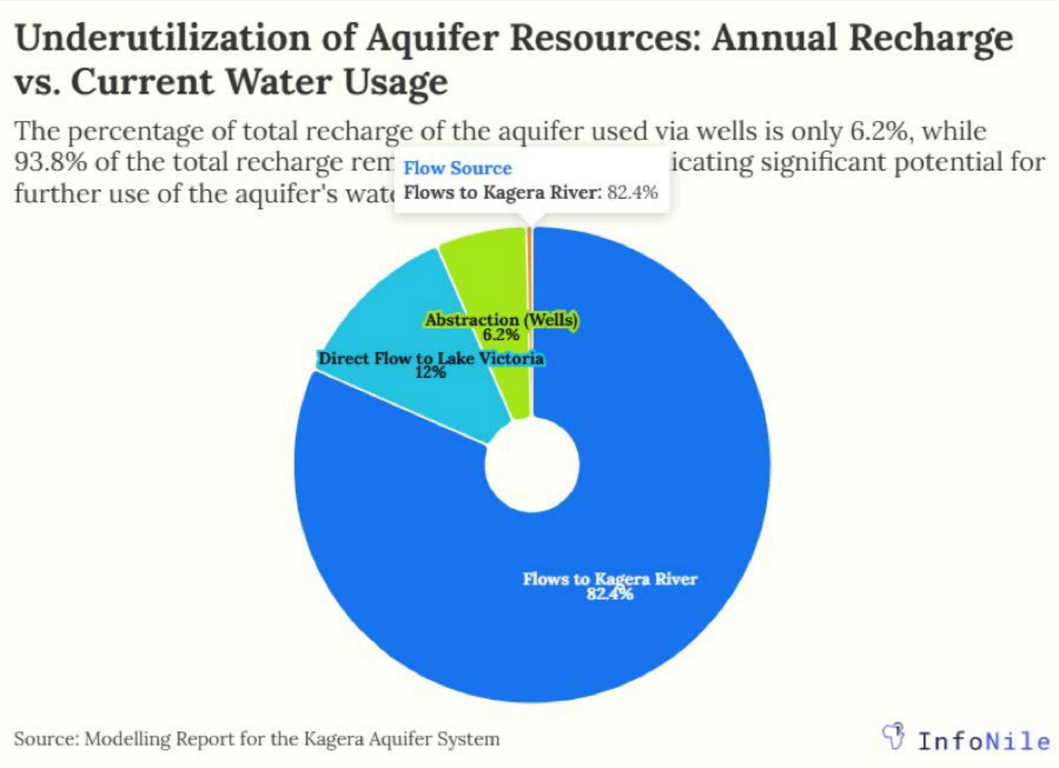
Jacqueline Nkeshimana, a consultant in environmental economics and tourism, says that the country earned 154 million Brundian Francs (BIF) from the thermal waters of Mugara between 2019 and 2023. The projection for 2024-2025 is 112 million BIF.

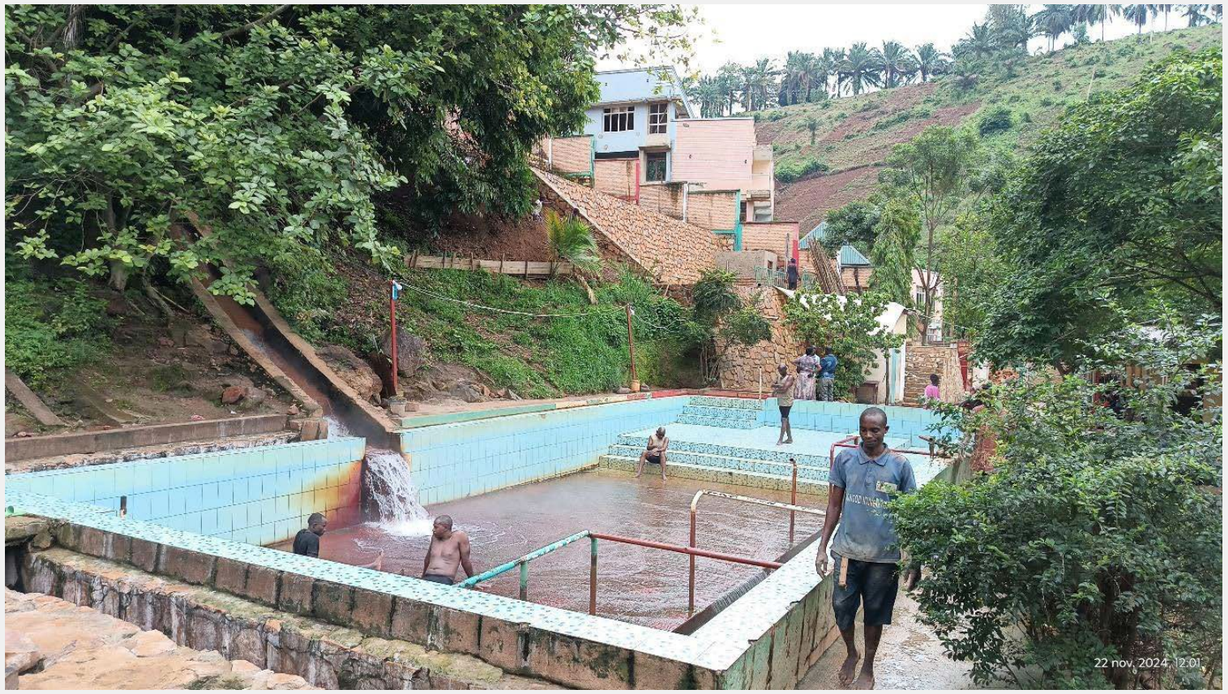
Thermal Waters: Victims of Climate Change

Unlike other water sources, which drop and even dry up during the dry season, thermal water remains constant during both the dry and rainy seasons, confirms Ndayisaba Alexis.

According to Ndayisaba, during the dry season, when the sun is shining, the thermal waters are not very hot. He says this is because the sun rays neutralise the steam, adding that It's only during the rainy season, when there are no sun rays that the thermal waters of Mugara are hot and give off a lot of steam.

Citing the World Climate Research Programme coupled with the analysis of the impact of climate change on the Kagera Basin, the Nile Basin Initiative technical report shows that the Kagera Basin will experience an increase in precipitation, temperature and potential increase in evapotranspiration.





Protection of the environment around Mugara thermal water spot is crucial to protect this treasure for generations

Citing the World Climate Research Programme coupled with the analysis of the impact of climate change on the Kagera Basin, the Nile Basin Initiative technical report shows that the Kagera Basin will experience an increase in precipitation, temperature and potential increase in evapotranspiration.

"Average surface temperatures are projected to increase by 1⊠C to 4⊠C by 2100. The sun will also neutralise the steam and heat from the thermal waters," explains Dr. Nsabimana.

To preserve the thermal waters, Ndayisaba Alexis is calling on the government to reforest the hills overlooking the source of the Mugara thermal waters. At present, they are surrounded by palm oil plantations, which exposes the thermal springs to erosion. He recalls that the first thermal water source was abandoned due to erosion pollution.

CONSERVING GROUNDWATER TO ENSURE SCHOOLS HAVE RELIABLE ACCESS TO WATER

By Prosper Kwigize – Tanzania

Father Juvenalis Mutalemwa, the head of Ntungamo Vocational College, is among the hundreds of seminarians who enrolled and studied at Ntungamo Minor Seminary. The seminary is in Ngara District, Kagera Region, which is about 15 kilometers from the Kagera River.

After completing grade seven, he joined the school in 1980, preparing to enter secondary education in the Catholic Church system. He and many of his colleagues relied on the Kizosi groundwater source, which was also relied on by other residents of Ntungamo and Kabalenzi villages in Ngara District.

"If it were not for the Kizosi groundwater source, I and many others would not be priests. I am genuinely hurt when I witness the environmental destruction and drying up of springs in the Kagera Region."

The Kizosi spring is the source of the Mukizosi River water, which collects water from small springs, including Muwinkona and Kizosi, and travels about 20 kilometers from Kabalenzi Village to the Kagera River.

Ngara District in the Kigoma Region is among the areas in the Nile River basin where water services primarily depend on groundwater.

According to the Ngara Water Authority, 100% of the water distributed to the community is groundwater from deep and shallow wells and natural springs flowing in various valleys.

The acting manager of the Ngara Water and Sanitation Authority, engineer Daudi Gwiyera, says that Ngara Town, with a population of about 24,062 and 6,375 households, according to the results of the 2022 population and housing census, relies on five (5) wells for water services to the community and public institutions such as schools and health centers.

Father Juvenalis Mutalema, Principal of the Ntugamo Catholic Vocational Training College, was a beneficiary of the Kizosi underground water during his childhood and to this day.

Eng. Daudi mentions that due to population growth and climate change, groundwater, including springs, is increasingly depleted, endangering citizens' well-being.

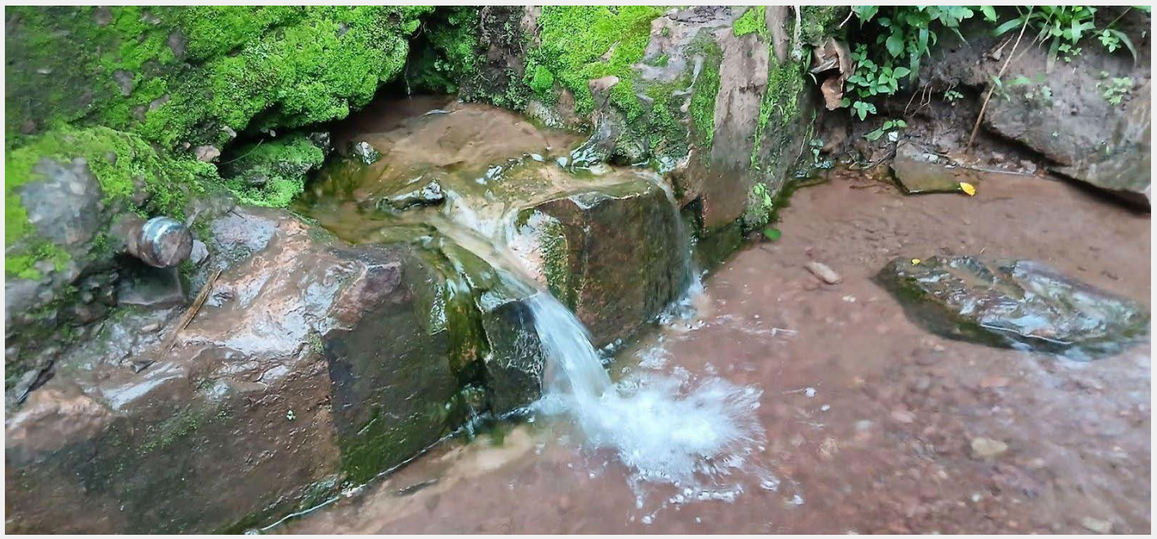
"Through groundwater sources, our authority produces 28,000 cubic liters out of the 3,450 cubic liters required daily," Gwiyera notes

The largest group experiencing immediate effects of water service becoming poor are preschool, primary, secondary, and tertiary school students.

Such groups without water, sanitation, and the environment, are at risk of disease outbreaks and encourage absenteeism.

Father Juvenalis explains that water is one of the most essential services in the upbringing of children in school.

"When we were young in this school, we relied only on rainwater because there was no alternative, so springs were our refuge, and at that time was preserving the environment of water sources like the apple of an eye," Father Jumenalis emphasizes.



Kizosi groundwater source.

Eng Daud Gwiyera, acting manager of the Ngara Water and Sanitation Authority.

Water infrastructure at the current Ntugamo Seminary in Ngara District depends on both underground and rainfall water sources.

For his part, Deogratius Nshimilimana, a resident of Buhororo Village who also studied at the Ntugamo Minor Seminary in 1991, says his life and upbringing depended on groundwater sources.

He urges the community to value groundwater, saying the only things that "will save us from the scourge of drought."

Flora Eliakimu, a 20-year-old girl from Kumwuzuza Village in Mabawe Ward, is among the students who dropped out of school due to poor social services, including a lack of water.

Eliakimu notes that she was forced to drop out of school after failing to cope with the lack of water at her school.

Eliakimu notes that she was forced to drop out of school after failing to cope with the lack of water at her school.

water at her school. This forced children to carry water from home to school, and at home, they were also faced with the difficult task of fetching water from far away.

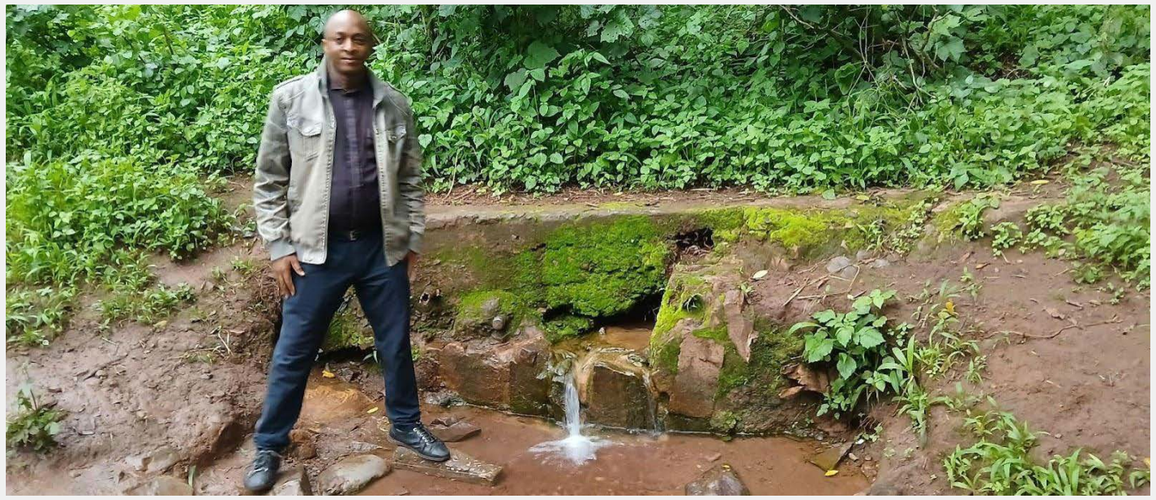
Flora Eliakimu,

Pupils from Ngara Urban Primary School, Kagera Region, draw water for drinking from a groundwater tank and then return to school to continue their studies.

The lack of water in schools in many areas in Ngara, Karagwe, Kyerwa, and Misenyi districts hinders students from bathing and washing their clothes and denies them water for drinking. Thus, they are forced to abscond classes to fetch water.

This shows that despite the community's indifference, school children still rely on groundwater for infrastructure. Sadru Majidu, a grade six student in one of the primary schools in Karagwe District, admits that groundwater sources are a saviour for education and that during the dry season, many children are being punished for being dirty.

"We students rely on the Katahoka water source here in Kayanga. We use its water for all activities, including drinking, cooking, washing school clothes, etc.; even our parents and guardians rely on it for gardening," says Sadru Majidu



Nshimilimana, an alumnus of the Ntugamo Junior Seminary, led a group of journalists to witness the source. He was amazed by how water continued to flow, remembering how it helped students of the Ntugamo Seminary about 34 years ago.

KAGERA FARMERS HARNESS GROUNDWATER

By Prosper Kwigize – Tanzania

Horticulture in the Kagera River Basin is evidence of Groundwater's contribution to agriculture in the section of Nile basin within Tanzania.

Agriculture is the heartbeat of local communities in the lush hills and fertile plains of Kagera, a region in the far Northwest of Tanzania.

The landscape, rich in potential, is dominated by small-scale farmers relying on the land and groundwater to grow crops such as maize, beans, cassava, and bananas. But while Kagera is blessed with fertile soils and a warm temperate climate, it faces significant challenges in terms of water availability, especially during the dry seasons.

For years, farmers in Kagera struggled with erratic rainfall patterns, often leading to crop failures. Short rainy seasons paired with long dry spells made it difficult to sustain crop production. This challenge, however, was gradually met with a solution hidden beneath the ground: groundwater.

Groundwater in Kagera has long been an underutilized resource. The region sits on an aquifer that can provide a steady water supply even during periods of drought.

As awareness about the potential of this hidden resource grew, local farmers and agricultural organizations began to experiment with groundwater to complement rainfall and provide a more reliable source of irrigation.

At first, groundwater use was limited to a few innovative farmers with access to simple wells or boreholes. However, as the benefits of using groundwater became apparent, more farmers began to dig their wells or tap into community boreholes. Water pumps allowed for more effective irrigation, particularly for crops sensitive to water stress, such as maize and vegetables.

The introduction of groundwater-powered local and modern irrigation systems revolutionized farming in Kagera.

A shallow well dug by the community to provide water for domestic use and irrigation

With a more reliable and consistent water supply, farmers were able to cultivate crops throughout the year. This increased crop yields allowed farmers to diversify their products. Farmers who once grew only seasonal crops like maize and beans began to grow high-value crops like tomatoes, onions, and vegetables.

Groundwater also allowed for multiple yearly harvests, which was impossible with rain-fed agriculture alone. Farmers could grow crops in many areas during wet and dry seasons, ensuring a steady annual income.

Vegetable farming that relies on water flowing from springs beneath the rocks and hills of the Kagera River basin.

A part of the Mabawe mountains in Ngara District has been cultivated, and trees have been cut down. These mountains are the water sources of the Kizosi Muhweza and Muwinkona springs in Ngara district.

Irrigation opportunities in Kagera Region.

According to the National Irrigation Commission of Tanzania, Kagera Region has a great opportunity to use Lake Victoria water to irrigate many large basins surrounding the Lake.

Many rivers in the region flow water throughout the year, so it is a great opportunity to establish irrigation agriculture. Kagera also has fertile land that accepts all types of crops. Farmers are encouraged to use all schemes appropriately through various strategic plans of the central government and the regional level, considering the principles of good land use and water use.

Through various plans, including under the National Irrigation Board, Schemes developed in Kagera Region, include the Mwisa (Karagwe), Kyamyorwa, Kyota, Buhangaza, and Buyaga (Muleba) schemes and the Kyakakera, Nkenge (Misenyi), Bigombo (Ngara), and Mwiruzi (Biharamulo) schemes.

In addition, preliminary studies have been conducted in the Burigi Basin, where a large dam was expected to be constructed from groundwater after a feasibility study and funding is available.

The Ngono (Misenyi) River Basin has been subjected to a feasibility study through the Nile Basin Initiative, and once funding is available, it will be developed.

Of all the schemes developed, six have already been registered, namely Mwisa, Kyakakera, Buhangaza, Buyaga, Kyota, and Bigombo. Due to climate change and harmful human activities, farmers from Nsunga ward, Byamtemba Village, Misenyi District, admit to witnessing water shortages in natural sources. They say this is due to environmental degradation caused by agriculture and deforestation.

"We indeed farm in the valley; this water helps us get delicious crops. Yes, we are prohibited when we are told to go 60 meters away from the source, but 60 meters is where there is drought," Kagisha Juston Vitalis elaborates.

Vitalisi insists that the government should implement its irrigation farming plans, especially by sponsoring or lending farmers irrigation equipment to reduce or eliminate marginal farming and the water source. The Agriculture Officer of the Ngara District Council, Remigius Kawishe, explains that the government has taken various steps to control unfriendly agriculture through education and sometimes punishment to conserve the environment.

The Kagera Sugar Irrigation Scheme at Misenyi District in Tanzania uses both water from the Kagera River and boreholes at the same time to sustain the sugarcane farm.

Kawishe emphasizes that farmers in the Ngara District rely on valley farming, which requires groundwater and mostly dried-up rivers and is generally unsustainable.

He noted that the district faces effects of climate change, which leads to almost all water sources drying up during the dry season. In addition, Kawishe explains that another strategy is to collaborate with natural resources and environmental authorities to control indiscriminate deforestation, educate the community not to destroy water sources, and avoid spraying pesticides that are harmful to land and water.

On his part, the Environment Officer in Ngara District, Athanasio Andrew, admitted that the environment has primarily been degraded, leading to the depletion or drying up of surface and underground water sources due to various. Andrew noted that the Department of Natural Resources and Environment is collaborating with other authorities, including the Lake Victoria Watershed Board, urban and rural water authorities, and the Tanzania Forestry Authority to control environmental degradation.

Regarding the effects of climate change, Andrew explained that the society has been affected by the drying up of water sources, the decrease in rainfall and it's level.

Economic Empowerment

Economic benefits of groundwater use were profound. As yields increased, farmers' incomes grew, improving living standards. Many farmers invested in better tools, equipment, and technology to improve their farming practices. Some even expanded their agricultural enterprises, creating local employment opportunities and fostering small-scale agribusinesses that processed crops like maize flour, dried vegetables, and cassava chips.

Local markets flourished as farmers brought surplus produce to sell.

This gave them greater economic independence and improved their social standing in the community.

Environmental Sustainability and Challenges

While groundwater irrigation brought clear benefits to Kagera's agricultural sector, it also posed environmental challenges. The increased reliance on groundwater led to concerns about over-extraction, particularly in areas where boreholes were poorly managed.

Some farmers, eager to expand their operations, began to draw more water than the aquifers could sustainably supply. As a result, some regions experienced a drop in water levels, threatening the long-term viability of groundwater as a resource.

With proper management and conservation practices, this underground resource can help ensure food security, increase agricultural productivity and improve the livelihoods of farmers in the region.

Adopting modern irrigation technologies, such as drip irrigation, alongside the continued use of groundwater, will help optimize water use and reduce waste.

Kagera's experience offers valuable lessons for other regions in Tanzania and beyond, where the potential of groundwater still needs to be explored. By integrating groundwater into sustainable agricultural practices, communities can build resilience against the increasingly unpredictable climate patterns affecting East Africa.

In Kagera, groundwater has become more than just a resource. It has become a lifeline, sustaining agriculture and transforming the lives of farmers in the region. With careful stewardship, it promises a future of prosperity for generations to come.

Despite considerable and small rivers in the Kagera River Basin, rainfall has been the primary source of income for farmers in Africa; however, irrigated agriculture, especially during the dry season, contributes a large portion of farmers' income in the Nile River Basin.

CLEAN GROUNDWATER SAFEGUARDS PEOPLE'S HEALTH

By Prosper Kwigize – Tanzania

Some children fetch water from the Katahoka underground water source in the small town of Kayanga in Karagwe. The town is only 12 Kilometers away from the Kagera River.

In the Kagera Region of Tanzania, many families struggle to find clean water daily. This area, situated in the Nile basin, has communities that often lack access to reliable water sources.

As surface water from rivers and lakes gets contaminated due to agriculture and poor sanitation, the importance of underground water becomes even more evident.

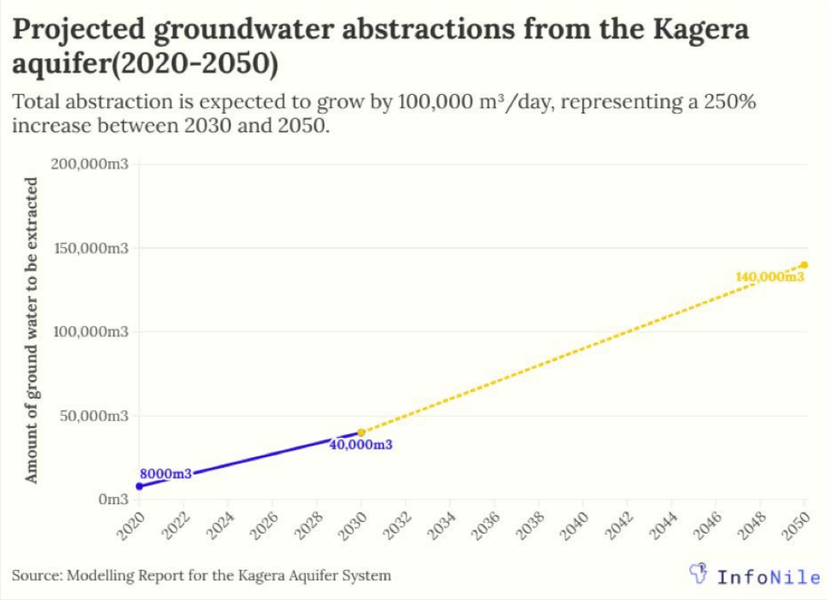
Deogratius Nzimiliamana lives in Buhororo Ward in Ngara District. He is among many who believe underground water is a much safer option than other surface water sources.

"By protecting and overseeing these underground sources, communities can help ensure they have safe drinking water, thereby reducing the risk of waterborne diseases that severely impact the health of residents," he notes.

Access to clean water is a significant challenge in rural Tanzania, particularly in Kagera, where many families depend on surface water that can quickly become contaminated.

Nzimiliamana highlights that with proper care and management, groundwater can serve as a cleaner and safer alternative to polluted surface water.

"By protecting and overseeing these underground sources, communities can help ensure they have safe drinking water, thereby reducing the risk of waterborne diseases that severely impact the health of residents," he notes.



Likewise, Ezekiel Nzabhayanga, an education officer in the Ngara District Council of Kagera Region, emphasizes the critical role that groundwater plays in the educational landscape, particularly for rural schools that lack access to piped water.

He explains that clean and reliable water sources are not merely a convenience but a foundational element supporting essential educational services, especially when learners are in good health.

Nzabhayanga asserts that the quality of education is intrinsically linked to the availability of safe water in schools.

"Without adequate water services, students face immense challenges, including compromised hygiene practices, which can lead to increased absenteeism due to illness."

He is passionate about the idea that when schools prioritize access to groundwater, they enhance students' health and create an environment conducive to learning, fostering academic success and overall well-being in these underserved communities.

Reducing the Risk of Waterborne Diseases
In the Kagera region, water-related diseases are a major cause of illness and death. Rural water sources are particularly at risk of contamination since many areas lack proper sanitation facilities.

When people use untreated water from lakes or rivers or rely on dirty water for washing and cooking, they often suffer from diseases such as cholera, diarrhea, and typhoid fever.

According to the Nile Basin Initiative, families using groundwater from protected wells are less likely to contract waterborne diseases than those using surface water.

The Water and Sanitation Authority in city councils has an important job: they ensure that everyone has access to clean and safe water that meets their needs. But their responsibilities don't stop there. They also need to protect and maintain water sources by creating guidelines on how to use water properly in wells and distribution centers.

One of the traditional methods of the Kagera community of harvesting water for human and livestock use in the Kyerwa and Misenyi districts.

Engineer Daud Gwiyera, the Ngara Water and Sanitation Authority manager, highlights that "human activities pose several risks to water sources."

This includes farming practices and livestock management, where harmful chemicals are often used.

"Having clean water is also essential for basic hygiene," notes Gwiyera.

In Kagera, where there may not be enough education about sanitation, having easy access to water encourages people to wash their hands more often, which is a simple but effective way to prevent the spread of diseases.

Human settlements and farming practices near water sources also create significant environmental and health challenges in the Kagera River basin.

Local voices

Kagisha Justas, a resident of the Misenyi District in the Kagera Region, understands the pressing challenges surrounding water safety in his community.

He voices his concerns about ponds and shallow wells, stating that the water from these facilities is often unreliable and its safety highly questionable.

"Many people suffer from water-related diseases," he laments, reflecting on a particular experience when his son fell severely ill with a stomach condition attributed to drinking contaminated water.

Similarly, Shamira Mbaraka, a 13-year-old student at Bohari Primary School in Karagwe District, shares her struggles.

Previously reliant on surface water sources like ponds and shallow wells, she frequently suffered from typhoid and had to miss classes on numerous occasions.

However, since her family switched to groundwater sourced from a spring, Shamira has been able to study without interruption.

"Our spring must be protected because if the water dries up, students will face many challenges, especially going to school with dirty clothes and getting sick," Mbaraka insists.

Mansour Kalokola, the Principal Environmental Health Officer in Ngara District, discloses the ongoing collaboration between water authorities and the health department.

This partnership aims to ensure that the water harvested and distributed to the public undergoes thorough testing and is certified for quality.

Kalokola stresses the importance of community action, urging residents to avoid constructing settlements near natural water sources, refrain from farming within 60 meters of these critical areas, and for farmers in the highlands to steer clear of harmful pesticides that risk contaminating water supplies.

Kalokola stresses the importance of community action, urging residents to avoid constructing settlements near natural water sources, refrain from farming within 60 meters of these critical areas, and for farmers in the highlands to steer clear of harmful pesticides that risk contaminating water supplies.

"The issue of water safety is crucial for us. We are committed to ensuring that the water used by citizens for any purpose is clean and safe. Our goal is to protect them from transmitting various diseases," he asserts firmly.

CALL FOR AWARENESS AND CONSERVATION OF GROUNDWATER

By Prosper Kwigize – Tanzania

Shangilia Manisha, a water vendor in Ngara town in the Kagera region in Tanzania.

Twenty years ago, we were not struggling to wait at a single tap like we do now; our town was surrounded by many springs that provided water all year round. But now, when you get to those springs, you will surely cry," reflects Shangilia Ibrahimu Manisha, a resident of Ngara Town in the Kagera Region.

His words echo the feelings of many in this community who remember when clean water was plentiful and readily accessible.

Today, however, the struggle for water is intense, following the challenges posed by climate change and pollution, which are rapidly drying up groundwater sources.

Groundwater is a crucial source of drinking water for individuals, livestock, and wildlife in the Nile Basin, with more than 70 percent of the rural population in the area relying on it.

Manisha, whose business involves extracting and distributing water to homes and commercial areas in Ngara, admits that there is a, "significant risk of groundwater sources drying up due to citizens cutting down native trees, cultivating in wetlands areas, and planting non-native trees such as eucalyptus."

As a water trader, Manisha acknowledges that if environmental education is not provided, the community will be at risk.

Manisha represents part of the voices of people who rely on groundwater for domestic use, business, livestock, and agriculture.

Residents of the Kagera basin utilize water from underground sources for a variety of purposes, including household needs and the irrigation of livestock and crops. This water can be accessed through methods such as boreholes, springs, reticulated systems, and dug wells.

Currently, access to water in the Kagera region of Tanzania ranges from 40 to 80 percent. In areas like the Kyerwa and Misenyi districts near the Ugandan border, access to clean water is between 48 and 70 percent. Many people rely on ponds to satisfy their water supply needs.

The Kagera Region has completed 73 water projects costing over 62 billion shillings to improve this situation.

CLEAN WATER ACCESS IN CITIES

42% 2015 → **65%** TO DATE

CLEAN WATER ACCESS IN RURAL

53% 2015 → **67%** TODATE

These projects have increased clean water access in cities from 42 percent in 2015 to 65 percent and in rural areas from 53 percent to 67 percent.

The Rural Water Supply and Sanitation Agency (RUWASA) aims to improve water access over 85 percent of rural areas where groundwater is a vital resource.

Katahoka, a spring in Kayanga town Karagwe District

Community Voices

Springs in Katahoka, Karagwe, Kisozi, Murugwanza Ngara, and other groundwater sources in the Kagera River Basin have significantly contributed to the community's well-being for many decades.

However, groundwater is disappearing, leaving behind stories told by older people, youth, the importance of conserving groundwater sources.

Nelson states that Katahoka spring water is the only source for the local community, adding that "environmental education is still lacking despite the community's awareness of it's importance and needs to be improved.'

Murugwanza underground spring in Ngara, which has been improved by the water and sanitation authority after the original spring dried up.

Ms. Bahati Nelson

Bahati Nelson, a resident of Kayanga in Karagwe district, is among thousands who rely on the endangered Katahoka spring.

Nelson states that Katahoka spring water is the only source for the local community, adding that "environmental education is still lacking despite the community's awareness of its importance and needs to be improved."

Many pollute or destroy water sources without understanding the consequences.

She narrates that she is one of the many in the Karagwe community witnessing the decline and drying up of many water sources.

Nelson emphasizes the need to educate local communities about the significance of environmental conservation, noting that, "many rural populations are unaware of the importance of groundwater."

Kaiza Theonest, a farmer from Kyamtemba Village in Misenyi district, Kagera in Tanzania, admits that groundwater is vital to the community.

Kaiza calls on citizens living in areas with water sources, such as rivers and lakes, to conserve the environment by avoiding cutting down trees, cultivating in the sources, and using pesticides on plants grown along rivers and other water sources.

Kagisha Yuston, a resident of Misenyi district, says that despite the government building wells and distributing water to homes, their Kyamtemba area still needs water infrastructure.

On his part, Petro Dezideri, a resident of Nsonga Ward on the border of Tanzania and Uganda, says that underground water sources are a refuge, and they are currently witnessing widespread encroachment by communities. Petro calls on the authorities to erect fences around all groundwater sources in the Kagera River basin to protect them from encroachers.

Muwikona Spring in Ngara Kagera, Tanzania. More than 50 households depend on this spring for water

GROUNDWATER PIPELINE TRANSFORMS LIVES IN KIREHE

By Emmanuel Nkangura – Rwanda

Fetching water from the Akagera River used to be an arduous activity for residents of Nyamugari and Kigarama sectors in Kirehe District as they spent hours walking. This did not only expose children and the elderly to tiresome conditions, but also caused many deaths.

For school children, walking the distance to fetch water also stole their valuable time that could have been spent in class. Afisa Muhawenimana, a resident of Kirehe District lost her eldest son in 2022. Her son drowned in the Akagera River to fetch water before going to school.

Today, a network of water pipes from the underground Akagera has changed life in the region, schools being among the beneficiaries.

Afisa Muhawenimana is nowrelieved, thanks to a water tap installed in her compound.

"My other child no longer has to trek to the river. She can focus on her studies and attend classes on time," said Afisa Muhawenimana.

"My other child no longer has to trek to the river. She can focus on her studies and attend classes on time," said Afisa Muhawenimana.

Alisa Muhawenimana fetches water from a newly installed station in Nyamugari sector in Kirehe. Muhawenimana lost her eldest son in 2022 when drowned in the Akagera River after he went to fetch water.

Supplying clean water to over 16,000 households and three schools, the pipeline has become a lifeline for the region.

According to Eliezel Nzeyimana, the assistant headteacher at the school, water scarcity used to affect students' health and academic performance.

"Before the school got access to clean water, many students arrived late after walking 2-3 kilometers to fetch water," Nzeyimana said.

Nzeyimana said since the installation of the water pipeline, pupils' health and attendance have improved.

"We used to deploy 300 children to fetch water for school like cleaning and cooking," he said.

The success of the Akagera aquifer pipeline connecting residents in Kirehe, is part of a broader initiative to tap into Rwanda's groundwater resources.

Bernard Musana, head of the knowledge and forecasting hub at Rwanda Water Resources Board, said that they identified eight districts with high groundwater potential for drilling.

"We have identified more than 200 groundwater sites across Eastern and Southern provinces, regions highly vulnerable to prolonged droughts and water shortages," Musana said. "Among these, eight sites stand out, each with the capacity to supply 1,000 cubic meters of water per day."

He added that this water could support small-scale irrigation on 100 hectares and meet domestic needs of the local residents.

In Kirehe District, underground water sources such as Kirehe-Mushikiri-Rugarama-Bugarura and Kirehe-Gahara-Butezi-Kijumbura II have been identified as capable of providing clean water.

Musana also highlighted the importance of proper waste management amid increasing urbanization, modern farming, and industrial development.

"We are particularly concerned about the shallow aquifer, which lies close to the surface,"

He said. "Solid and liquid waste in various areas must be disposed of only after verifying and confirming the presence [or absence] of an aquifer to prevent contamination."

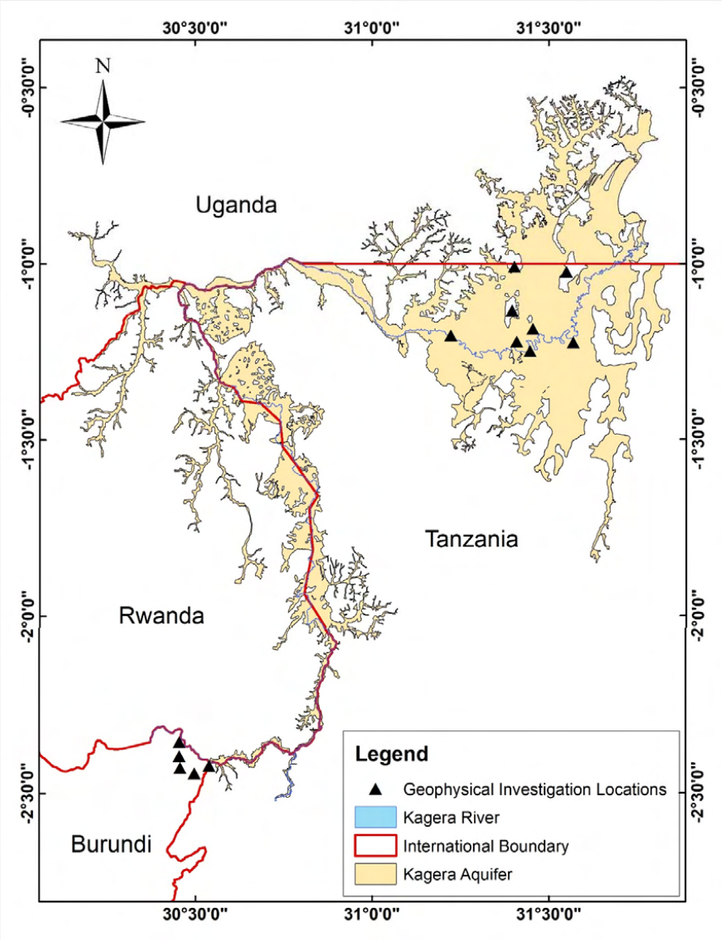
Rwanda has 6.8 billion cubic metres of renewable water resources in lakes and rivers as well as rainwater, while groundwater recharge is estimated at 4.5 billion m^3 per annum, according to figures from Rwanda Water Resources Board.

"We have identified more than 200 groundwater sites across Eastern and Southern provinces, regions highly vulnerable to prolonged droughts and water shortages," Musana said. "Among these, eight sites stand out, each with the capacity to supply 1,000 cubic meters of water per day."

GROUNDWATER ENHANCES MAIZE FARMING IN RWANDA

By Annociata Byukusenge – Rwanda

The borehole at Bwiza-Bweranka Basic School in Ngozi province

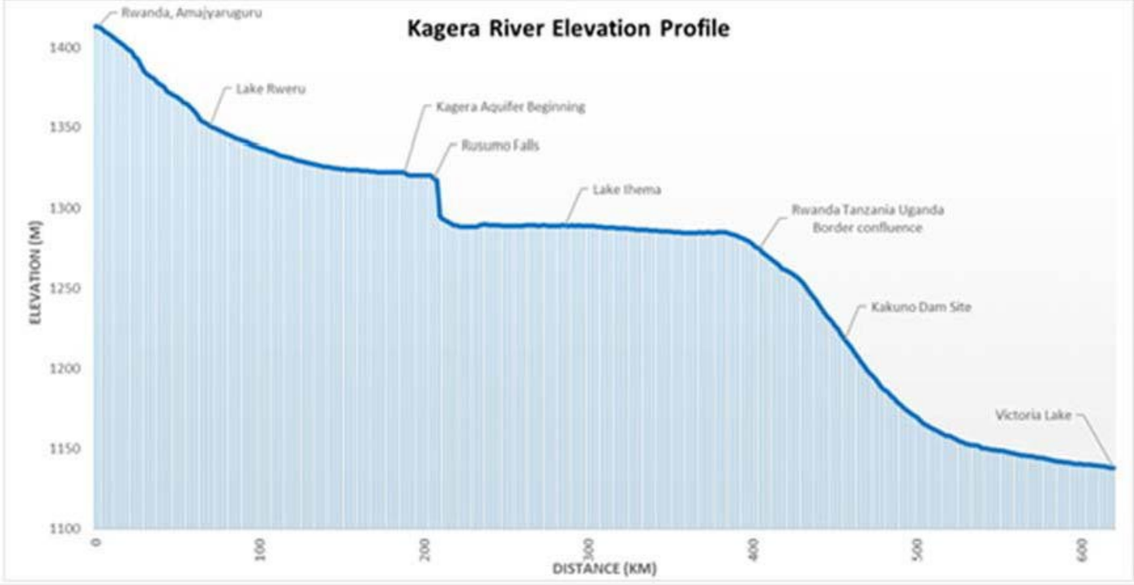


Access to reliable water sources has revolutionized agriculture in Eastern Rwanda. Farmers who once depended solely on rain-fed agriculture can now irrigate their crops, leading to increased yields and the ability to

maize, beans, and vegetables thrive, providing food security and surplus produce for the market.

The introduction of irrigation has also enabled farmers to engage in high-value crops like fruits and horticulture. This shift not only enhances their income but also contributes to the overall economic development of the region.

With consistent water supply, farmers can plan their planting and harvesting cycles more effectively, reducing the risks associated with droughts and erratic weather patterns. According to the 2020 Rwanda Irrigation Master Plan, produced in 2019, Rwanda's irrigation potential is 501,509 hectares, including 52,100 hectares from dams. This means that currently, Rwanda is only irrigating about 14 percent of its total potential. However, the irrigation achievement in 2020-2021 is 493,050 hectares.



Maize farmers in the Akagera swamp

- The total area equipped for irrigation in Rwanda is estimated at 11467 ha. With an estimated cropped area of 7000 ha, the overall cropping intensity is 61%. The main crop planted in most irrigation schemes is rice.

The success of water projects in Eastern Rwanda serves as a blueprint for other regions facing similar challenges, demonstrating that access to water is not just a basic necessity but a catalyst for comprehensive development.

The total population of the four riparian countries of Akagera is estimated to be more than 120 million with Tanzania being the most populous (~49%) followed by Uganda (~32%), then Rwanda (~10%), and Burundi (~9%).

The average annual population growth rate in the four countries is about 3% and about half of the total population is below the age of 15. The population within the Akagera aquifer area is estimated to be about 900,000 distributed between the four countries as follows: Tanzania 59%, Uganda 21%, Rwanda 17% and Burundi 3%.

Farming activities are the most dominant livelihood activity in the Akagera aquifer area. The main livelihood structure in the aquifer is dominated by subsistence farming, crop and livestock production. The main food crops include finger millet, maize, beans, bananas, cassava, and potatoes, in addition to fruits and vegetables with Coffee being a major cash crop.

Other livelihood activities include small-scale fish farming, agroforestry, and brickmaking. Women dominate agricultural activities, while men dominate the remaining aforementioned activities.

The aquifer region is generally one of high poverty, with poverty status varying from one location to another depending on existing opportunities for economic activities. Urban centres within the aquifer serve as regional trade and service centres relying primarily on trade and services and small manufacturing activities.

Precipitation and surface water from rivers and lakes are the source of water for the different livelihood activities in the Akagera region. Groundwater is used primarily as a source of drinking water and for animal watering accounting for about 70% of water supply (springs and boreholes).

Women and children are mostly responsible for the collection of water. The average time spent to collect the water ranges between 20-30 minutes.

Access to improved safe water sources varies greatly within the project areas and ranges in average from 60% to 80% with an average per capita water use of about 25l/day.

The development of groundwater resources in the area is increasingly sought by the authorities in the four riparian countries to improve access to safe water in a declared effort by the four countries to achieve universal access by 2030 in line with the UN Sustainable Development Goals (SDGs).

Groundwater can contribute to the reduction of the risks of waterborne diseases as in general, it is of better quality than surface water sources. The challenge, however, is to prevent groundwater contamination from anthropogenic sources.

While the development of groundwater can effectively contribute to the enhancement of the domestic water supply, it is generally hampered by several technical, financial, and/or managerial factors.

Estimation of current and future groundwater abstractions from the Akagera aquifer was based on available population data and the current and projected domestic water consumption per capita.

Vice Mayor in charge of economics in Nyagatare District, Mr Gonzague Matsiko.

The assumption is made that groundwater from the aquifer will be used solely for the provision of domestic water supply and that it will not be used for other activities such as irrigation and industry. The projection did not take into account possible use for animal watering.

Accessing water in Eastern Rwanda, supported by the Nile Basin Initiative through the Regional Rusumo Falls Hydro Electric Project (RRF-HEP) implemented by the Nile Equatorial Lakes Subsidiary Action Program (NELSAP), is to benefit the three neighbouring countries named Rwanda, Tanzania, and Burundi at the border of Rusumo in the eastern part of Rwanda, the Western part of Tanzania, and the Northern part of Burundi.

In November 2023, the Nile Basin Initiative officially handed over six hydrological monitoring stations to the Rwanda Water Resources Board, which are poised to monitor and collect data related to water levels, flow rates, and other relevant parameters.

The six Hydrological Monitoring stations handed over to Rwanda Water Resources Board are Akanyaru (Gihinga), Muvumba (Kagitumba), Nyabarongo (Kanzenze), Cyohoha (Shell), Akagera outlet, and Rweru (Gakindo).

These stations provide essential data including: Water resources assessment and planning and allocation to competing interests, flood forecasting and early warning information to enhance community preparedness and disaster risk reduction, drought severity assessment and forecasting of Power production for hydropower stations, support river navigation and transport advisory to shipping agencies.

GROUNDWATER BOOSTS LIVELIHOODS AND GENDER EQUITY IN GICUMBI

By Clementine Nyirangaruye – Rwanda

THIS STORY FIRST AIRED ON RADIO SALUS IN RWANDA.

In the hills of Gicumbi District, Kaniga Sector in the northern part of Rwanda, a quiet change is taking place. It is a change driven by ground water.

For years, the communities here relied on rain-fed agriculture, depended on seasonal rains that could be unpredictable and often let them vulnerable.

But today, thanks to harnessing groundwater, lives are changing.

In the past, fetching water was a labour-intensive job, especially for women and girls. It meant long walks to distant water sources, often leading to missed opportunities for education and income-generating activities.

But with the introduction of groundwater wells and boreholes, the landscape of Gicumbi district has been transformed.

Uvutseneza Clementine, a mother of one, from Burambira Village of Mukarange sector is just one of many women whose lives have been changed by groundwater access.
The improved access to water has made farming more reliable, allowing families to grow more crops, raise livestock, and even start small businesses. But it's not just about food security – it's about empowerment.

"Before, I had to walk for hours to fetch water. I would leave early in the morning and come back late, sometimes with my children carrying heavy jugs. I couldn't farm properly or take care of my family. But now, with the new wells, the water is right here. I can grow more crops, and my children can go to school."(Voice over)

Mujawimana Nathalia, is a student at GS Gasaka, she is grateful of having clean drinking water and use that water in other wash activities in her school.

"Ground water is so important to us, because we drink it.Before, everyone has to scrap to bring their own bottles at school, but today we have clean water at school. We also use it cleaning our classrooms, dishes and other wash activities."(Voice over)

In the heart of the community, the impact of groundwater goes beyond the fields. It extends into the marketplace and within the homes. Women, who once spent hours collecting water, now have more time for income-generating activities

Josiane Uwayezu, from Manyagiro sector, Rwaruyumbu cell, is just one example of how access to groundwater has become a catalyst for gender equity in Gicumbi district.

"Before, I had no time to work. But now I run a small shop selling vegetables and local crafts. I am able to support my family and contribute to the community. Water has made all of this possible and promoted gender equity."(Voice over)

Emmanuel Nzabonimpa, mayor of Gicumbi District says that groundwater projects in Gicumbi District, supported by local and international organizations, have also brought increased collaboration and collective action. Communities are working together to maintain wells, ensure equitable water distribution, and educate the next generation on the importance of conservation.

The future is bright. Children no longer have to skip school to fetch water, and more families have access to the resources they need to thrive. The next generation of girls and boys in Gicumbi will grow up knowing that water is not just a necessity, it is a gateway to opportunity. Groundwater is more than just a resource. It is a lifeline. Its transforming livelihoods, promoting gender equity, and fostering a sense of unity and hope across Gicumbi District.

As communities continue to tap into this precious resource, they are not just securing their future-they are rewriting their story of resilience and progress thanks to The Nile Basin Secretariat with the financial support of the Global Environment Facility and in the collaboration with the United Nations Development Program in its process of implementation of a Nile Basin wide program which focusses on transboundary ground water aquifers.

Over 255,000 people in different sectors of Gicumbi District have gained to potable water from 2016-2024 where there is a completion of 75 water supply systems , extending over 511.14 km , serving 255,194 residents of Gicumbi District, as well as 95 schools and 32 healthcare facilities.

OVER 255,000 RESIDENTS OF GICUMBI DISTRICT

95 SCHOOLS

32 HEALTHCARE FACILITIES

75 WATER SUPPLY SYSTEMS COMPLETED

SCAN OR CODE TO LISTEN TO THE COMPLETE AUDIO REPORT BY CLEMENTINE NYIRANGARUYE

"This story documents how groundwater is transforming livelihoods, promoting gender equity, and fostering a sense of unity and hope across Gicumbi district"

HOW GROUNDWATER TRANSFERRED NYAGATARE COMMUNITY IN RWANDA

By Emmanuel Nkangura – Rwanda

For many years, the people of Nyagatare District in Rwanda, struggled to find clean water, even though there were surface water sources nearby.

They often had to walk long distances—sometimes up to five kilometers—to get clean water for their families and livestock.

This made life very difficult, affecting their health and their children's education.

In this documentary, you will hear stories from residents who share how the lack of clean water had impacted their lives.

Many got sick from drinking dirty water, and parents felt stressed about providing for their families. But now, things are changing for the better.

Thanks to local leaders and community efforts, people have easier access to clean groundwater, which means they no longer have to walk such long distances.

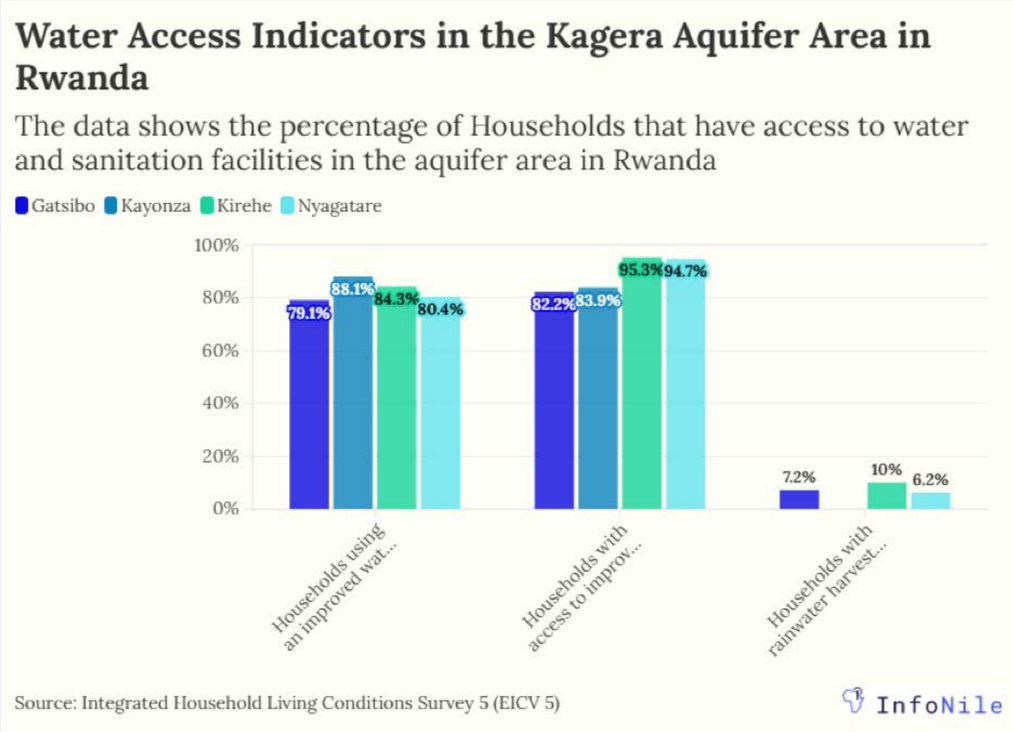
This change has brought hope and allowed families to focus more on farming and other important activities.

The groundwater that residents here access through boreholes and springs originates from the Kagera Aquifer, which is shared by Burundi, Rwanda, Tanzania, and Uganda. According to the Nile Basin Initiative, this aquifer provides a reliable supply of clean, fresh water that is essential for drinking, irrigation, and livestock.

Join us as we explore this inspiring story of how access to clean water has improved lives and created new opportunities in Nyagatare District.

Stay tuned to see how clean water can truly change lives in "Water for Life."

This feature was first aired by the Flash TV in Rwnada.



GROUNDWATER CHANGES LIVES IN NTUNGAMO

By Perez Rumanzi – Uganda

In the Ntungamo district of Uganda, something exciting is happening. Residents are coming together to drill for groundwater in a race to find safe and affordable water for their families and crops.

The need for safe water has united their efforts, with help from the government, non-government organizations (NGOs) and religious institutions joining the cause.

By November 2024, their hard work had led to the creation of over 2,000 boreholes across the district, providing a reliable source of drinking water and supporting local farming. According to the 2024 census, Ntungamo District has a population of 553,197.

According to data analysis conducted by the Ntungamo district water department, which was compiled from 1,031 villages in the district, communities that rely on groundwater sources have more sustainable, safe, and affordable water.

"There are areas where you cannot make any other water facility. You can't build a gravity flow; protected springs can't be there because there are no sources, and piped water can't be extended since, at times, they are hilly or far from the supply lines, and the only option is groundwater," notes Prosper Butubuura, the Ntungamo district water engineer.

He says several private individuals and organizations utilize groundwater resources by drilling boreholes and creating underground tanks for water collection.

While much of the groundwater in the district sourced by private parties is intended for production, non-governmental organizations primarily focus on providing communities with access to clean and safe drinking water. "The government is also involved in this effort, having dug boreholes, wells, and dip tanks to enhance community access to safe drinking water," notes Butubuura.

There are over 2,000 boreholes across Ntungamo district. Photo by Emma Muchunguzi.

Residents in places where the water table is not so low, especially those living near river banks or in lowlands, excavate deep tanks to access groundwater. Some use machines; however, some use hands to excavate the facilities.

Non-government organizations (NGOs), including churches, excavated boreholes in communities where piped water may not reach, sometimes using the boreholes to supply water through pipes further.

The National Water and Sewerage Cooperation, the most prominent water supply agency in the Ntungamo district, also supplies groundwater to part of the Ntungamo municipality. The Lake Victoria Water and Sanitation Department of the East Africa Community constructed this facility in 2013.

Butubuura cautions individuals and NGOs against creating water systems without proper regulations or licenses. He says unregulated setups can lead to confusion in the supply system, with some failing to work correctly. This, he notes, often leaves the government to step in and make repairs, usually without any planning. "Most people who dig these boreholes simply look at water availability, not the quality," notes Butubuura

Likewise, Dr. Maha Abdelraheem Ismail, the Groundwater Project Lead at Nile Basin Initiative, raises concerns about the implications of "drilling many wells without studies that could delineate the aquifer storage and the aquifer yield." If more wells are drilled in the same location, this practice could affect the borehole yield. There is a concern that the water level may drop, leading to increased pumping costs as deeper wells may need to be deepened and additional pipes installed to abstract water.

Groundwater in Ntungamo district falls under the Kagera aquifer shared by Uganda, Tanzania, Rwanda, and Burundi. According to the Nile Basin Initiative, Kagera aquifer covers an area of about 6,300 Km2.

Muslim leaders commission a groundwater project constructed to solve water challenges at Muntuyera High School Kitunga Ntungamo district Photo by Perez Rumanzi

The water abstraction in this aquifer is estimated at 3.25 million m3/year, and groundwater is used primarily for water supply of rural communities.

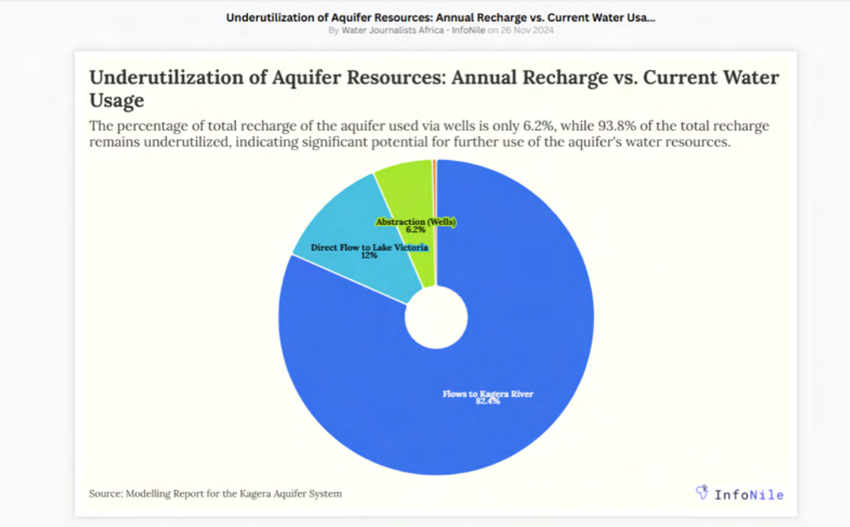
Nile Basin Initiative (NBI) is a cooperative arrangement initiated and led by the Nile riparian countries to promote joint development, protection and management of the common Nile Basin water resources.

Empowering Women with Accessible Water

According to Butubuura, one effective advantage of building groundwater sources such as boreholes near homesteads is alleviating the burden on women and girls, who often have to travel long distances to fetch water. "Having water sources closer to home saves time and enhances the safety and well-being of these women," he notes.

This, he says, is now allowing women. Girls and children focus more on education, employment, and other productive activities than spending hours fetching water.

He calls for engaging women in the planning and managing groundwater resources, saying, "They are the ones most affected by water accessibility issues." "Their insights and experiences can lead to more effective solutions that directly address their needs and challenges," notes Butubuura



Water for Production

According to the Nile Basin Initiative, farming activities are the most dominant livelihood activity in the Kagera aquifer area. The main livelihoods structure in the aquifer are dominated by subsistence farming, crop and livestock production. The main food crops include finger millet, maize, beans, bananas, cassava, potatoes, in addition to fruits and vegetables with Coffee being a major cash crop.

Robert Keizire, the Ntungamo district tourism officer, established a small farm at his home in Kiyanja Ngoma sub-county, Ntungamo district.

The area is greatly affected by dry spells. His farm mainly produces vegetables and other seasonal crops. For improved yields, Keizire needed a supplementary water source to irrigate his crops during dry spells. In 2021, all the water sources in the area dried up.

"When I invited my friend who works with water, he told me I could have a permanent water source that would provide reliable, safe and cheap production water. He brought me boys who dug 86 feet down, and I established my water source. I have since abandoned paying for water. I irrigate my crops at will, and my animals have better water for drinking," notes Keizire.

Likewise, Saturday Ernest of Nyakagando Ruhaama sub-county, Ntungamo district, drilled for groundwater to feed his animals and irrigate his coffee.

"Before, I was using National Water (piped water) to irrigate my newly established coffee farm; you can't imagine the bill that came. Apart from farming, I also engaged in mining, and when we are mining in the hills, we sometimes find water. When I asked, they told me I could drill for water near my home.

Using almost the same cost as the previous water bill, we excavated, and I don't think I will ever pay for water again. I now pump to several tanks, treat the water that needs treating, and use it for household and production. Very safe water," says a visibly happy Saturday.

In the western part of Ntungamo district, Simon Machati has dug a well for groundwater at his car wash facility in Rwashamaire town. Before using groundwater, he spent between Ushs 400,000 and Ushs 600,000 each month. But by investing Ushs 1.8 million in the groundwater excavation, he lowered his monthly costs to Ushs 180,000, which is the cost of running the pump. He pumps the water to various water tanks and later uses it to wash his clients' vehicles.

Dinah Tumwebaze, the Ntungamo district natural resources officer, stresses that the use of groundwater could reduce pressure on surface water sources, which would lead to environmental conservation. "Imagine if we used water from underground without exposing the ground like digging valley dams. Here, we use the water, and the surface remains the same," she notes.

Simon Machati's dug underground water project at Rwashamaire that generates water he uses to wash vehicles at his Rwashamire vehicle washing Facility.

COMMUNITY HEROES WORKING FOR LASTING WATER SOLUTIONS

By Emma Muchunguzi – Uganda

Benon Byabasaija and Alfonse Mugambwa have become local heroes in the Birere subcounty of Isingiro District. Nearly everyone in the area knows them for their dedication to the community.

Byabasaija is the trusted expert for families and businesses needing hand-dug wells. With his skilled hands and dedication, he ensures communities have reliable access to underground water. Similarly, Mugambwa, who proudly identifies as "the supreme caretaker of all the spring water points" in the Kasana Parish of Birere sub-county, plays a crucial role in maintaining these water sources. Through his self-appointed responsibility, he ensures that everyone in his parish has access to clean and accessible water.

Together, Byabasaija and Mugambwa provide more than just water; they help their community live healthier lives, and everyone in the subcounty greatly appreciates their efforts. These two men's initiatives have transformed lives in Isingiro, a district often affected by water scarcity.

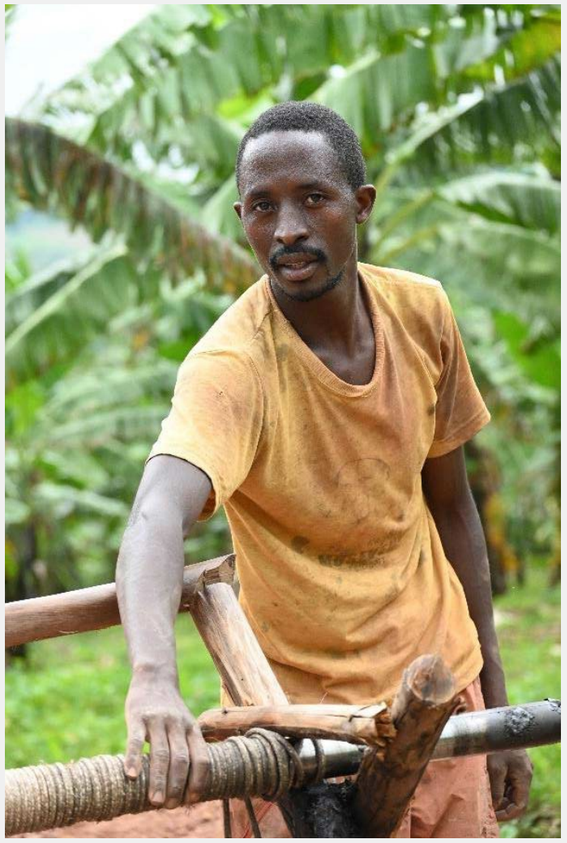
In this photo series, photojournalist Emma Muchunguzi visited the Birere sub-county in Isingiro, southwestern Uganda. He photographed Benon Byabasaija and Alfonse Mugambwa as they worked to improve their community's access to groundwater.

For 13 years, Byabasaija has worked as a "well-digger," as he identifies himself.

He says he has been "providing reliable and affordable water sources to the community through hand-dug wells" for all these years. He estimates the wells he has dug for the last 13 years to be over 50.

Byabasaija explains that "a hand-dug well requires a one-time investment, providing access to a lifetime source of water for domestic and commercial purposes at a lower cost than tap water."

He explains that most of the underground water wells he constructs are located near homes, which saves women from traveling long distances to fetch water from surface water sources such as shallow wells, rivers, and lakes.



Byabashaija

Byabasaija climbing down to the bottom of the well, he is ready to find water

They finally found water! Byabashaija and friends pour it into a jerrycan and bring it up to celebrate.

The men do not only lower Byabashaija down into the well but also a jerrycan and other plastic tins that he uses to bring up the dug soil, mad and finally water when he reaches.

Once water is found, Byabashaija constructs the well to make sure it stores water found for years.

Just like Byabasaija, Mugambwa, acknowledges the many benefits of groundwater as a solution to water scarcity, particularly in rural areas where access to tap water is hard.

"Spring water is natural and contains pure minerals that are good for human health and animals. It provides an inexpensive alternative source of water in rural settings compared to tap water," notes Mugambwa.

Mugambwa narrates that filling a 20-liter jerrican with spring water once took only one minute, allowing people to fetch water around the clock without the hassle of long lines or bills. Sadly, he laments that these spring water points are at risk of drying up due to unhealthy environmental practices.

He points out that some families are planting eucalyptus trees and encroaching on wetlands, which damages groundwater recharge points. Mugambwa is concerned that, over time, people in this community might revert to suffering from water scarcity due to environmental degradation caused by human activities that destroy catchment areas for groundwater.

Groundwater catchments or recharge areas are points where water infiltrates the ground and replenishes aquifers.

A perfect example is a wetland. Wetlands naturally filter and store water, acting as significant catchment zones for groundwater. Others are water bodies such as lakes, rivers, and ponds, which allow water to seep into the surrounding soil, helping to recharge groundwater.

Groundwater catchments or recharge areas are points where water infiltrates the ground and replenishes aquifers.

A perfect example is a wetland. Wetlands naturally filter and store water, acting as significant catchment zones for groundwater. Others are

For over half a century, Alfonse Mugambwa, has been taking care of all the spring water points in the Kasana Parish of Birere sub-county. In Isingiro district.

water bodies such as lakes, rivers, and ponds, which allow water to seep into the surrounding soil, helping to recharge groundwater.

Wetlands filter and store water, acting as significant catchment zones for groundwater.

Isingiro district is located within the Kagera aquifer area of Kagera river basin, replenished mainly by rainfall, the Kagera River, and surrounding wetlands. According to the Nile Basin Initiative (NBI), the aquifer feeds into the Kagera River and wetlands.

The annual recharge of the aquifer is estimated to be between 40 and 50 MCM. NBI's modeling shows that the aquifer can sustainably provide up to 140,000 m^3 per day, roughly 70% of the daily water needs for the population in the aquifer area by 2050.

"As the caretaker of the spring water points in Kasana Parish, I take my role seriously," Mugambwa.

He narrates that his daily tasks involve checking each water source to ensure they remain clean and free from contamination. He also makes repairs when needed and keeps the areas surrounding the springs safe from pollution.

Mugambwa also spends time educating his neighbors about the importance of protecting water sources and practicing good hygiene.

In Birere sub county, just like other places in Uganda, spring wells are a source of water that supports both human and ecological health.

They provide clean, accessible water for drinking, irrigation, and sanitation, enabling the maintaining of community well-being and agricultural productivity.

The steady flow of spring water can also help sustain local ecosystems, supporting diverse plant and animal life.

Additionally, spring wells often hold cultural significance, serving as communal gathering places and symbols of shared resources in Birere.

For half a century, Mugambwa has been caring for all the spring water points including those above in the Kasana Parish of Birere sub-county.

HOW COMMUNITIES THRIVE WITH GROUNDWATER SOLUTIONS IN KABALE

By Job Namanya – Uganda

John Musiimenta a resident of Kekubo drawing water from a water spring in the area.

Kabale Municipality, located in the beautiful Kigezi region of western Uganda, is known for its stunning landscapes and rich agriculture.

However, the area faces challenges due to climate change. Unpredictable rainfall, long dry periods, and water shortages are threatening the livelihoods of the people living there.

In this situation, groundwater has become essential for the residents of Kabale. The water comes from the Kagera Aquifer, which is shared by several countries including Uganda, Tanzania, Rwanda, and Burundi.

The Kagera aquifer covers a large area of around 6,300 square kilometers.
In a region where agriculture dominates, reliable access to water is critical. Farmers like John Byamukama, who grows Irish potatoes and cabbages on the slopes of Kyanamira village, Kabale Municipality – Kabale district, have turned to groundwater to irrigate their fields.

"I used to rely entirely on rain, but the seasons have become unpredictable. Now, with a borehole nearby, I can water my crops even during dry spells," says Byamukama. His success mirrors that of many others who have adopted groundwater-fed irrigation systems, enabling consistent yields despite climate variability.

The municipality's reliance on groundwater has expanded beyond agriculture. In peri-urban areas like Kekubo and Kigongi (all in Kabale municipality), boreholes and protected springs supply clean water to households that previously depended on seasonal rivers and streams. This has reduced the community's vulnerability to prolonged droughts and fostered resilience among residents.

Hadard Rukundo, a farmer based in Kekubo village has both livestock and a tree nursery bed on his farmland. He has for the past 5 years embraced a protected spring.

Rukundo says that prior to adopting the groundwater, he would spend over 400,000 Uganda shillings (about USD 110) on water every month which reduced his profits.

"My initial income was mainly from the tree seedlings and watering them in the nursery beds was always a struggle. I realized I needed to address this. During the dry season, it was always challenging to have my trees watered. But now, I have access to water for irrigation all year through," remarks Rukundo.

He explains that the tree species on his farmland are meant to help the community in fighting the negative effects of climate change and the fact that he can avail them all year through has helped in ensuring climate-smart agriculture in the area.

Andrew Mwebesa, an agricultural extension worker in the area notes that groundwater benefits the majority of farmers in Kabale municipality since most of them cannot afford water provided by the government owned water supplying company – the national water and sewage corporation.

"A vast number of our farmers practice subsistence agriculture and their income is limited so they cannot afford to use national water on their farms. With groundwater they can have water for both domestic and farm use," Mwebesa says.

Improved Living Conditions and Health Outcomes Due to Groundwater

Alfred Ahimbisibwe, the Kabale Municipality Senior Environment Officer reveals that the area has 54 protected springs, six boreholes and four gravity flow schemes.

"Groundwater is more stable and less affected by surface temperature changes. It has become our primary buffer against climate-induced water shortages," Ahimbisibwe elaborates.
At community level, access to clean groundwater has significantly improved public health. Before the introduction of boreholes, residents of downhill areas of Kabale municipality were prone to waterborne diseases such as cholera and dysentery, especially during the rainy season when the area floods.
Emmanuel Ndyanabo, a health worker at Kamukiira Health Centre Four notes a drastic reduction in these cases.

This water spring in Kigongi is one of the 54 in Kabale Municipality.

"The availability of clean groundwater has reduced contamination and improved hygiene, especially for children. Improved health outcomes mean families spend less on medical bills, enhancing their economic stability," he explains.

Groundwater has become a game-changer in schools across Kabale. At Kigezi High School, a groundwater-fed tank ensures students access to clean drinking water and functional latrines. This has improved hygiene standards and reduced absenteeism, particularly among girls, who no longer miss school due to inadequate sanitation facilities.

"For us, water is life. The groundwater source has transformed our school environment and allowed us to focus on learning," says Abraham Akampurira, the school head teacher.
Ivan Ahimbisibwe – an old boy of Kigezi high school recalls the good school days devoid of water related stress. "Water was never a problem at all. No student ever went out of school to fetch water – because the groundwater that supplied the school was always sufficient," he notes, adding that for every learner, "this is the desired school environment."

Grahams Tumwekwase – a tour and travel consultant in Kabale town observes that many tourism facilities including hotels have found utilization of groundwater the best available option and nolonger experience water shortage.

Groundwater not only provides immediate relief but also supports long-term climate adaptation. Local environmentalist Nicholas Mugisha highlights that groundwater systems are less vulnerable to climate disruptions than surface water sources.

"Groundwater allows Kabale to adapt to changing climate patterns. Investing in its sustainable use ensures we have a dependable resource even as temperatures rise and rains become less predictable," Mugisha emphasizes.

KABEREBERE A COMMUNITY THRIVING ON GROUNDWATER

By Eli Akiza, Annita Matsika and Alex Akankwasa – Uganda

THIS RADIO STORY FIRST AIRED ON RADIO WEST IN MBARARA CITY

Welcome to our special feature about Kaberebere, a lively town just 13 kilometers from Mbarara City.

This community is full of life, and it has an important story to share—one about groundwater, a resource found beneath its residents' feet.

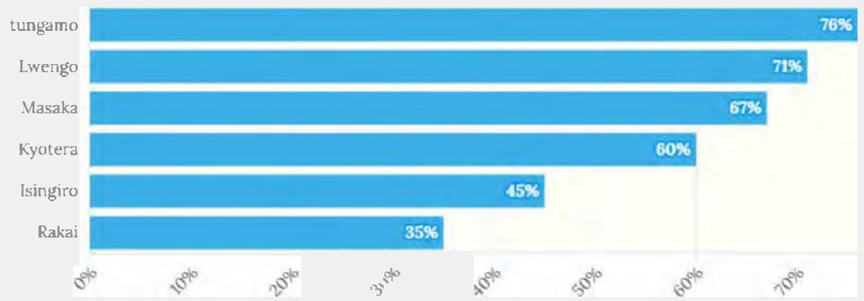
Once, people here had to walk long distances to find water, but thanks to underground water sources, they have better access now.

Today, we will discuss water sourced directly from the Kagera aquifer, hear from local residents about their experiences, and see how groundwater not only helps with daily needs but also supports the town's growth.

So, stick around as we share an uplifting story of how water is helping Kaberebere build a better future!

Safe water access rates for the districts crossed by the Kagera Aquifer in Uganda

Shallow and deep boreholes with public access/taps are the prevalent technologies used by rural communities in the Kagera aquifer area



Source: (Directorate of Water Development, Ministry of Water & Environment, Republic of Uganda, 2021

InfoNile

SCAN THE QR CODE

To listen to the complete report by Eli Akiza, Annita Matsika and Alex Akankwasa

ONE RIVER ONE PEOPLE ONE VISION

NILE BASIN INITIATIVE
INITIATIVE DU BASSIN DU NIL

25 YEARS ANNIVERSARY

NBI Member States

Nile Basin Initiative Secretariat

P.O. Box 192
Entebbe – Uganda
Tel: +256 417 705 000
+256 417 705 117
+256 414 321 424
+256 414 321 329
Email: nbisec@nilebasin.org
Website www.nilesec.nilebasin.org

Eastern Nile Technical Regional Office

Dessie Road
P.O. Box 27173-1000
Addis Ababa – Ethiopia
Tel: +251 116 461 130/32
Fax: +251 116 459 407
Email: entro@nilebasin.org
Website: www.entro.nilebasin.org

Nile Equatorial Lakes Subsidiary Action Program

Program Coordination Unit
Kigali City Tower
KCT, KN 2 St, Kigali
P.O. Box 6759, Kigali Rwanda
Tel: +250 788 307 334
Fax: +250 252 580 100
Email: nelcu@nilebasin.org
Website: www.nelsap.nilebasin.org

/Nile Basin Initiative @nbiweb

#NileCooperation; #NileBasin; #OneNile

ISBN 978-9970-444-05-2
9 789970 444052